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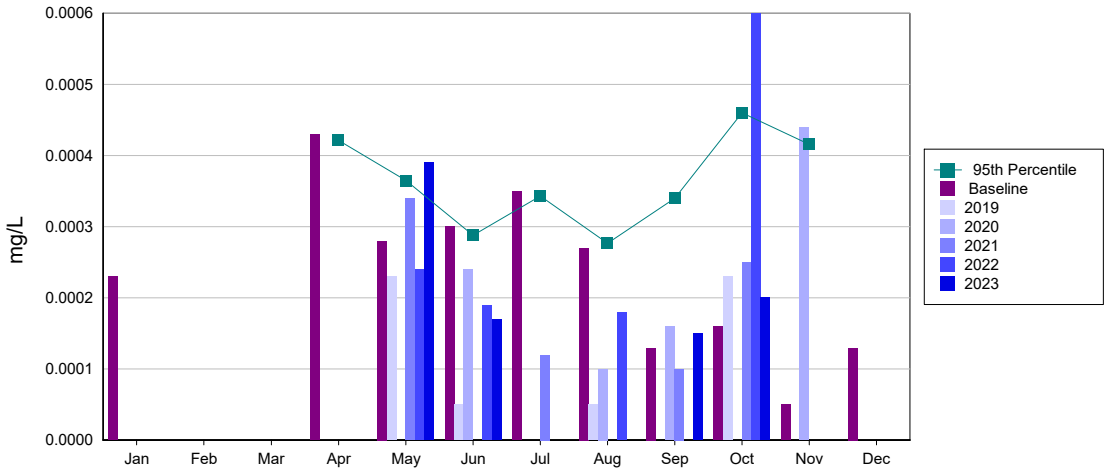

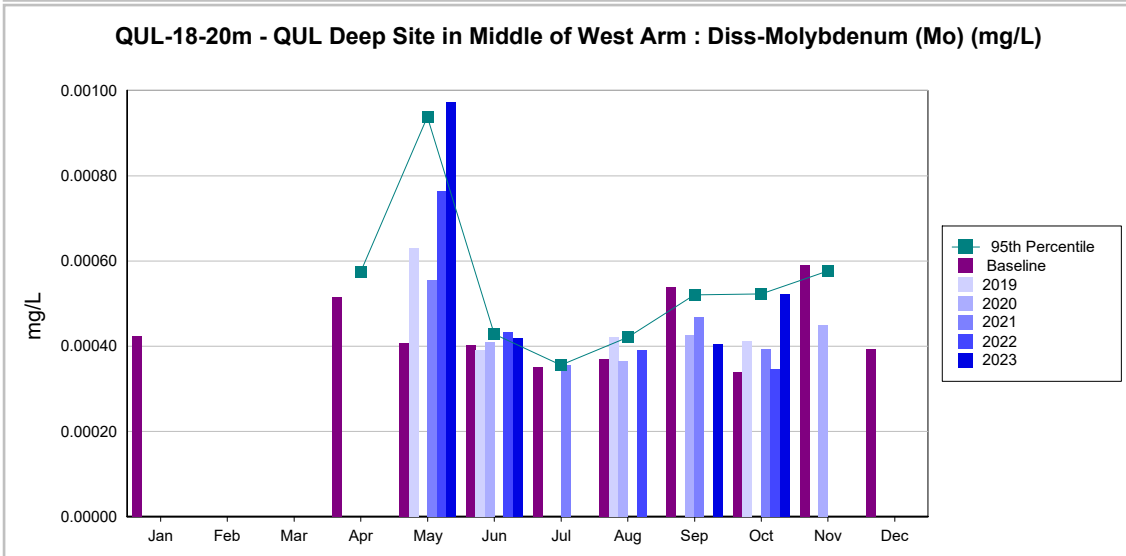

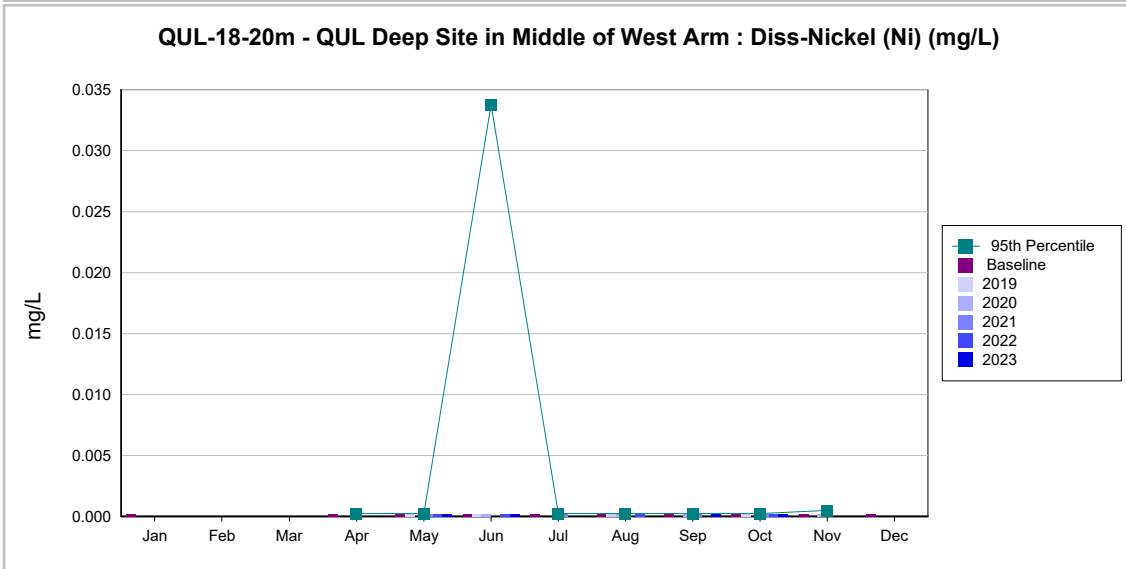

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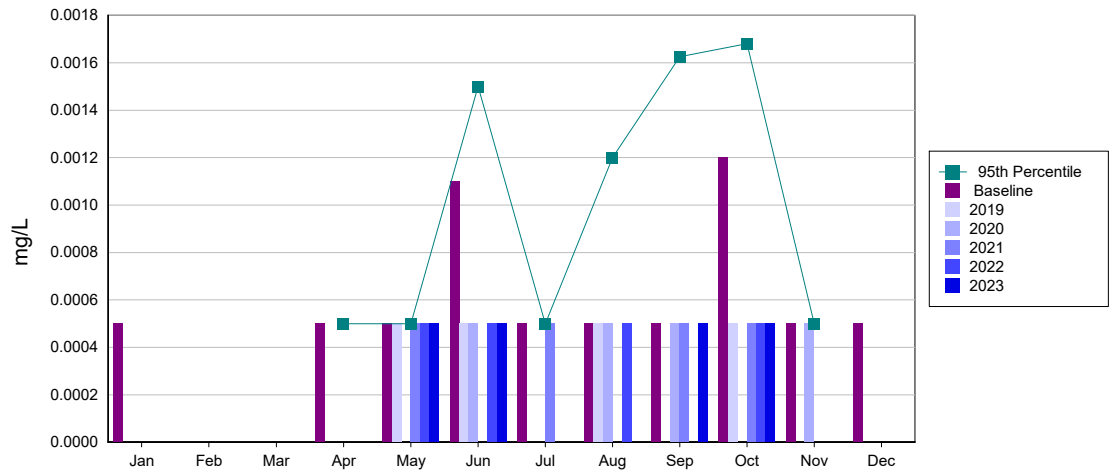
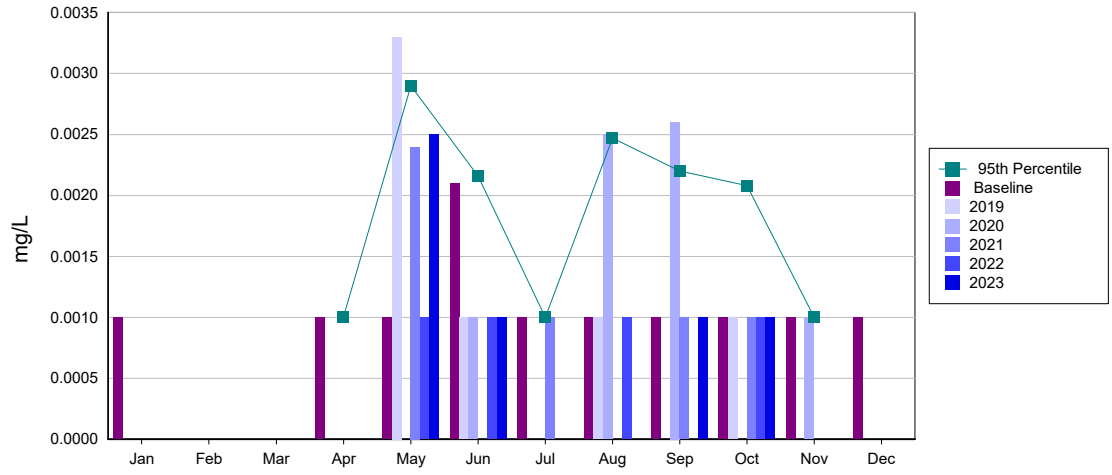
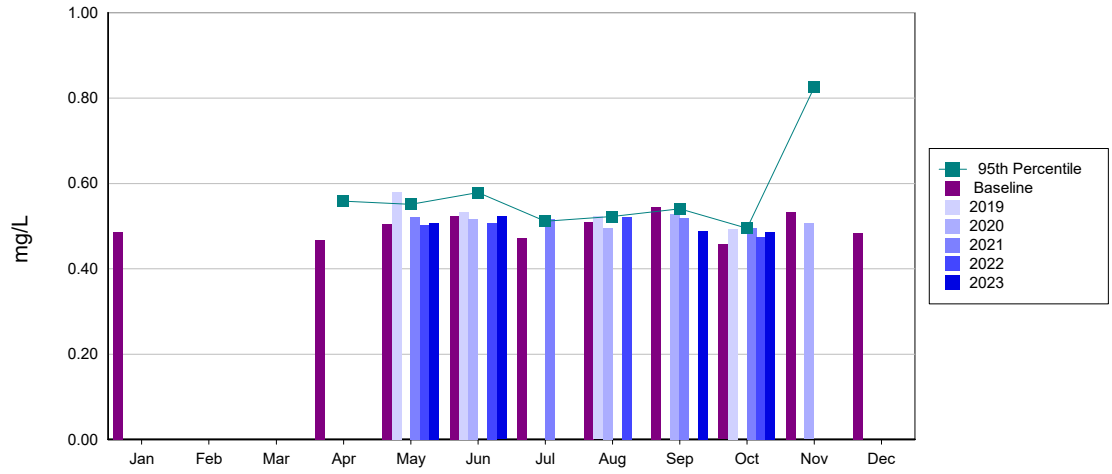
QUL-18-20m - QUL Deep Site in Middle of West Arm : Diss-Orthophosphate (mg/L)



QUL-18-20m - QUL Deep Site in Middle of West Arm : Diss-Phosphorus (mg/L)



QUL-18-20m - QUL Deep Site in Middle of West Arm : Diss-Potassium (K) (mg/L)



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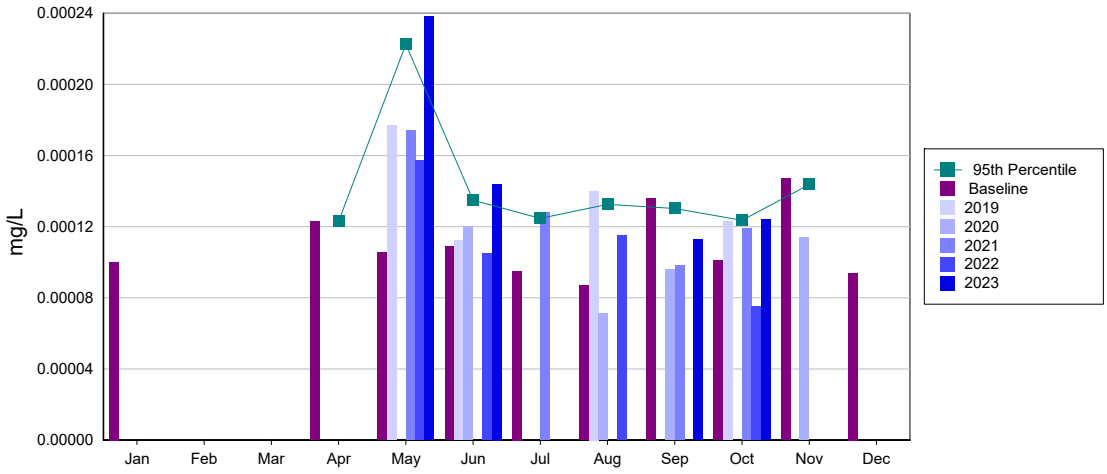

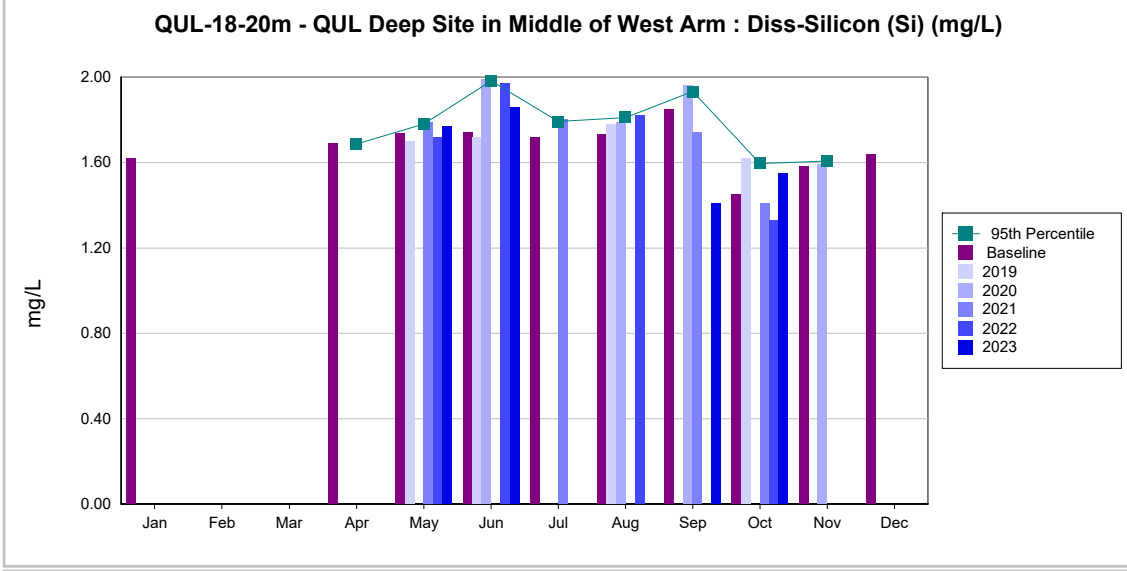

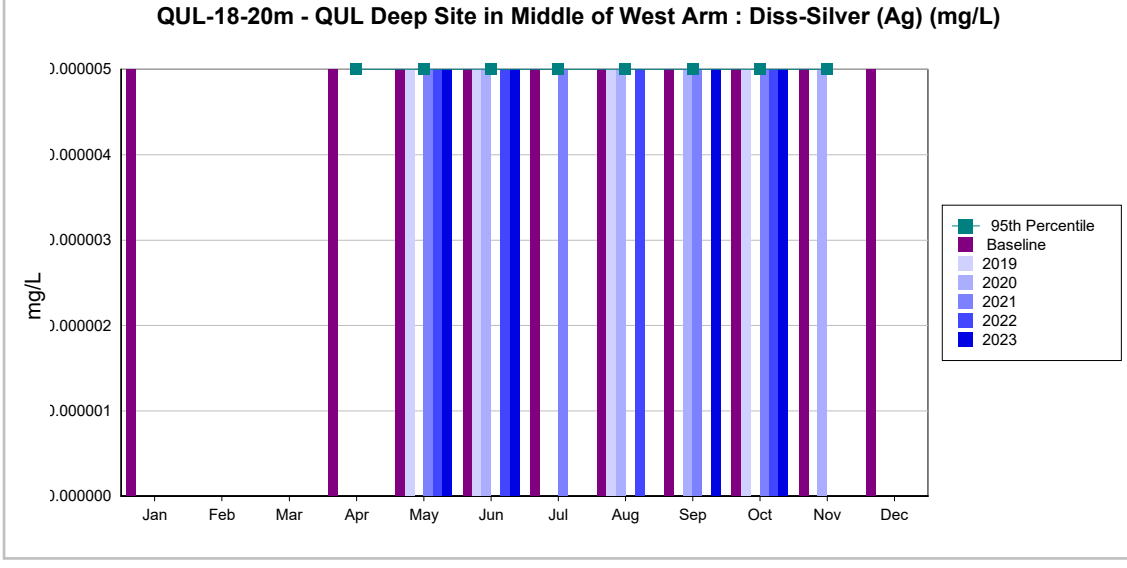

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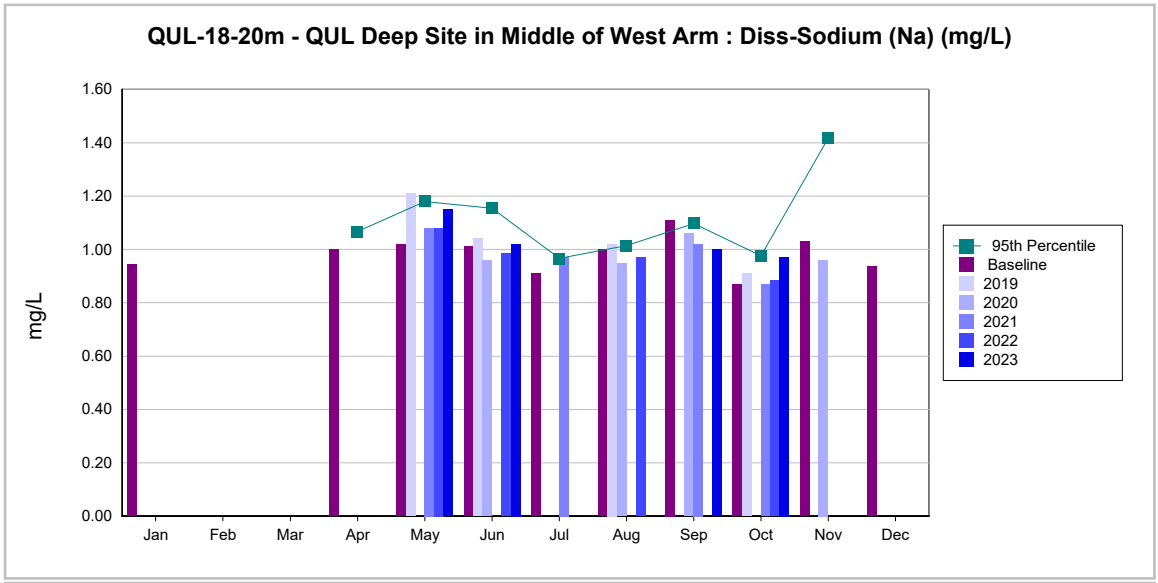

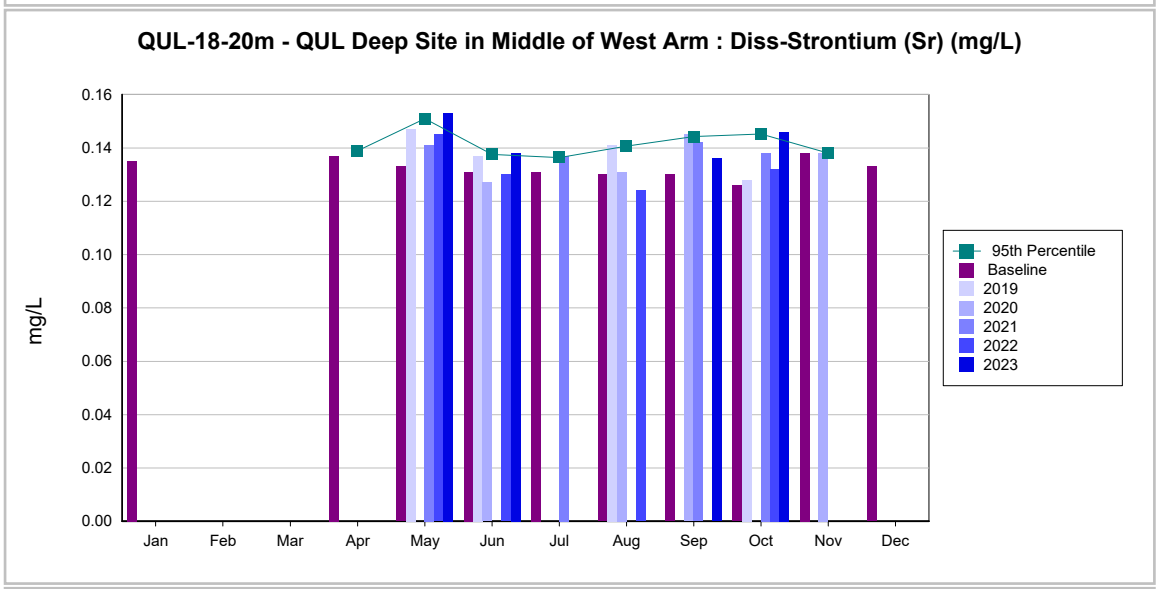

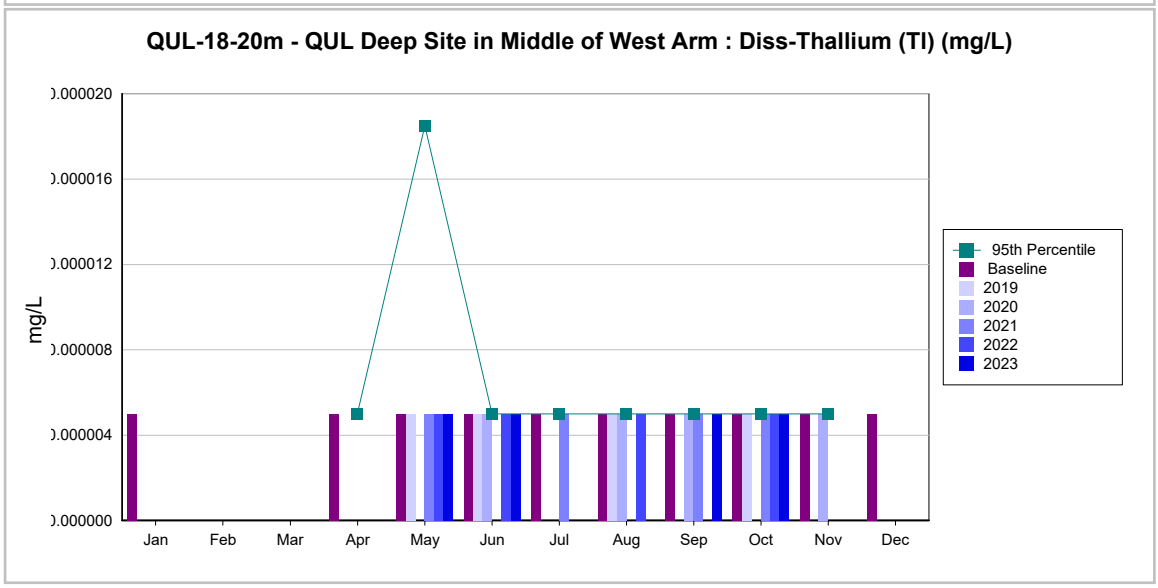

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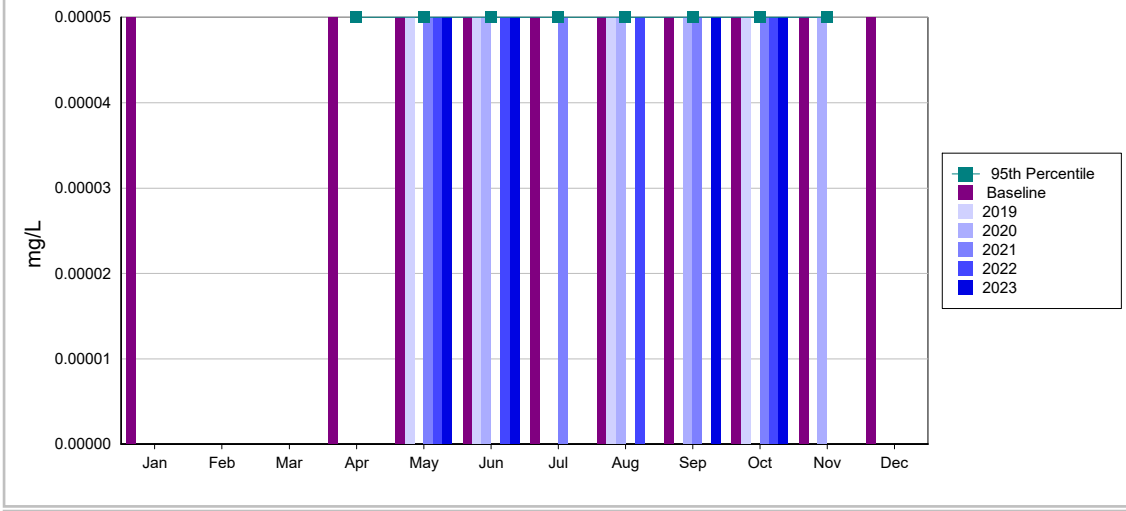

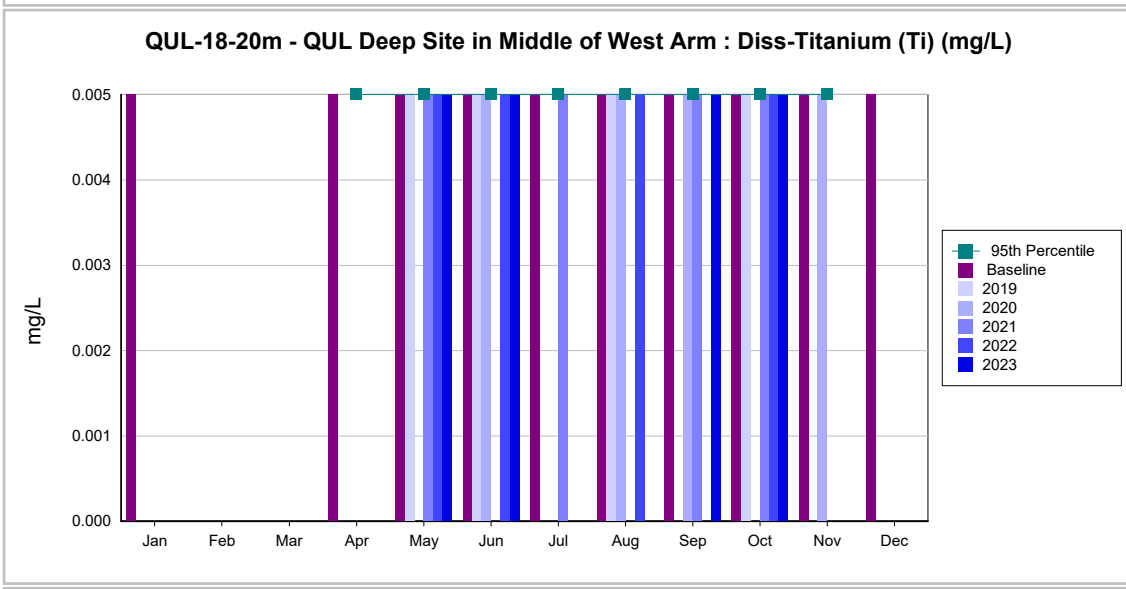

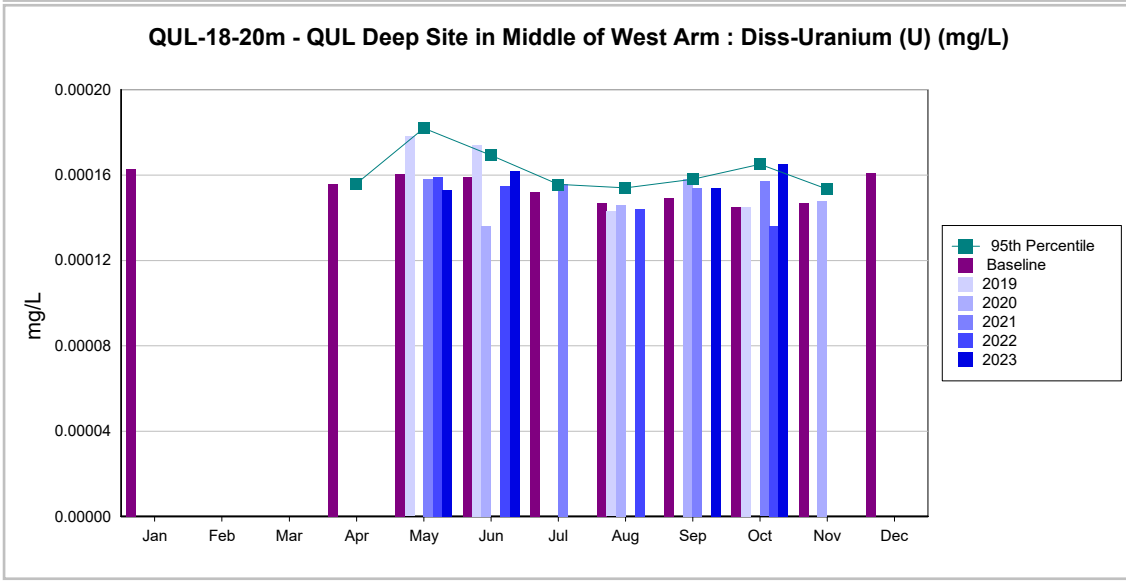

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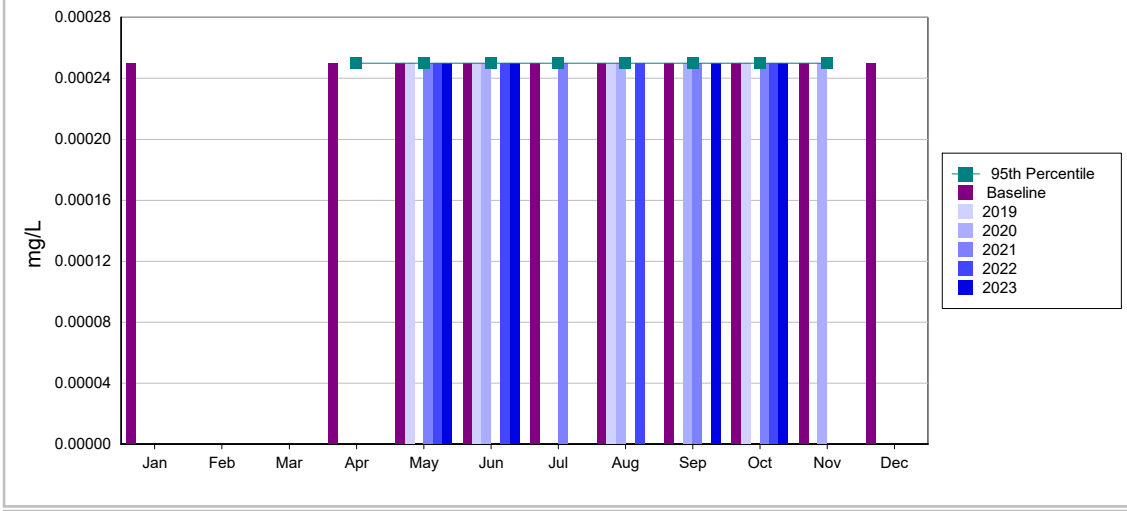

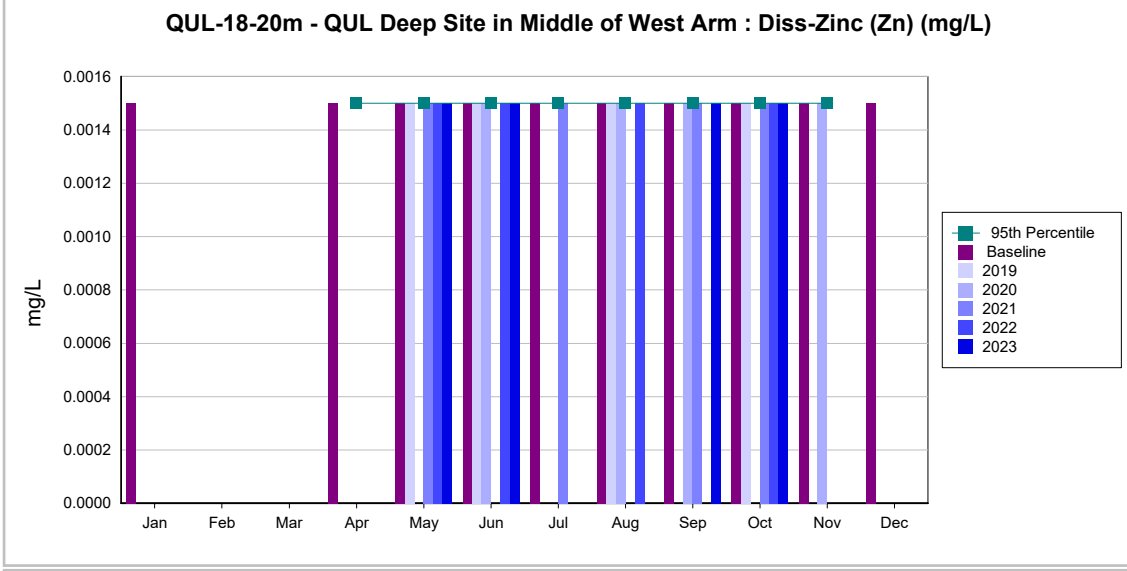

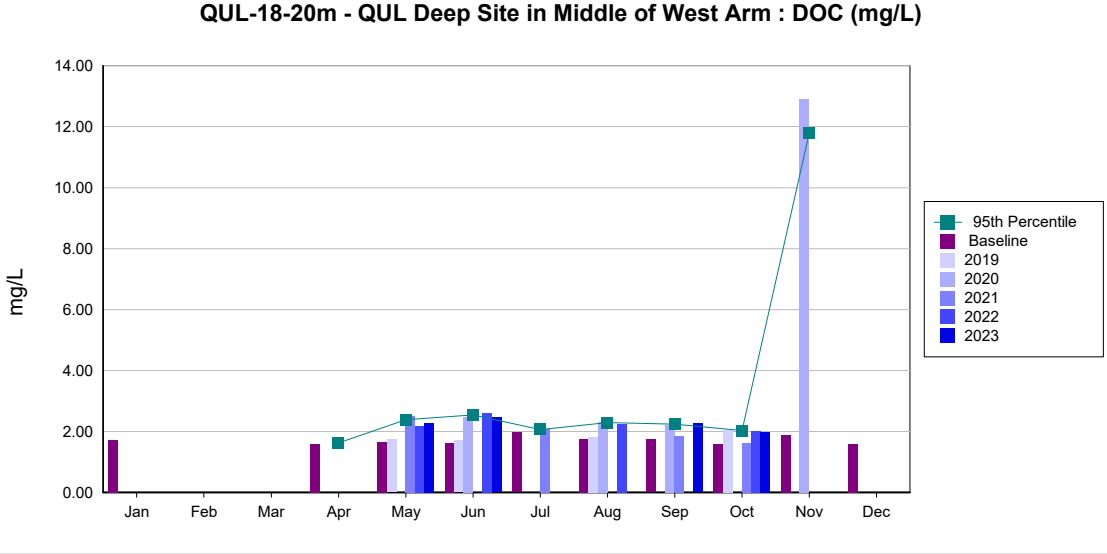

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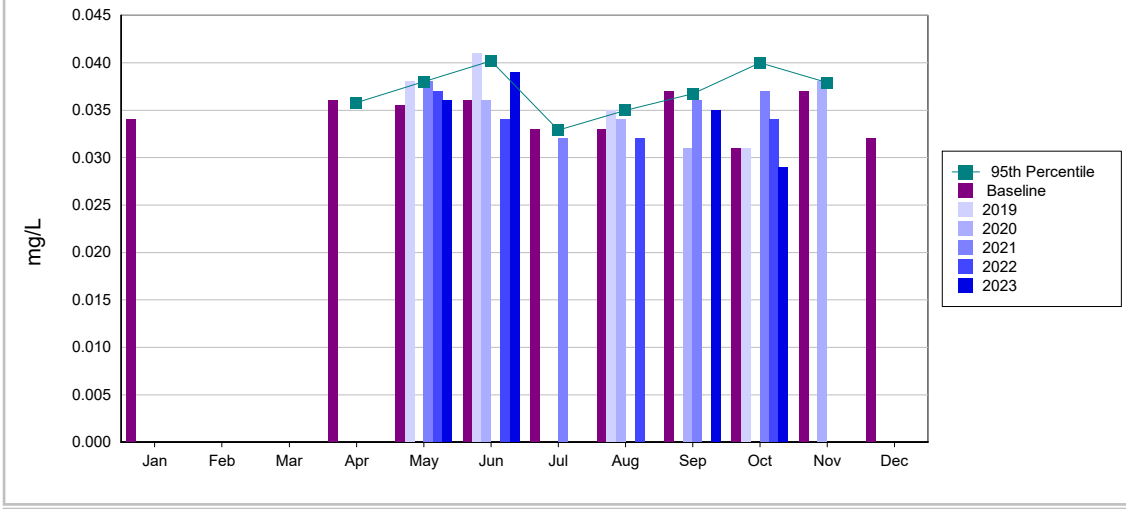

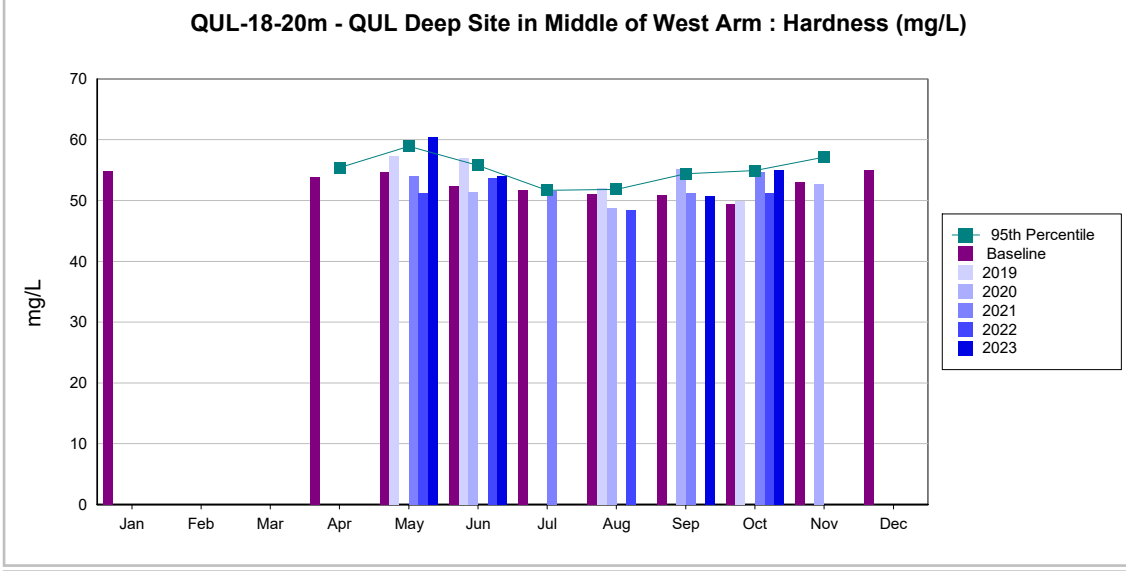

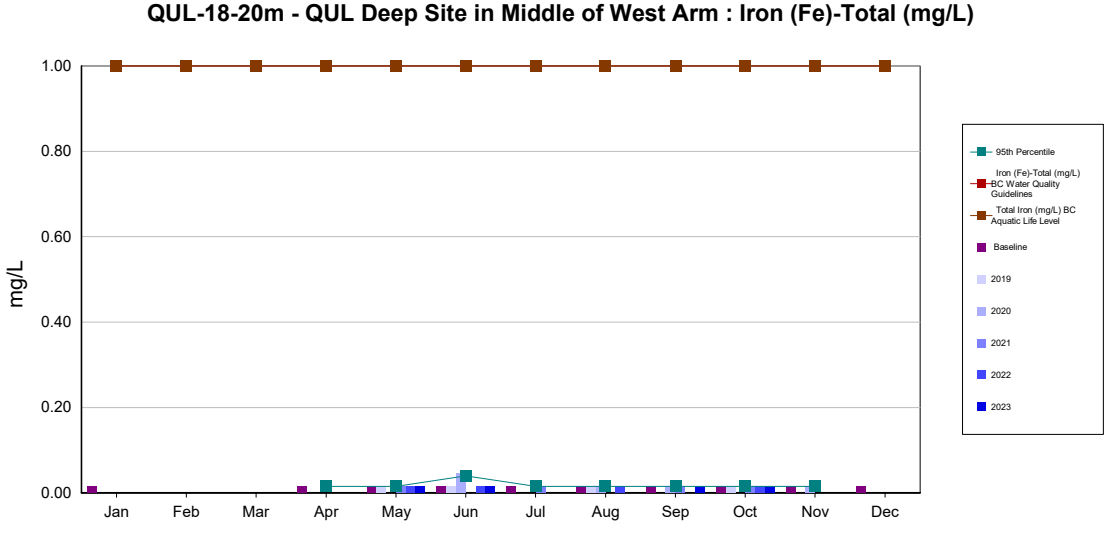

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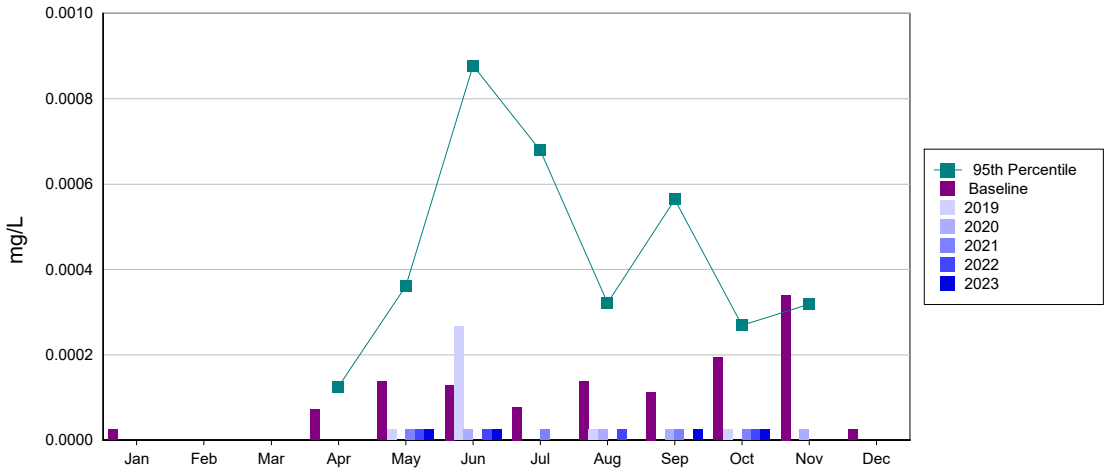

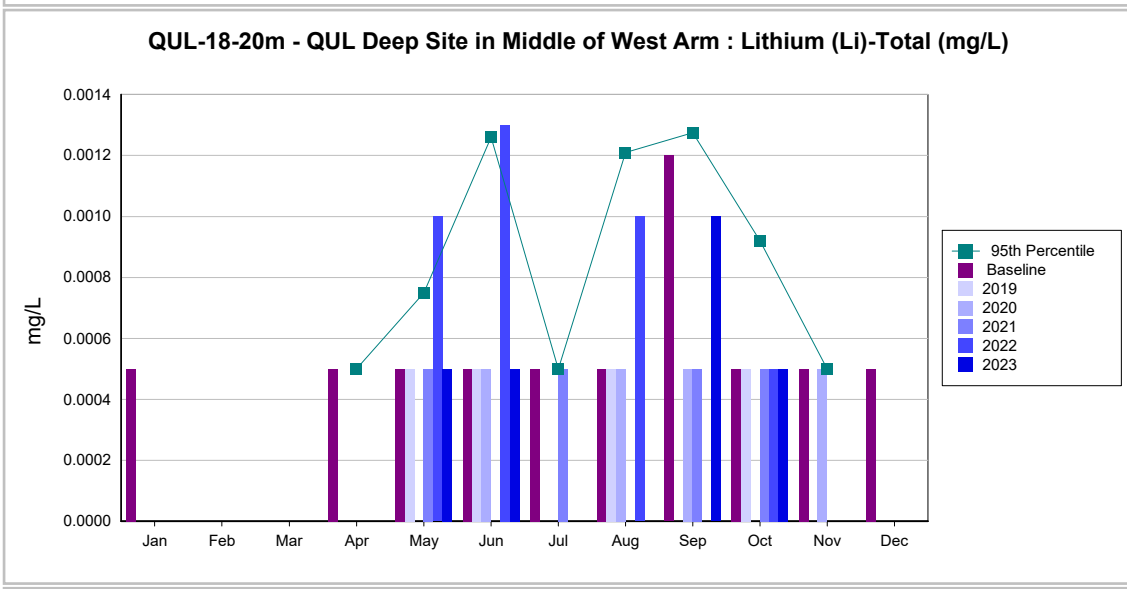

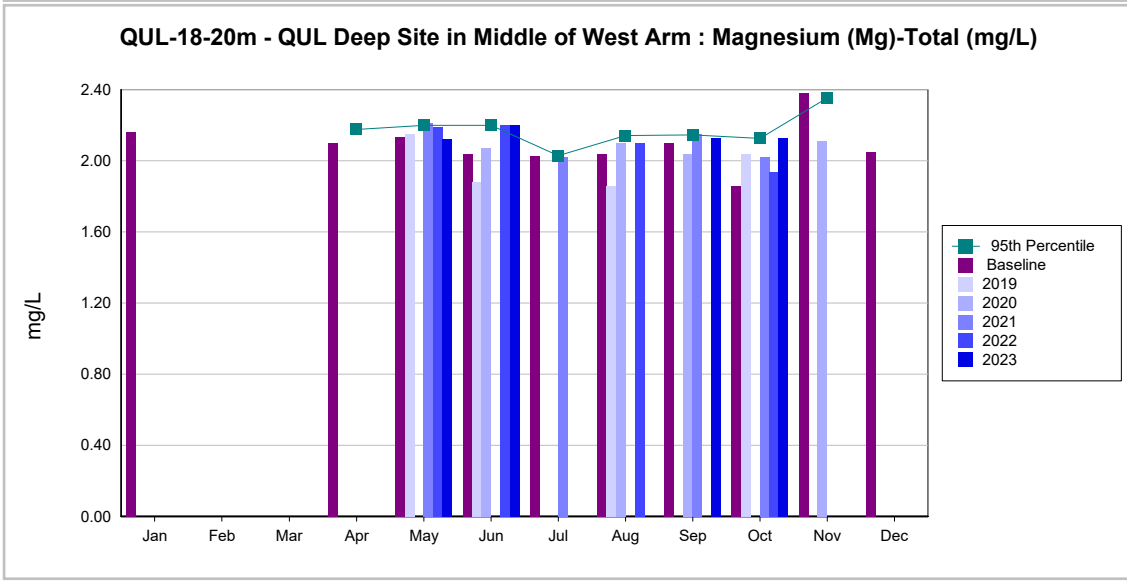

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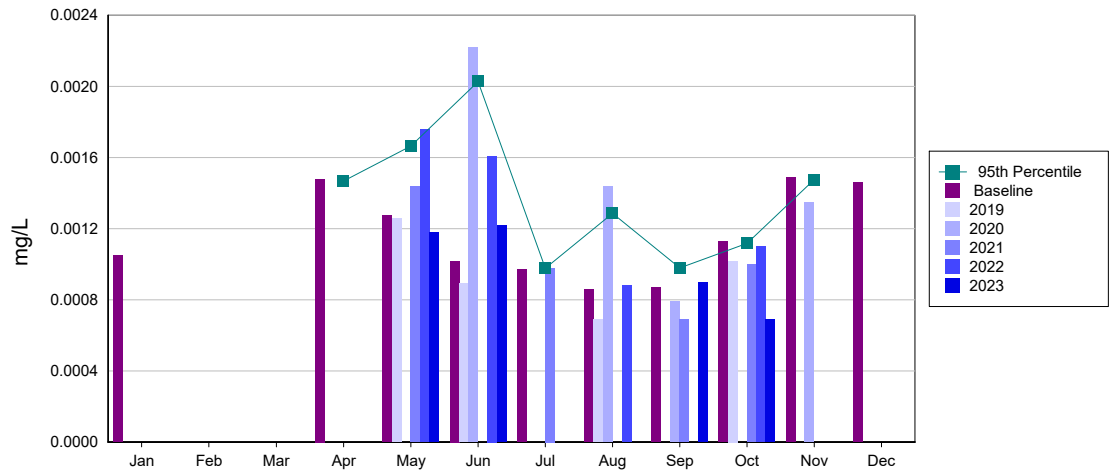
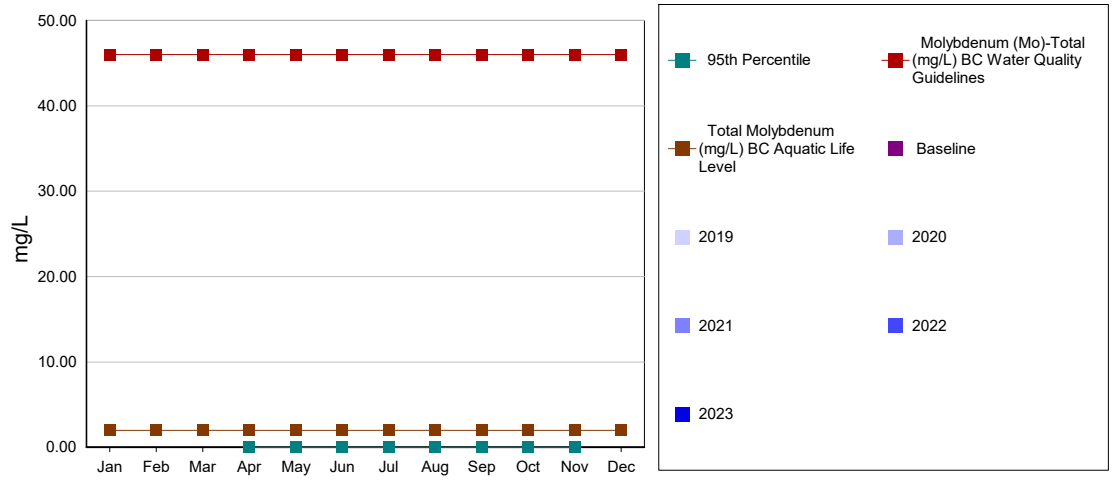
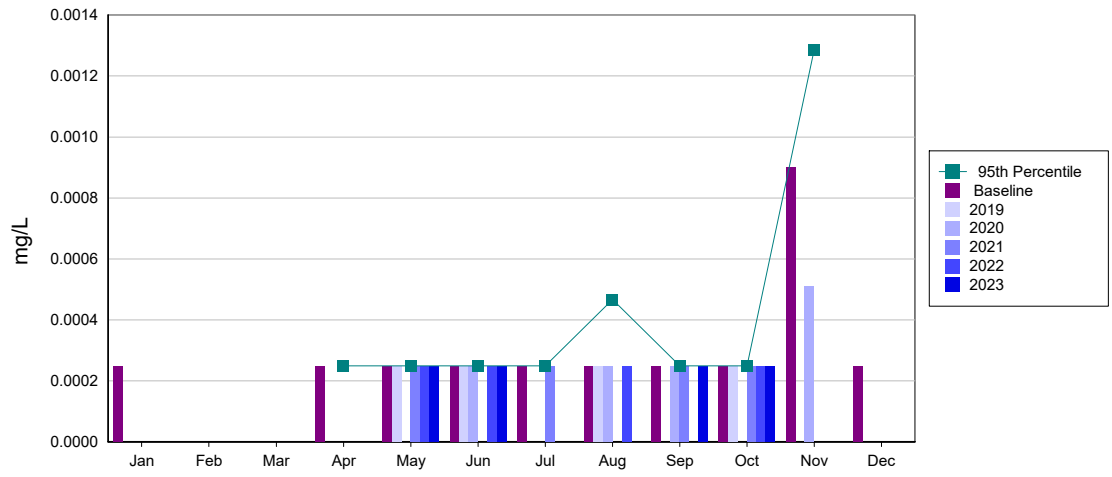
QUL-18-20m - QUL Deep Site in Middle of West Arm : Manganese (Mn)-Total (mg/L)



QUL-18-20m - QUL Deep Site in Middle of West Arm : Molybdenum (Mo)-Tota (mg/L)



QUL-18-20m - QUL Deep Site in Middle of West Arm : Nickel (Ni)-Total (mg/L)



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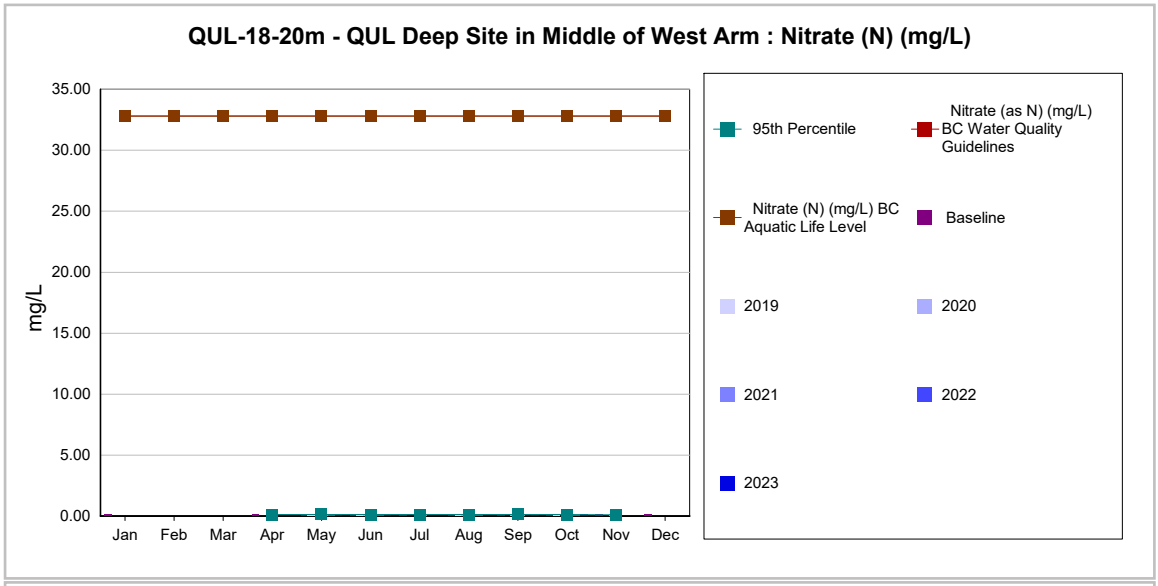

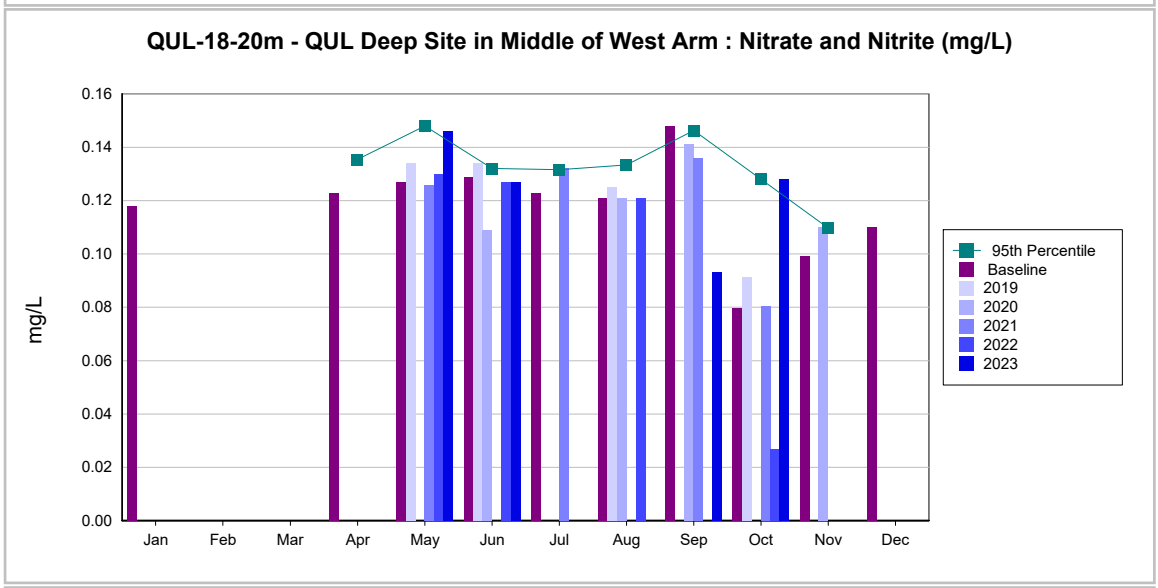

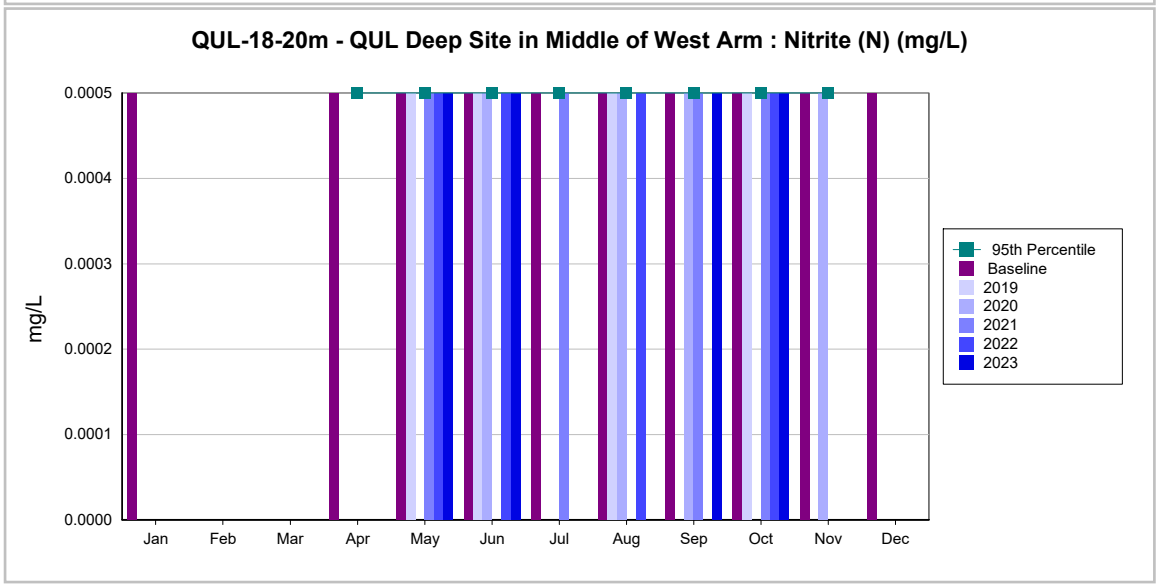

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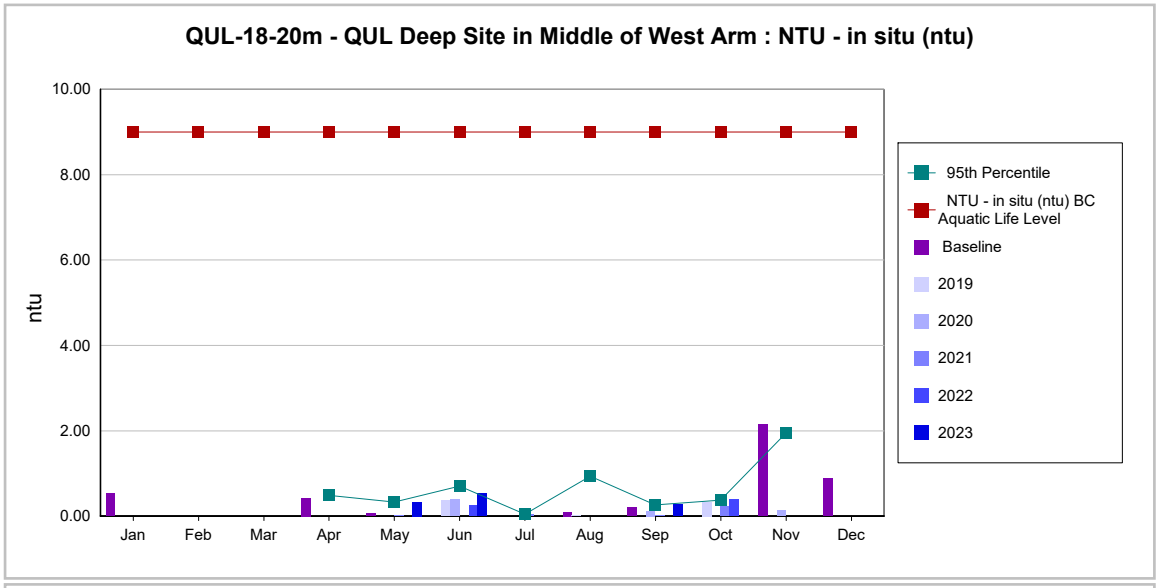

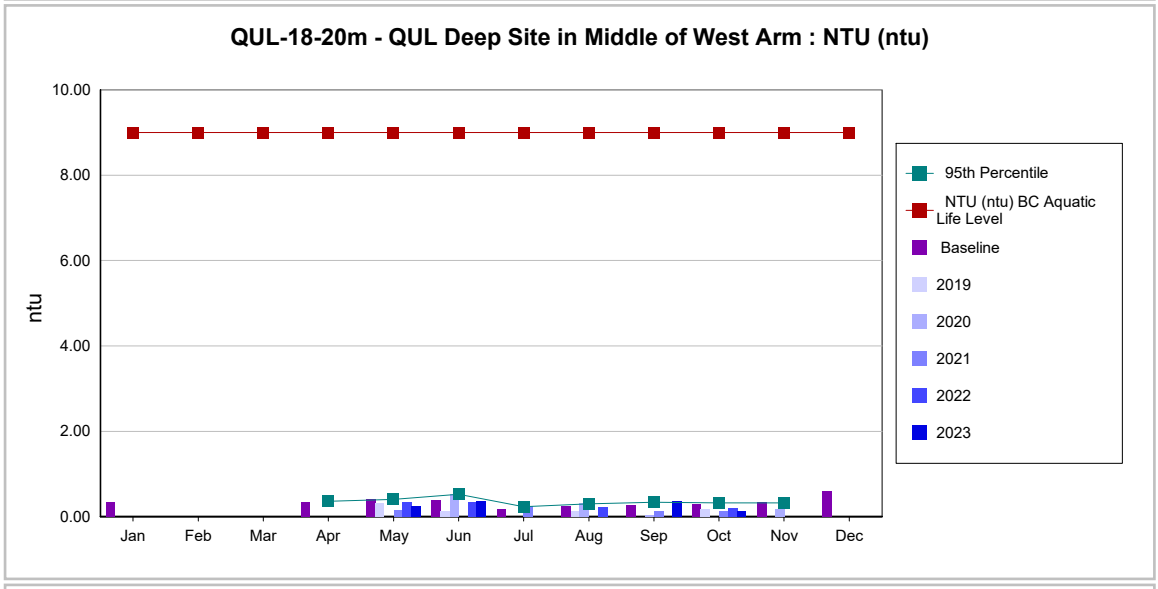

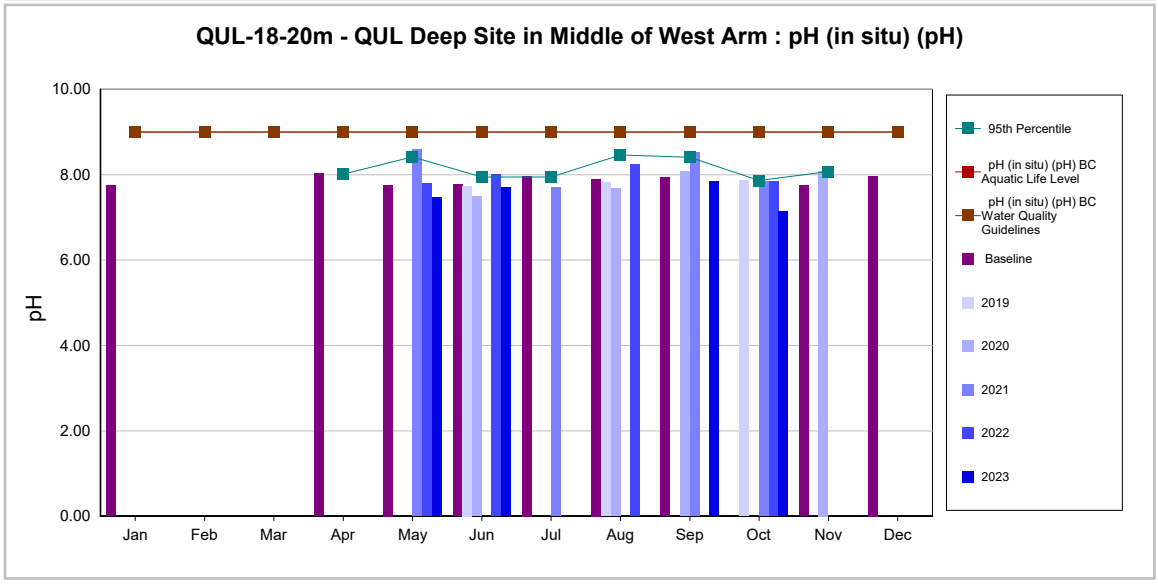

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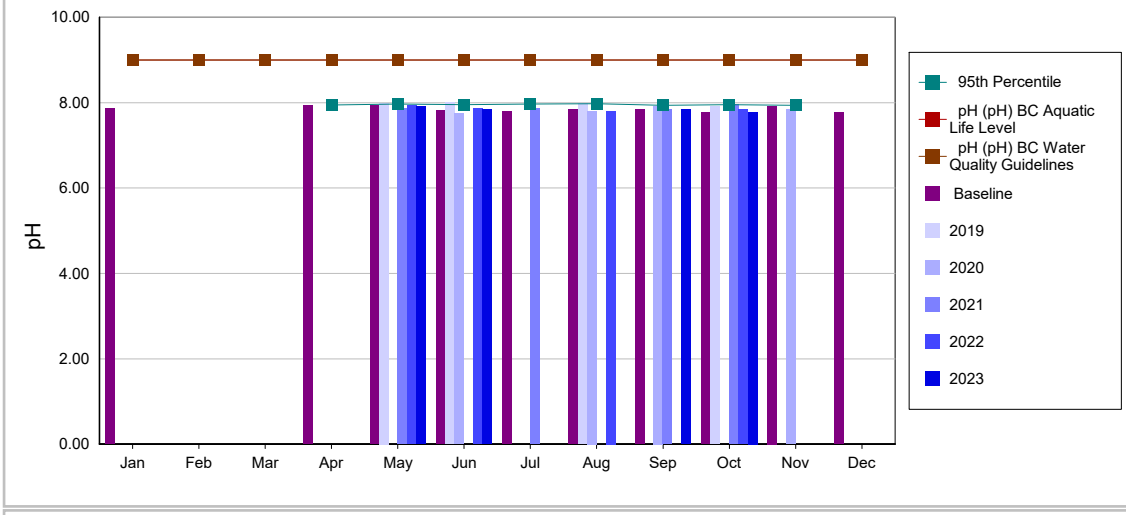

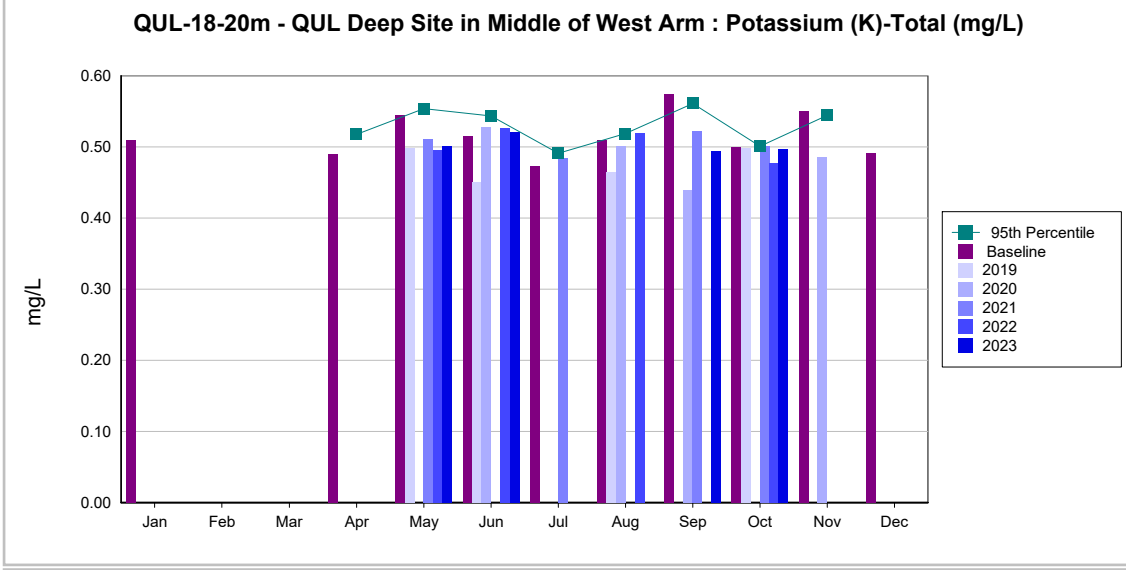

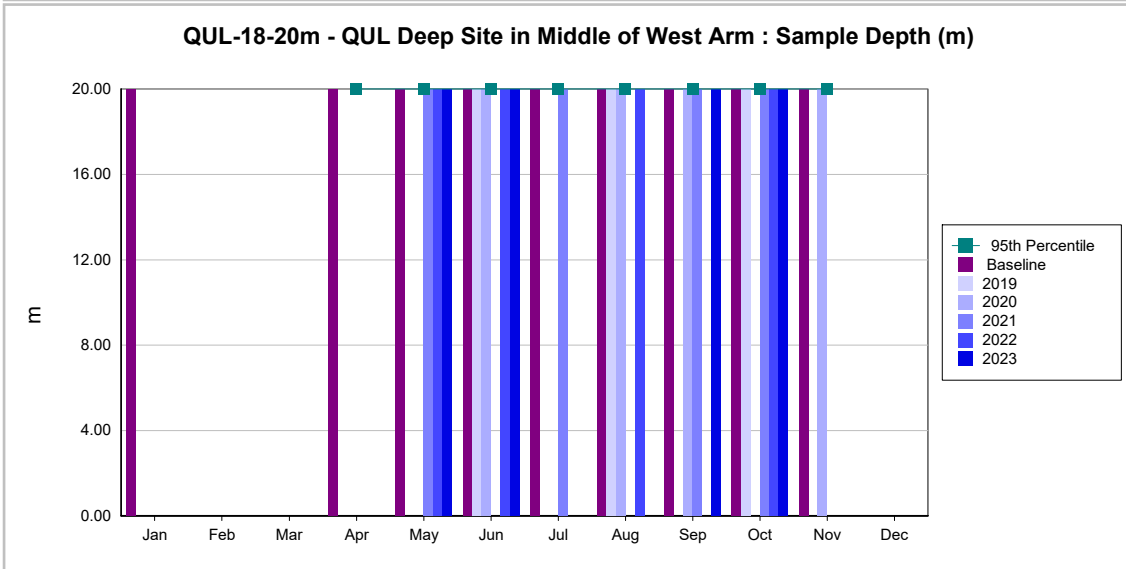

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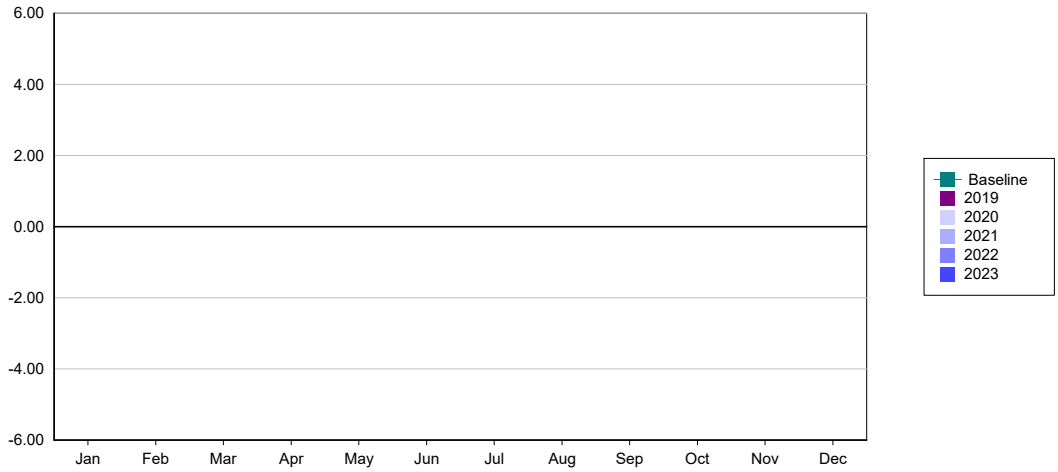
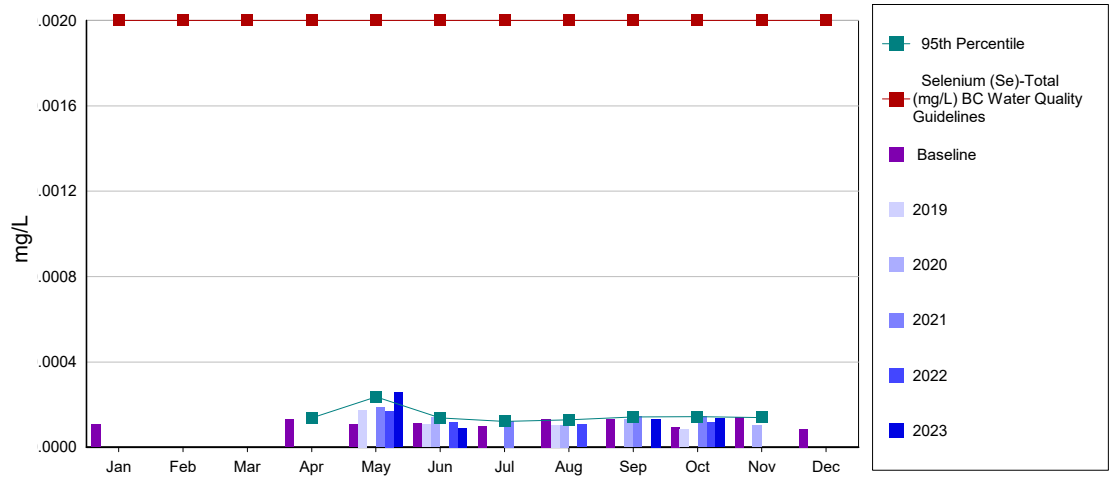
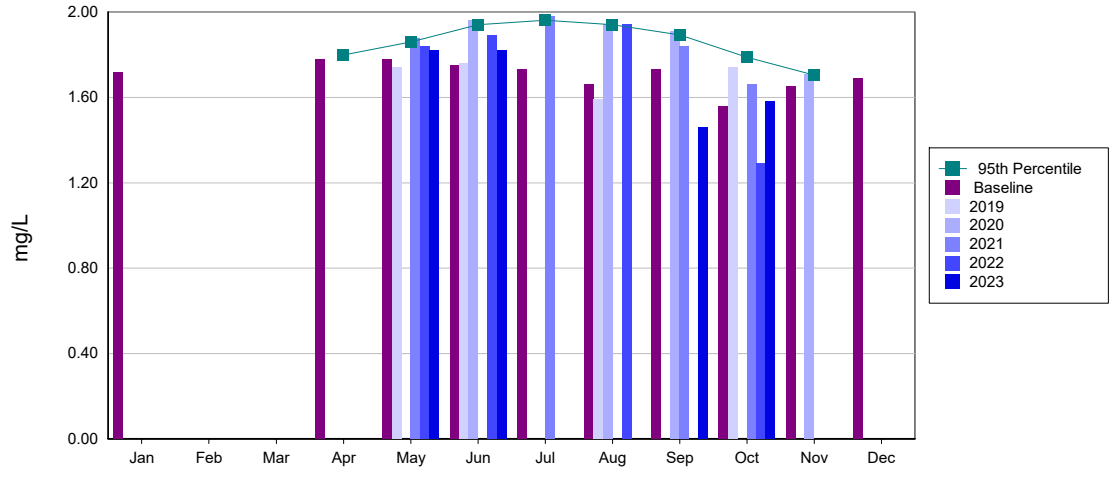
QUL-18-20m - QUL Deep Site in Middle of West Arm : Sample Taken



QUL-18-20m - QUL Deep Site in Middle of West Arm : Selenium (Se)-Total (mg/L)



QUL-18-20m - QUL Deep Site in Middle of West Arm : Silicon (Si)-Total (mg/L)



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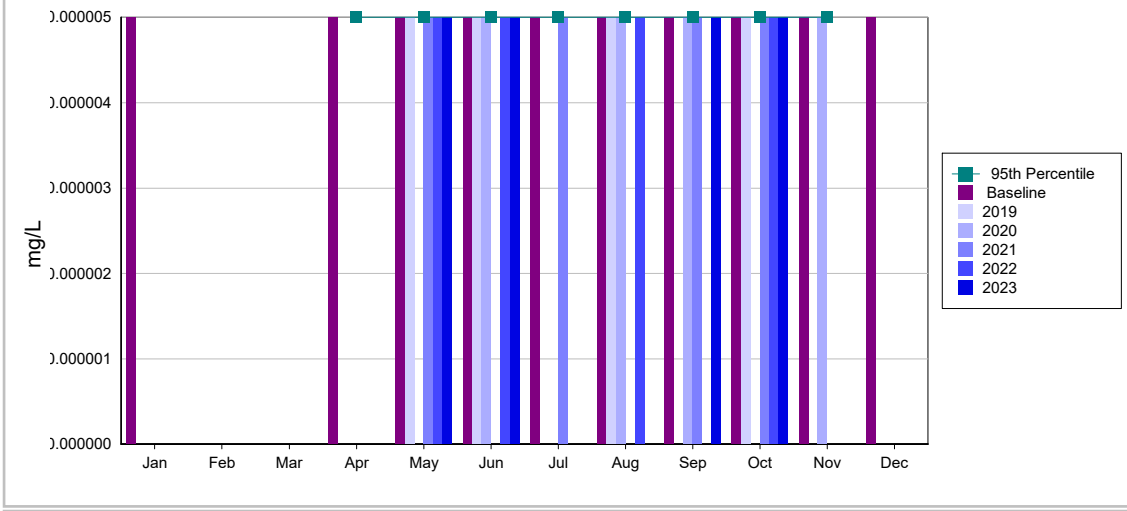

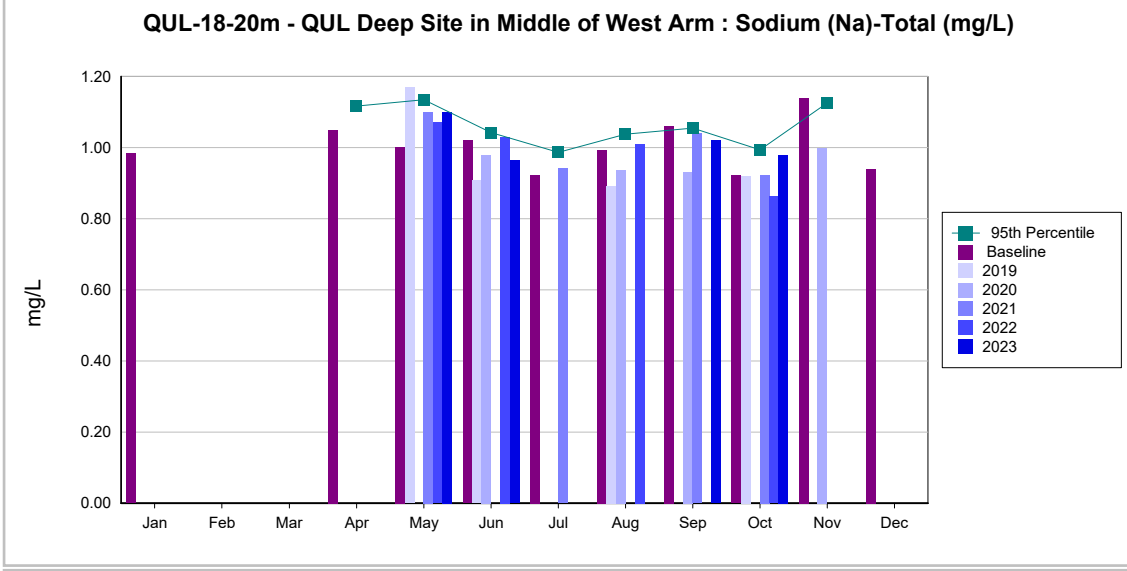

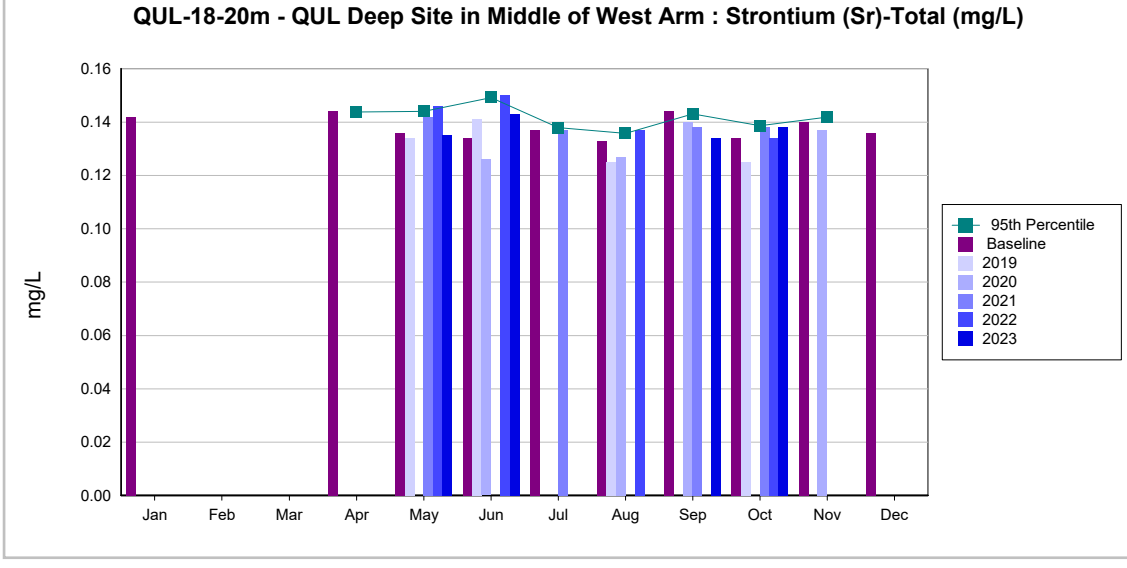

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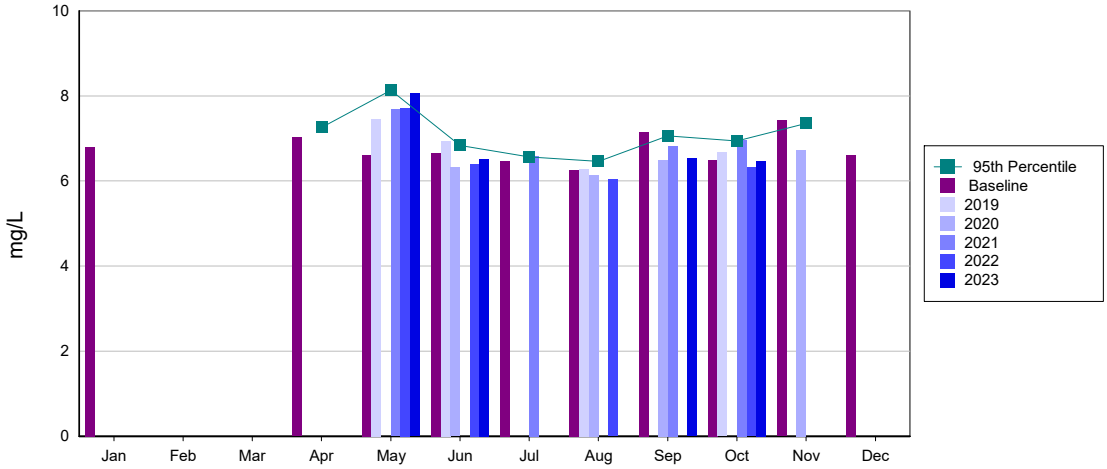

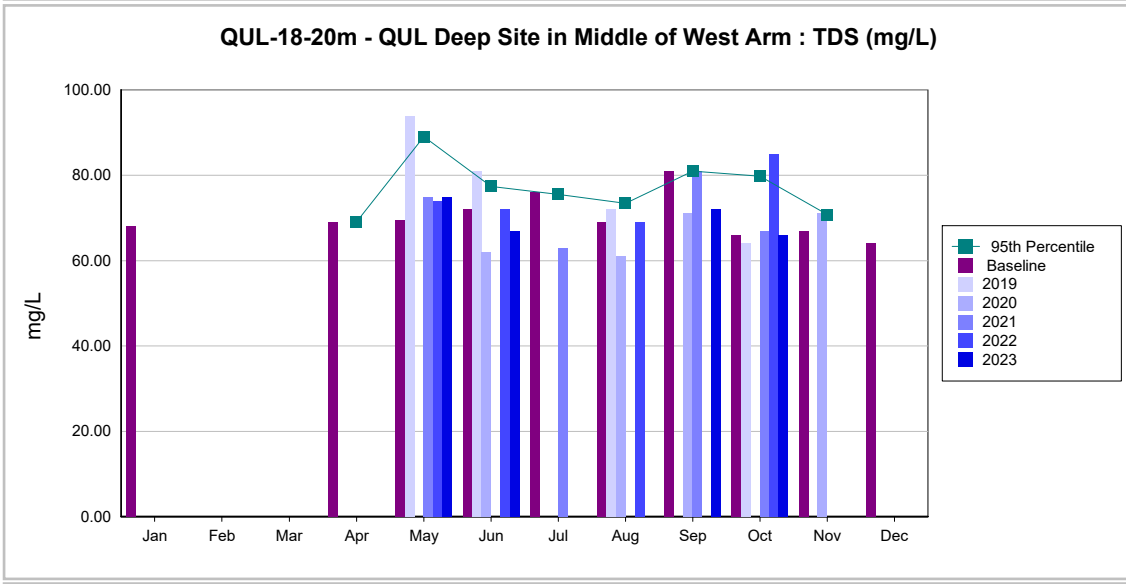

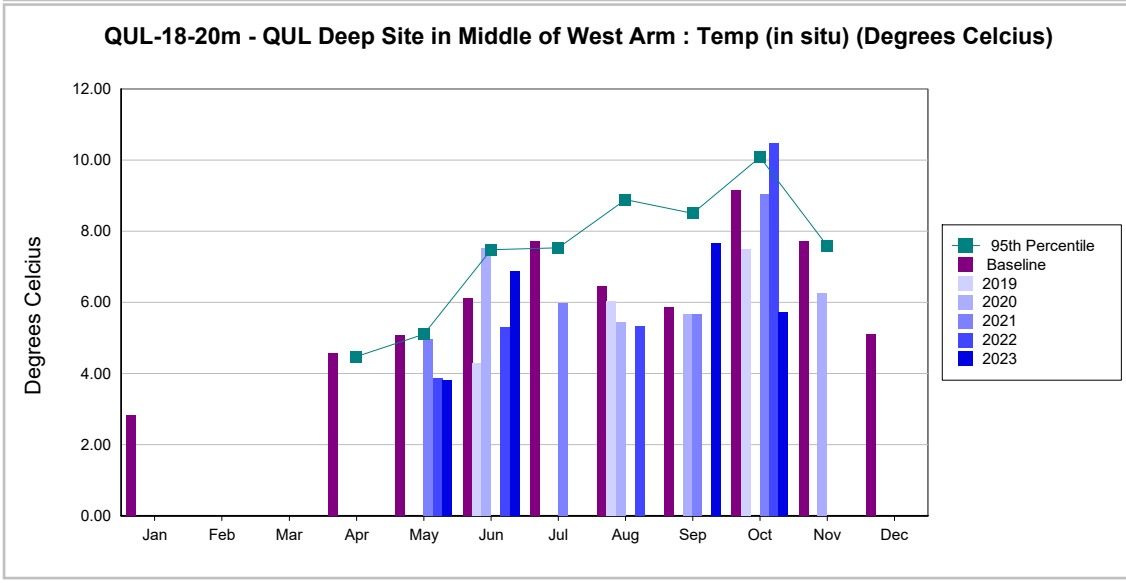

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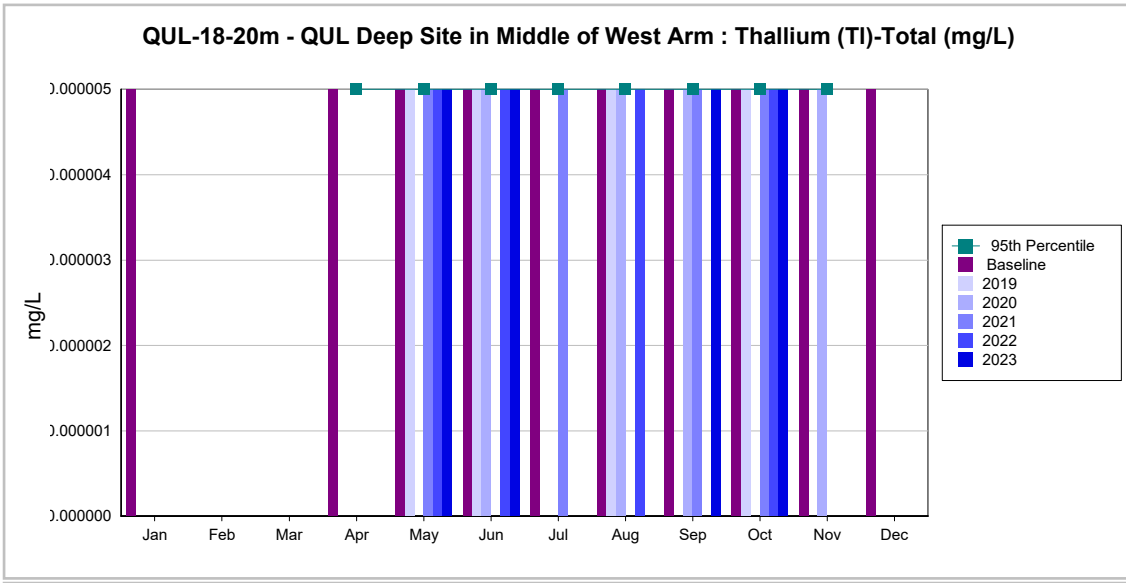

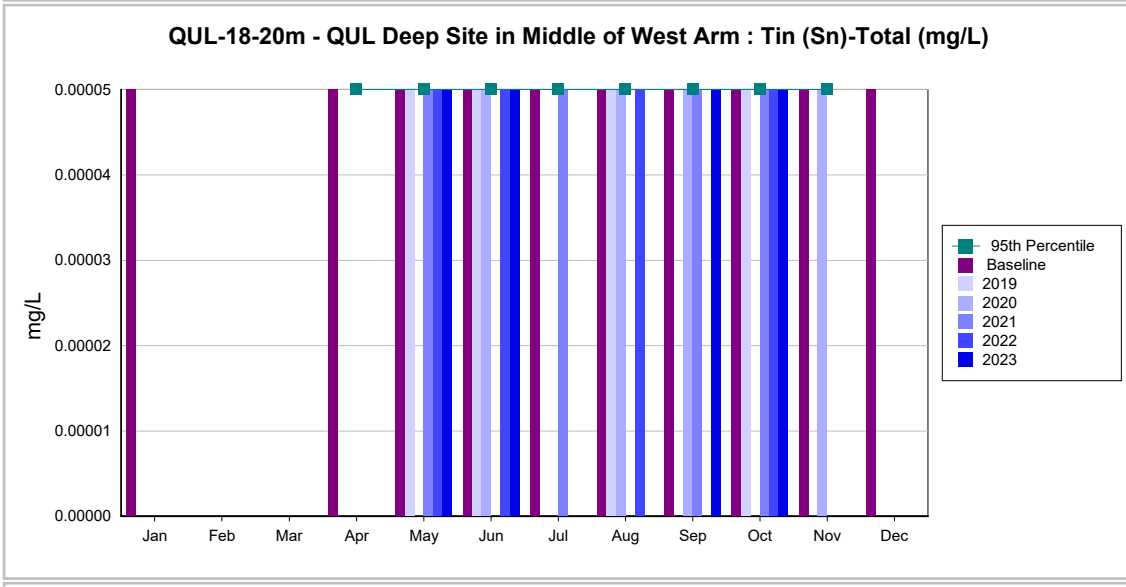

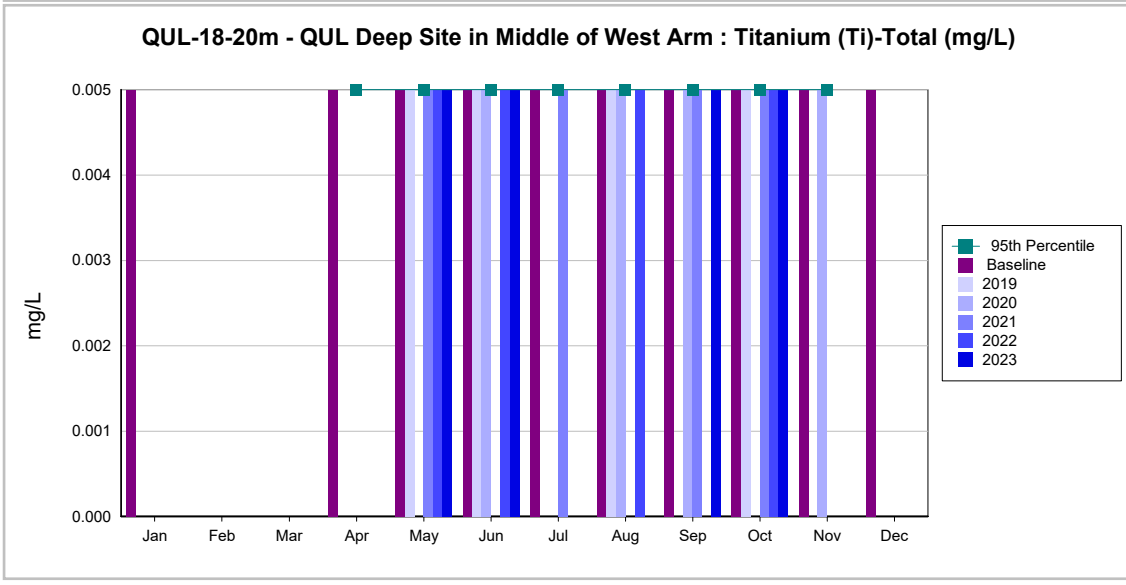

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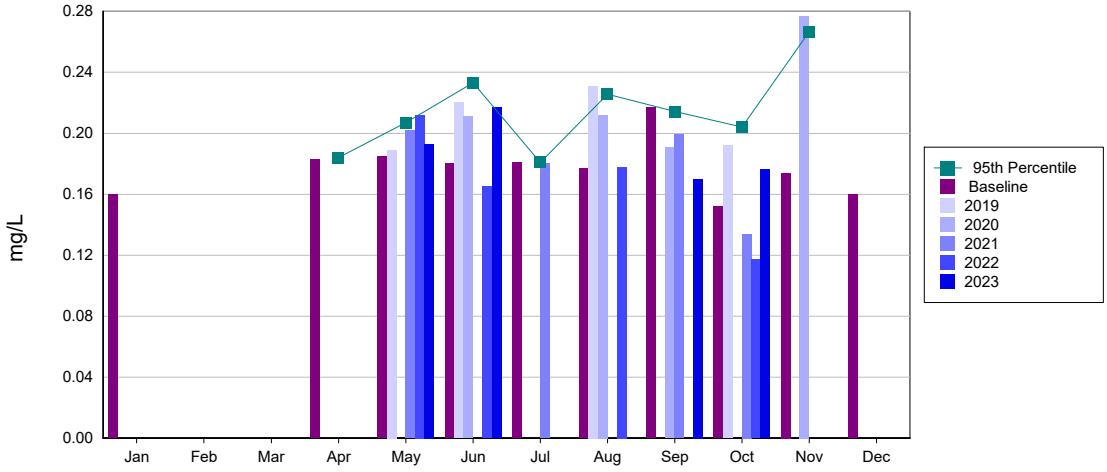

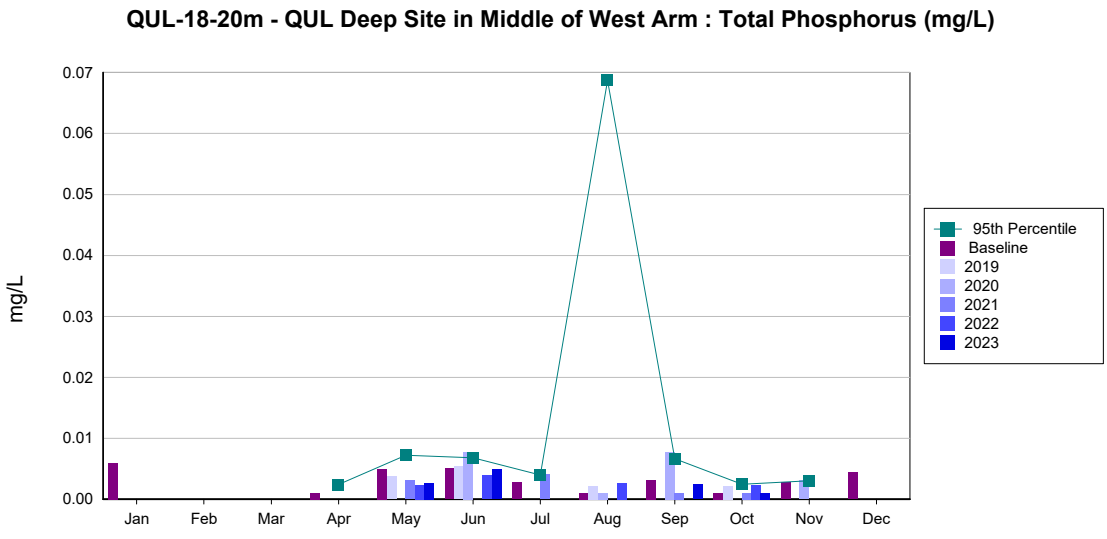

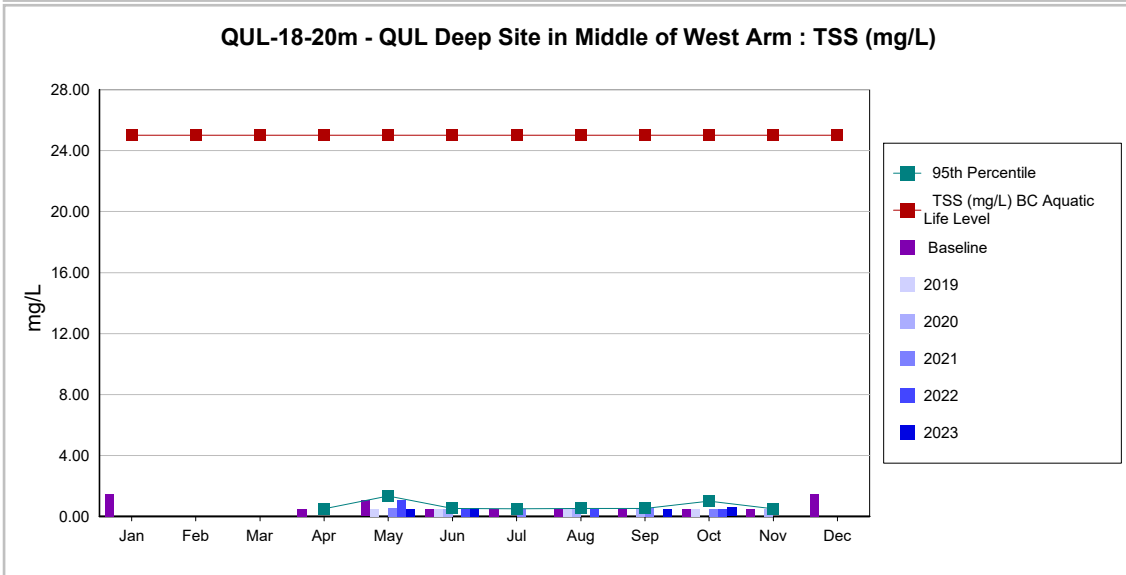

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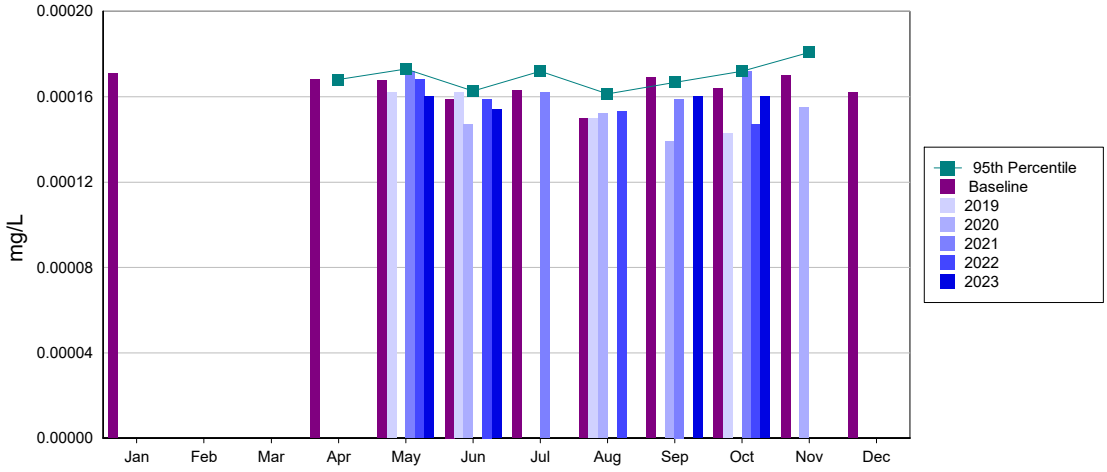

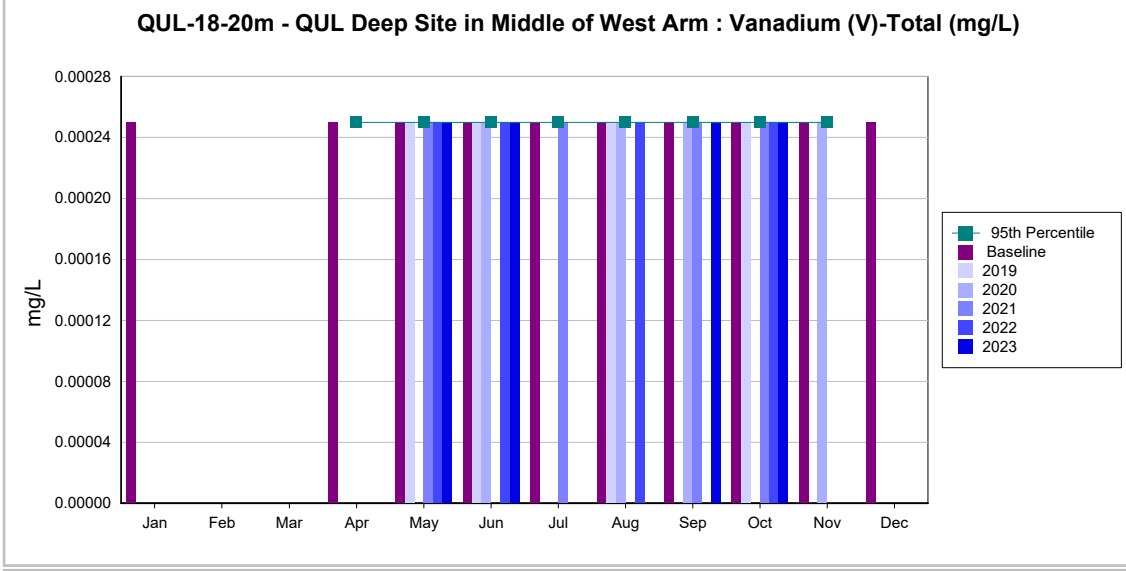

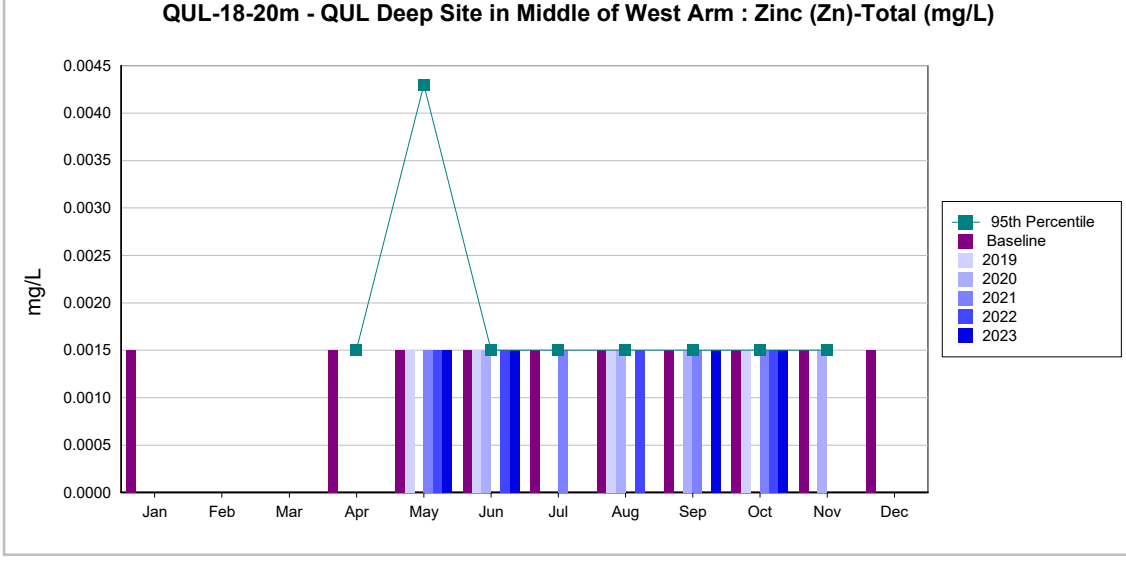

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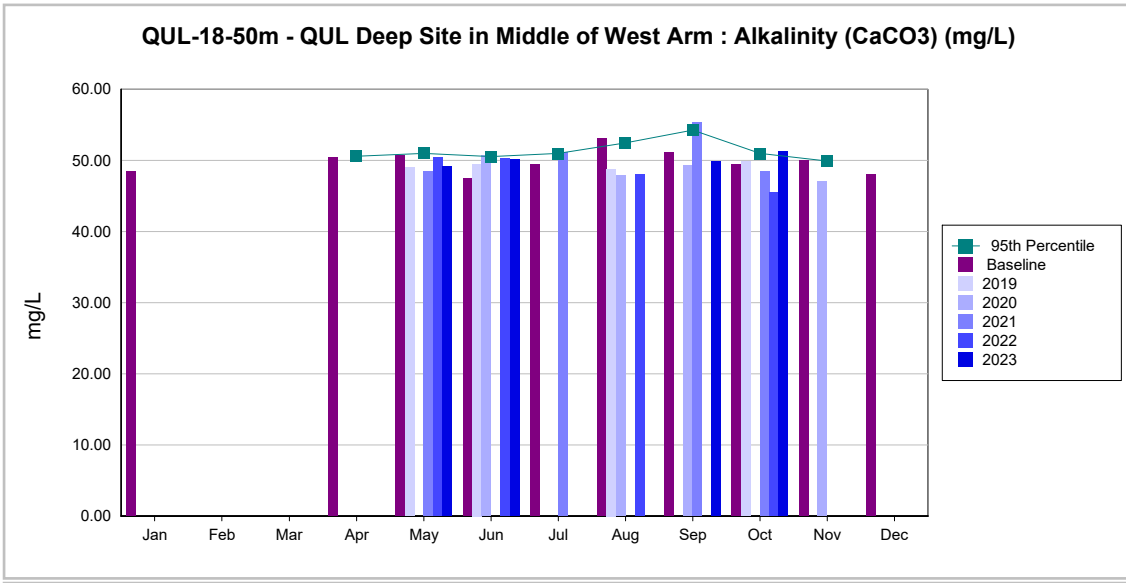

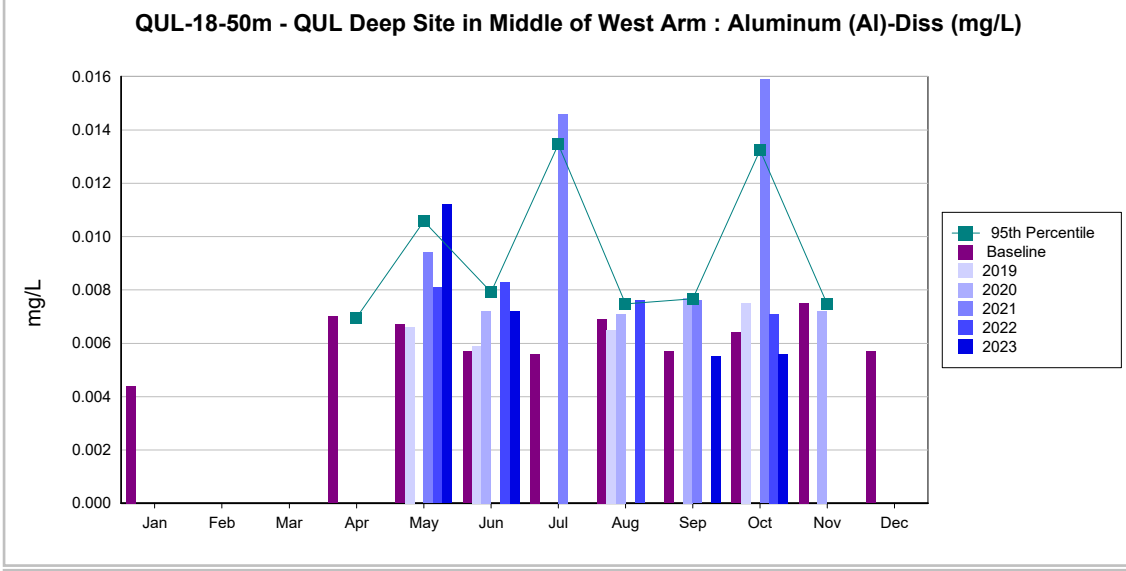

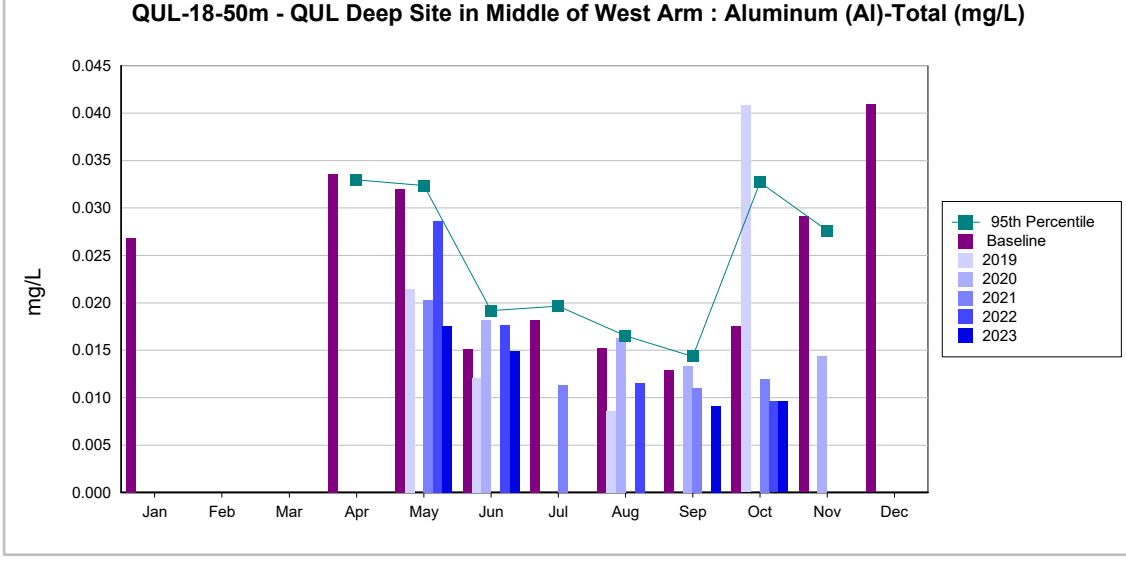

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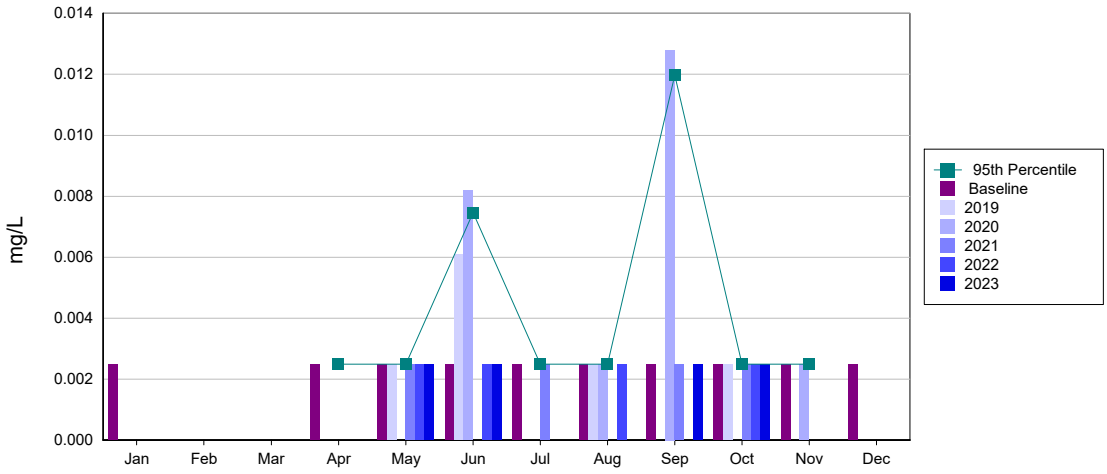
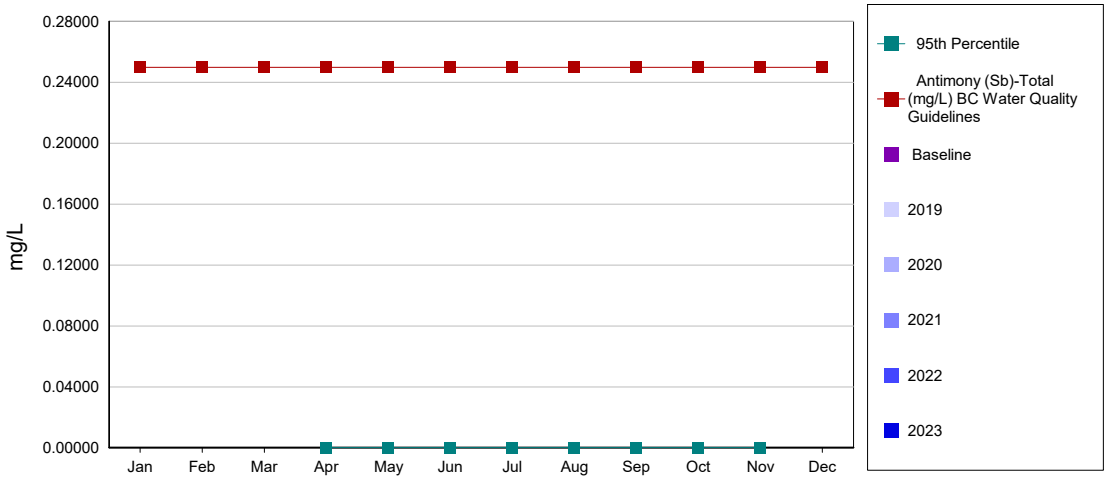
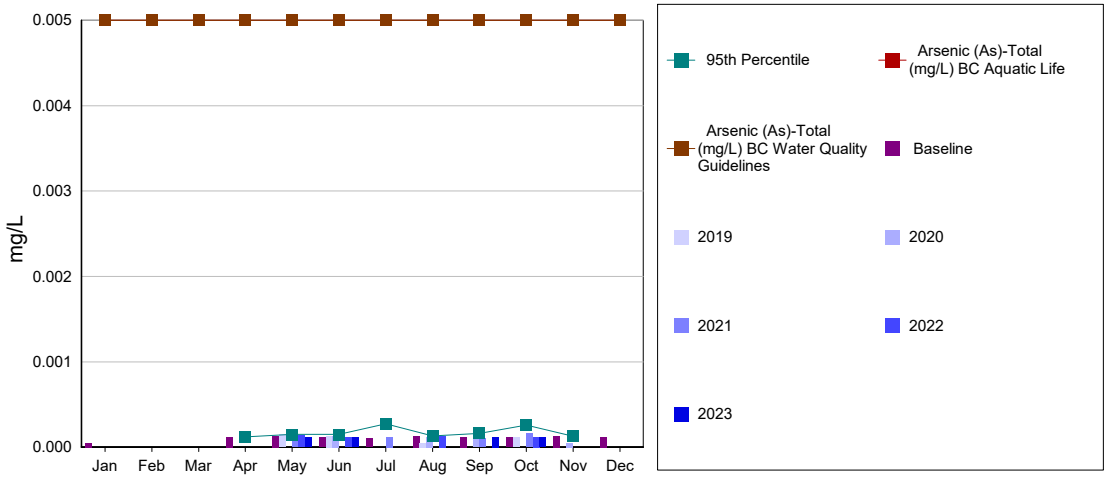
QUL-18-50m - QUL Deep Site in Middle of West Arm : Ammonia (as N) (mg/L)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Antimony (Sb)-Total (mg/L)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Arsenic (As)-Total (mg/L)



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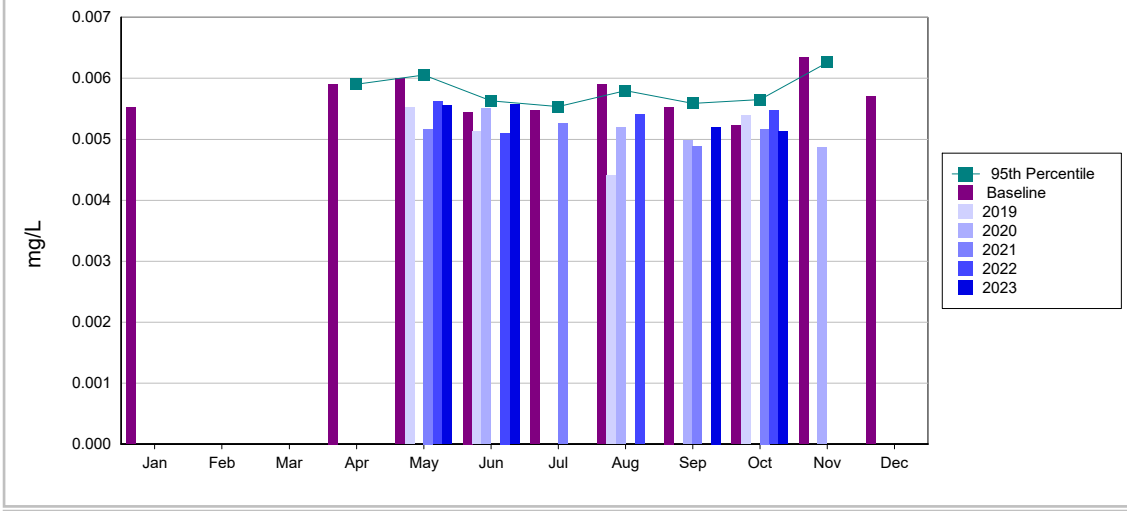

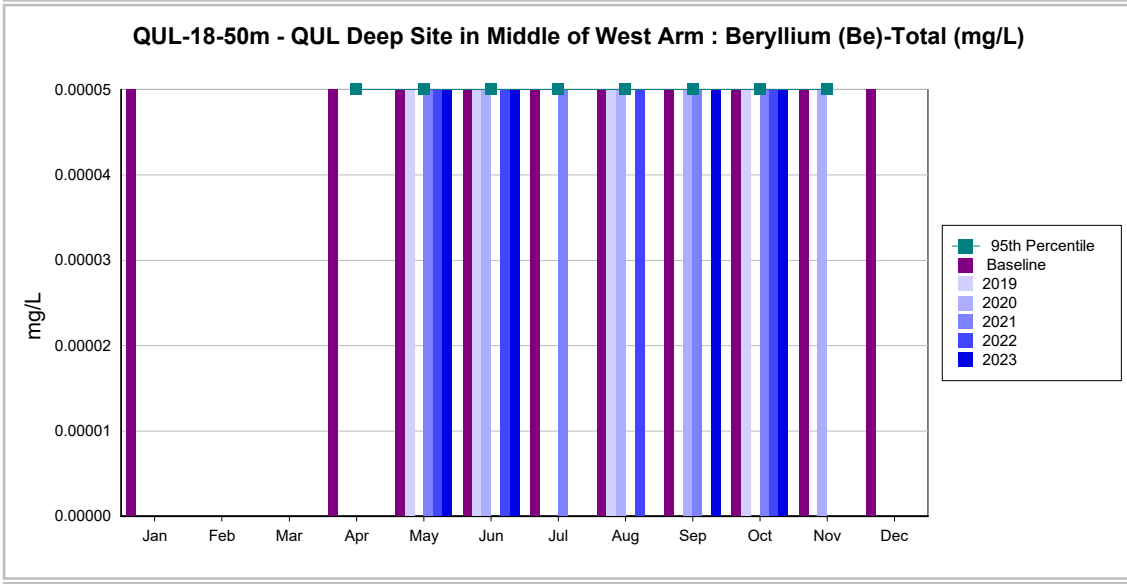

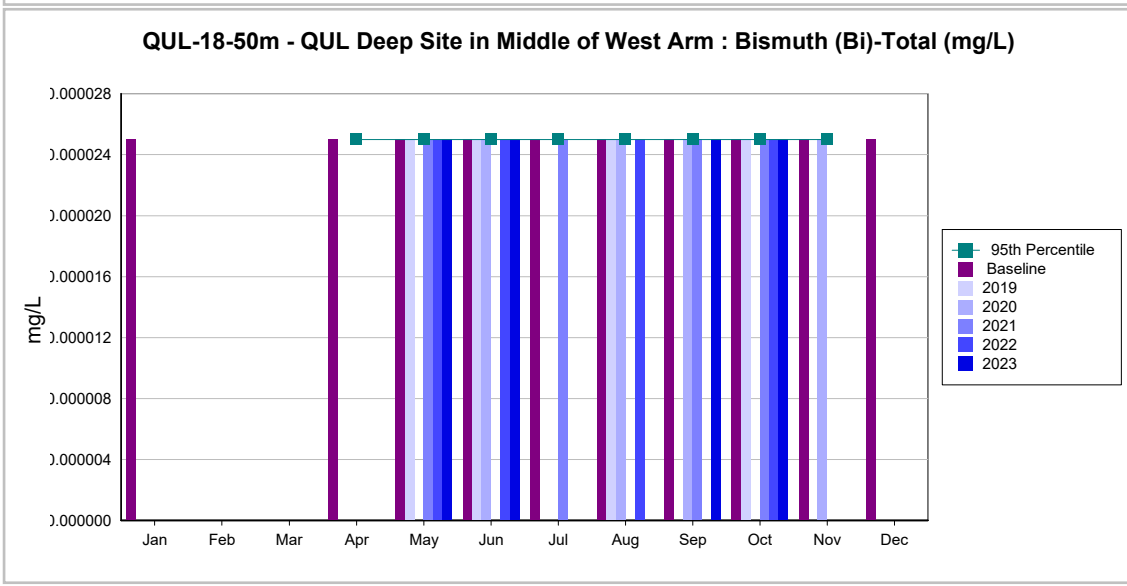

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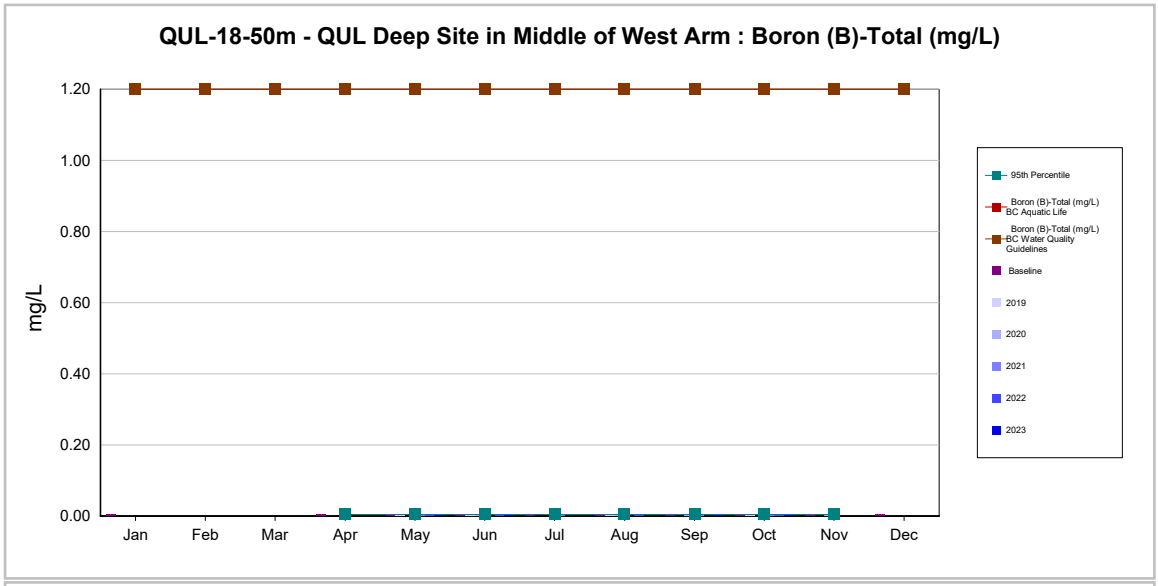

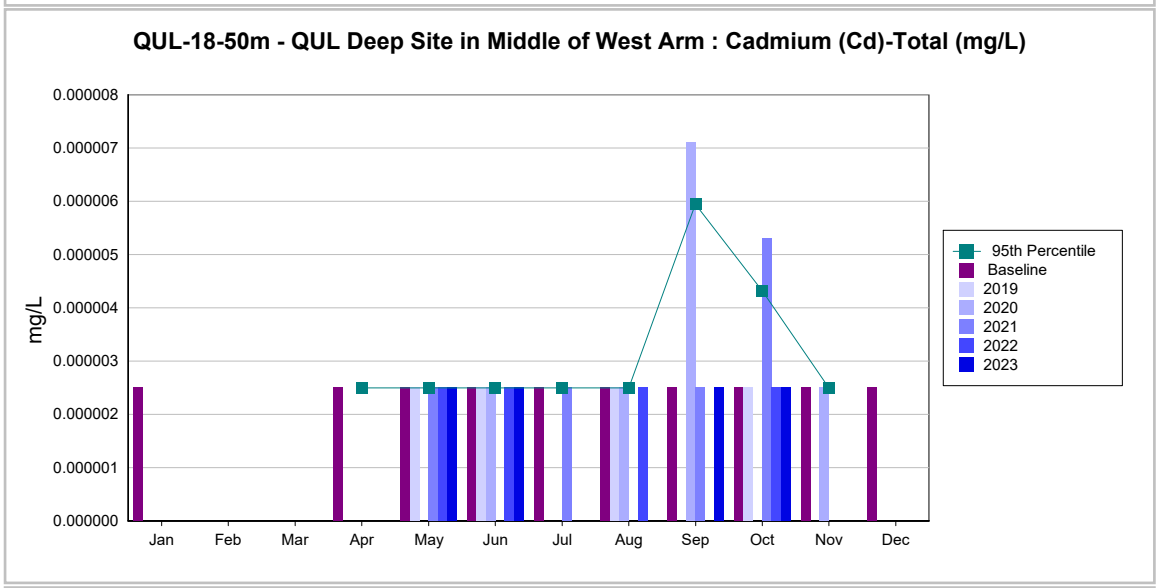

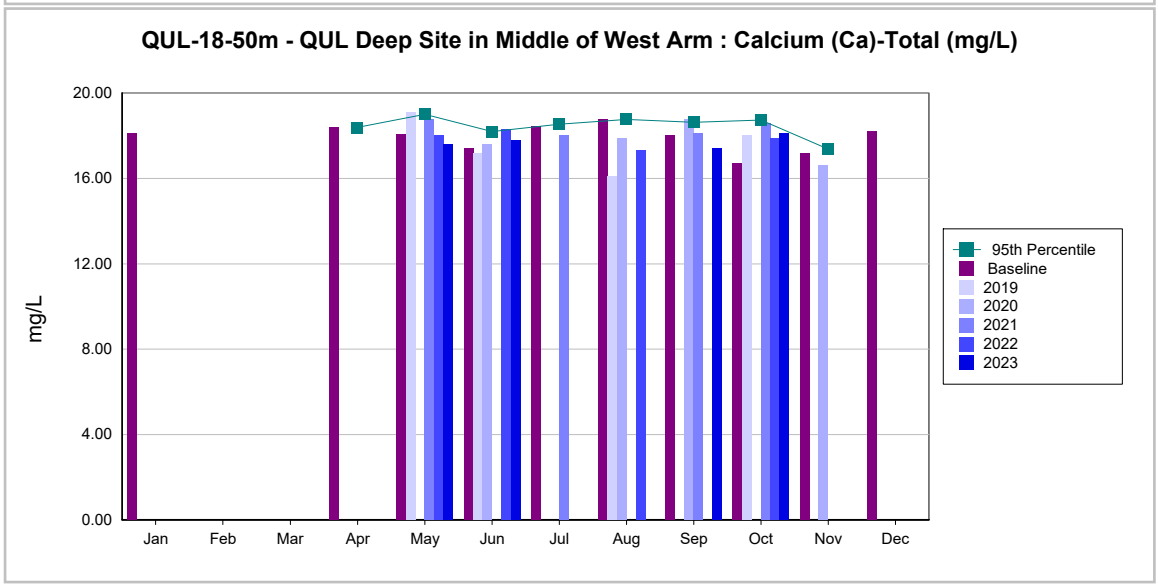

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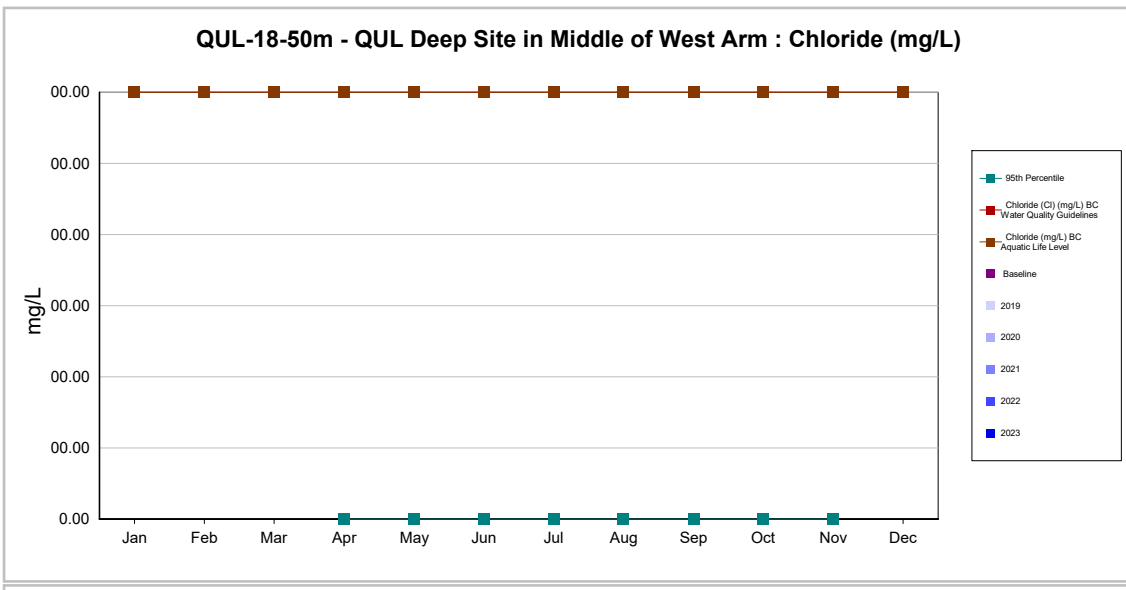

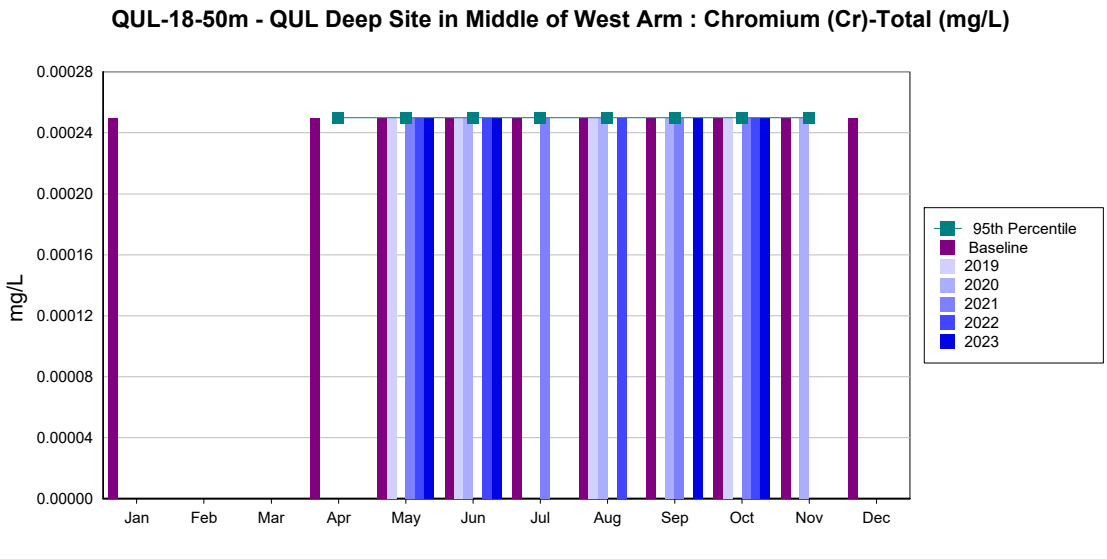

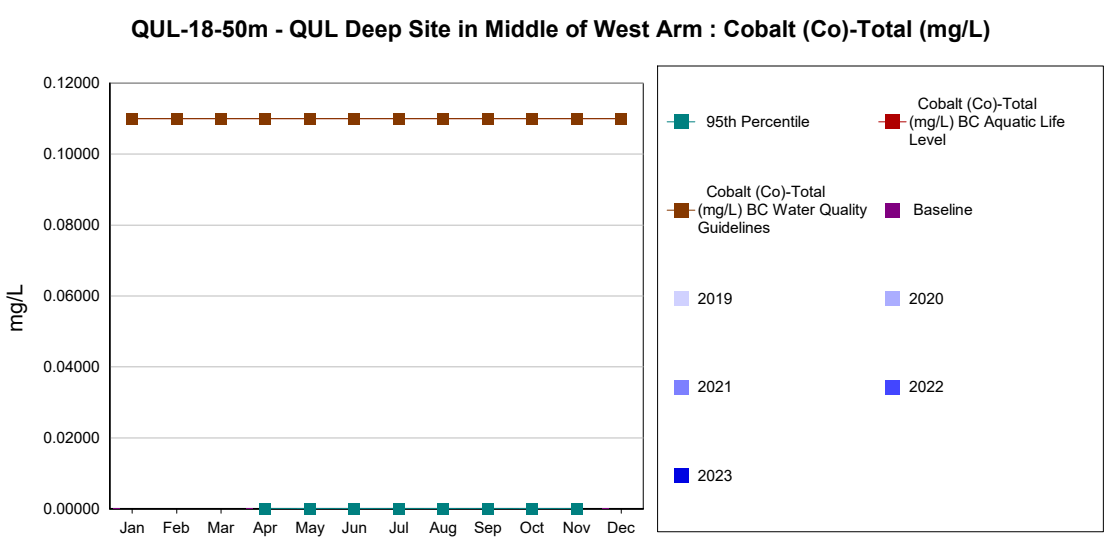

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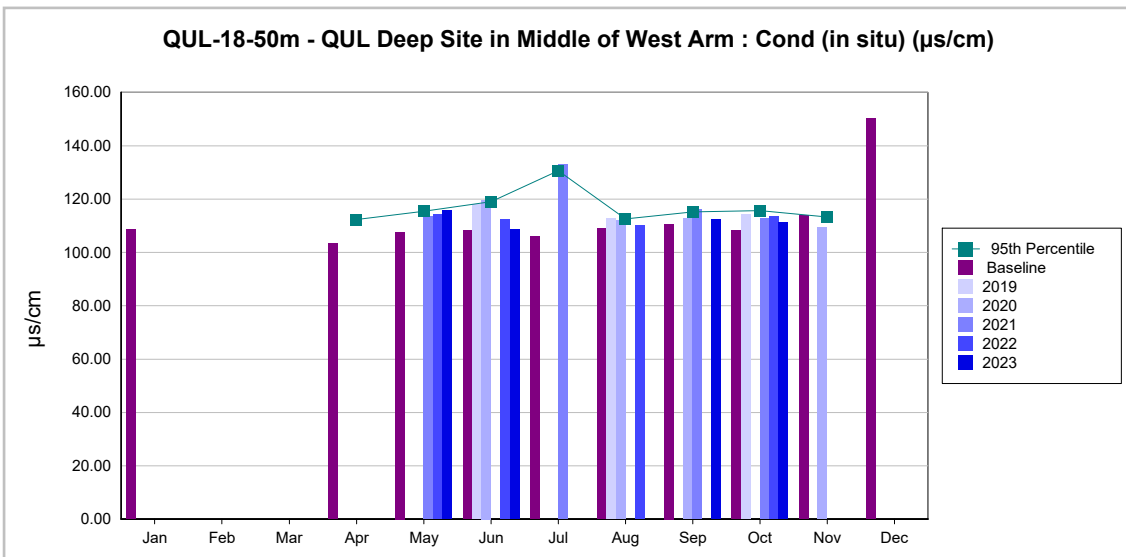

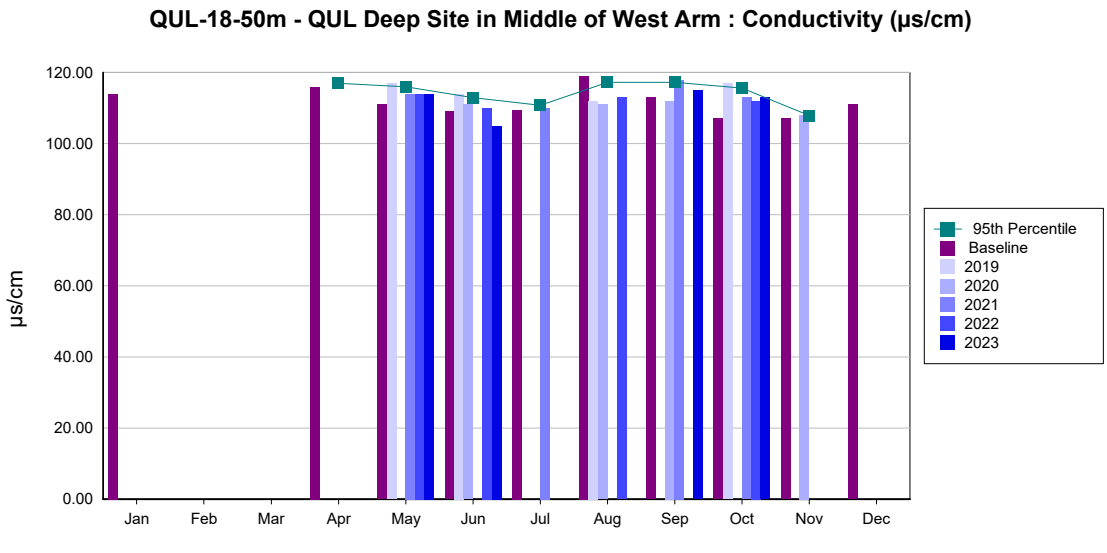

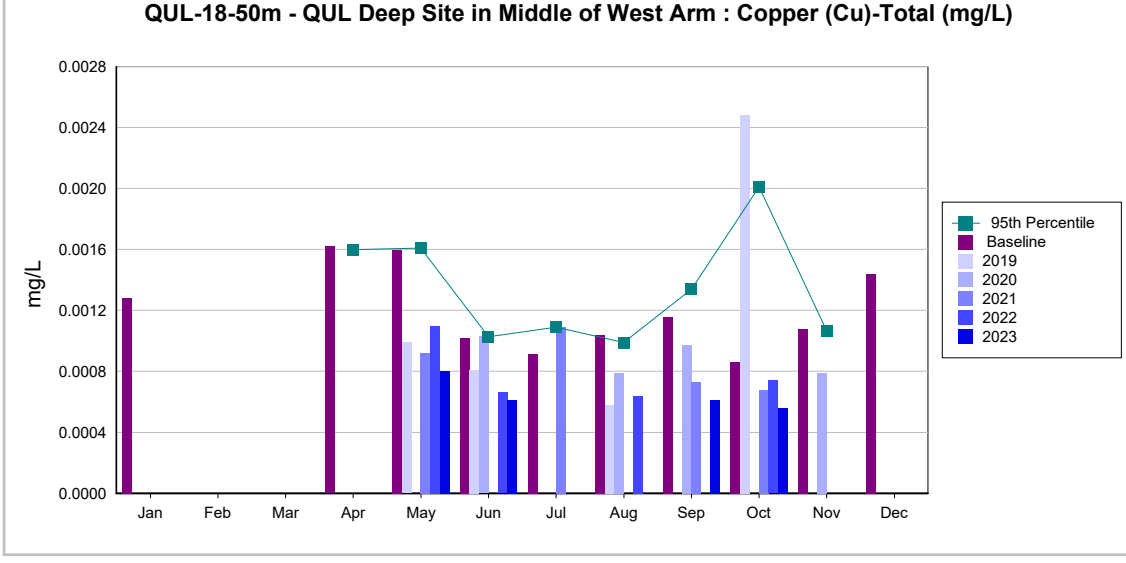

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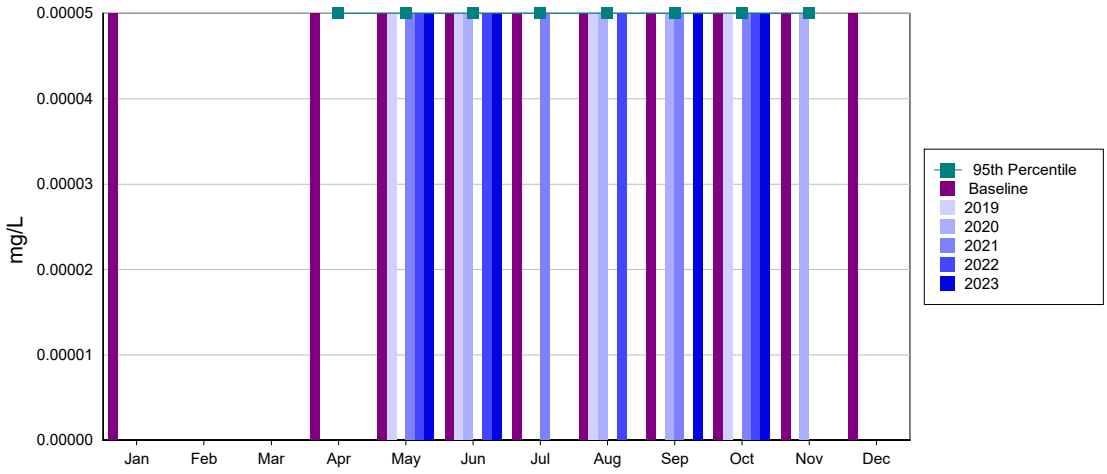

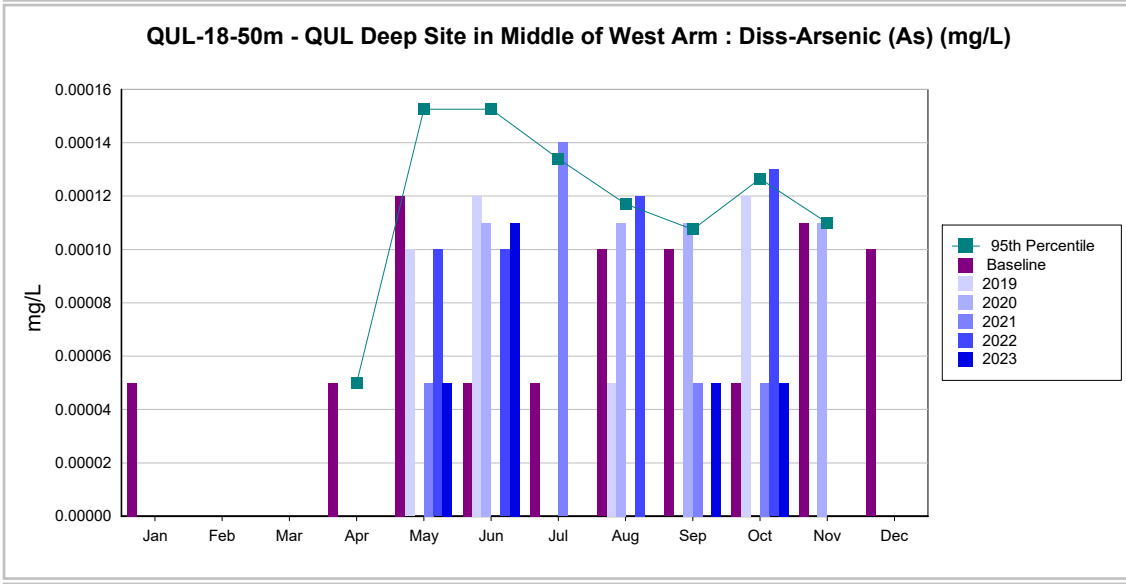

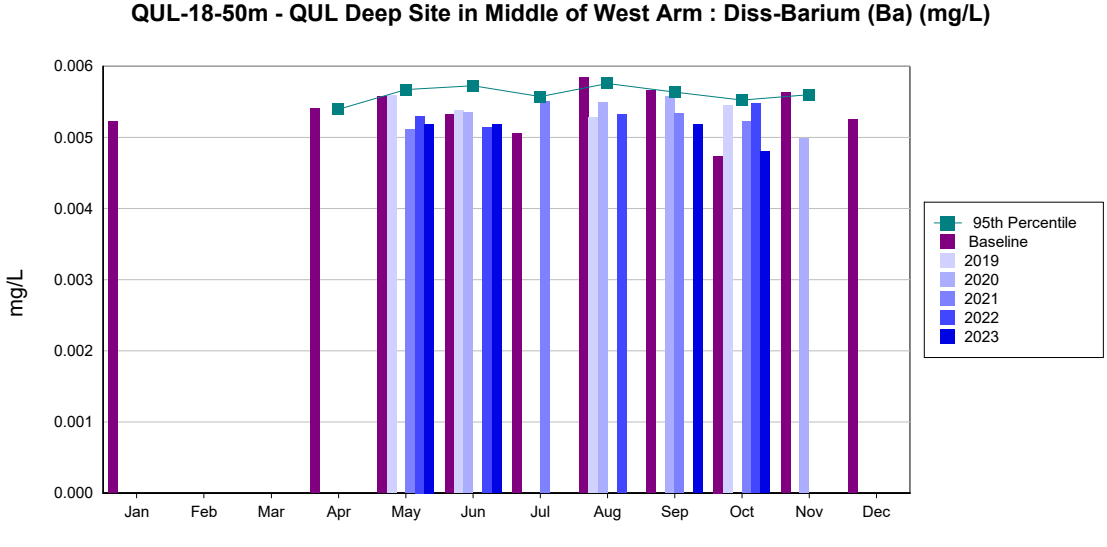

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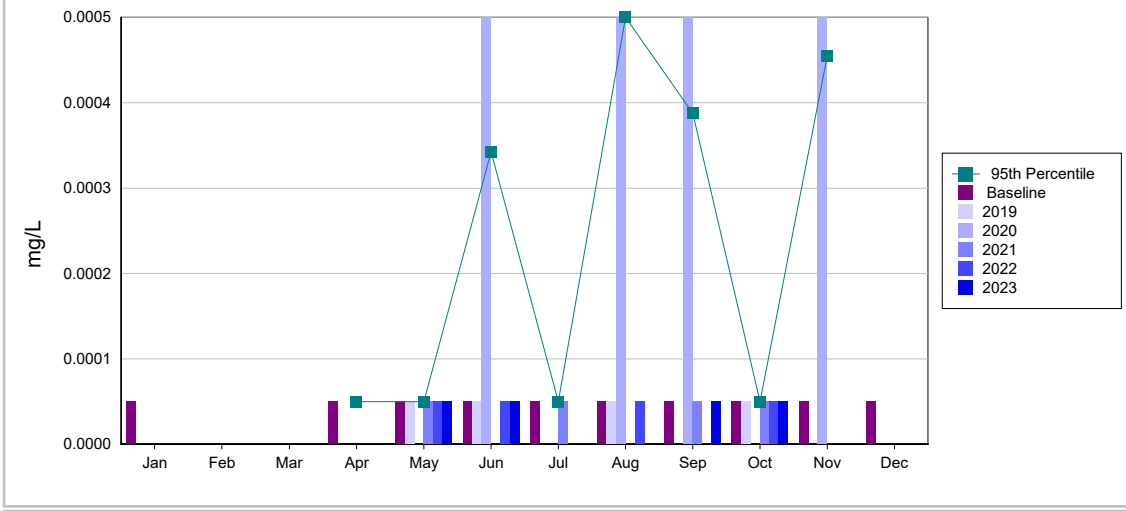

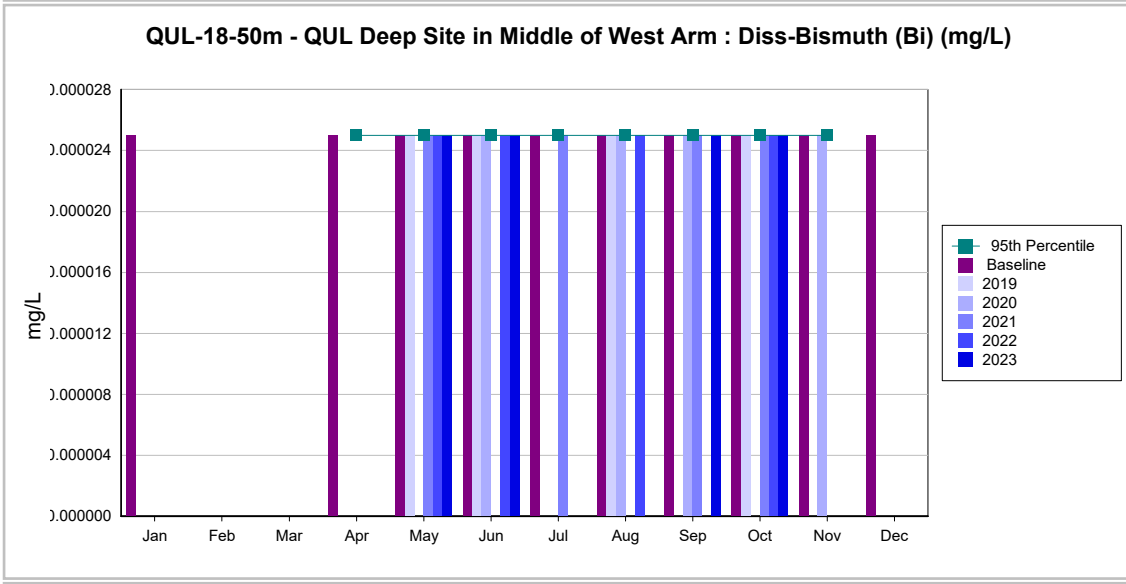

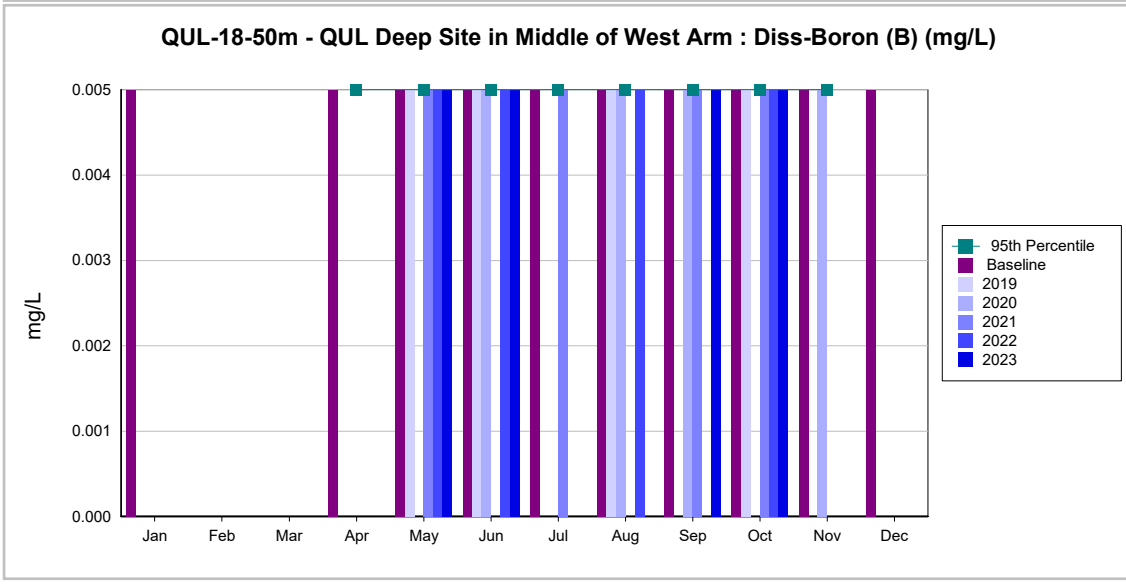

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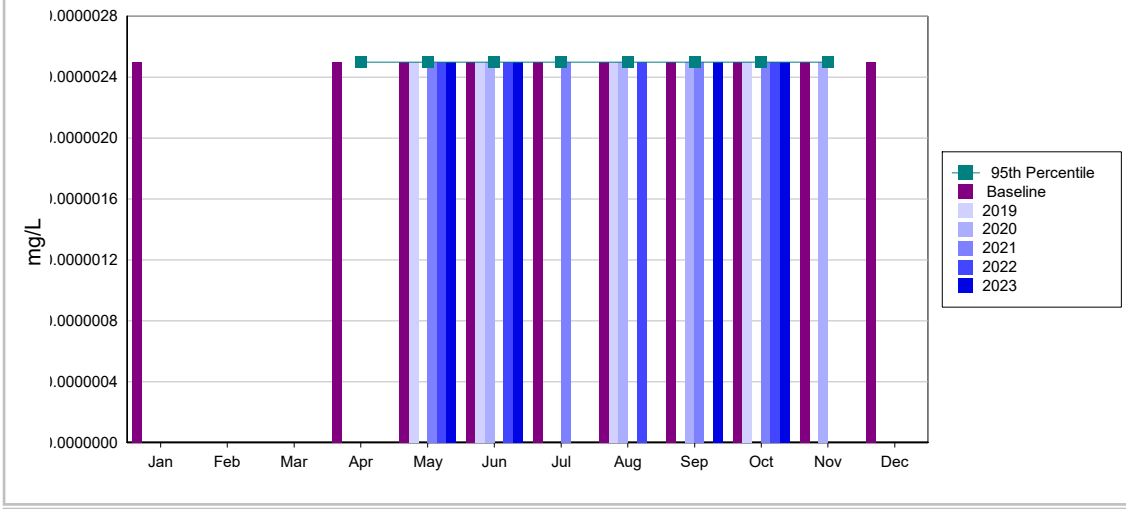

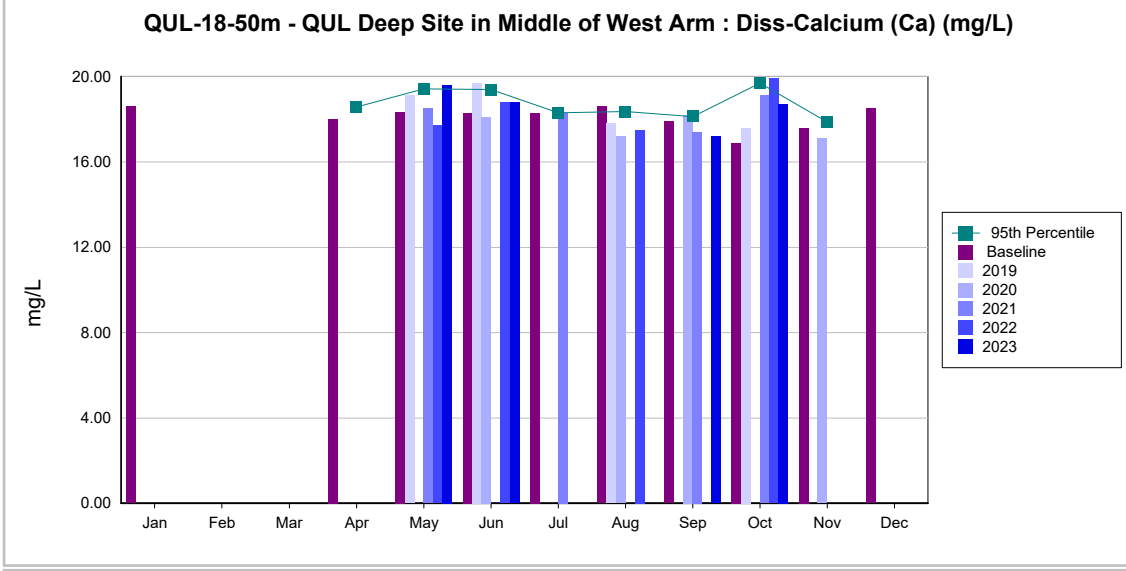

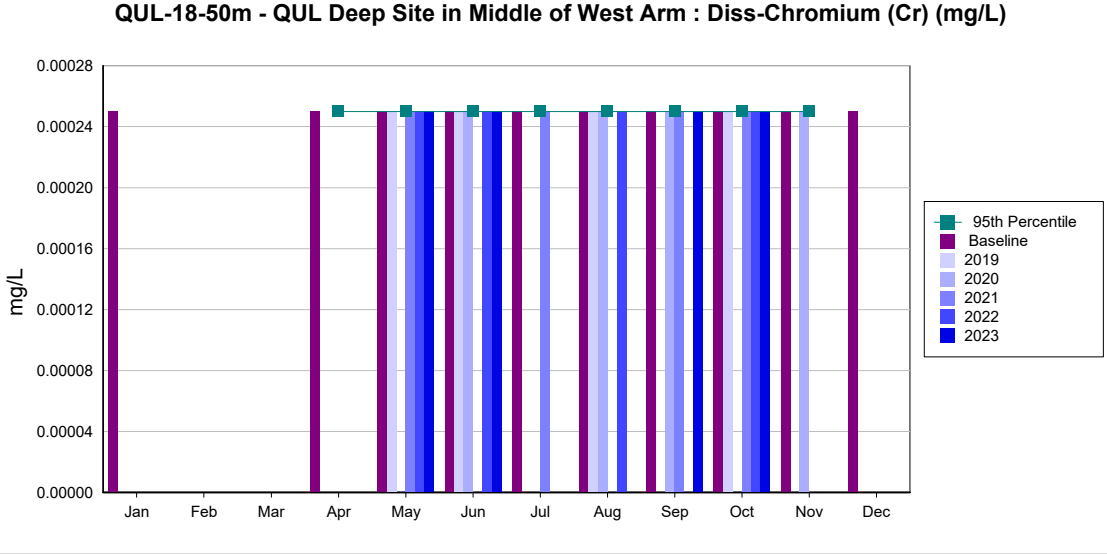

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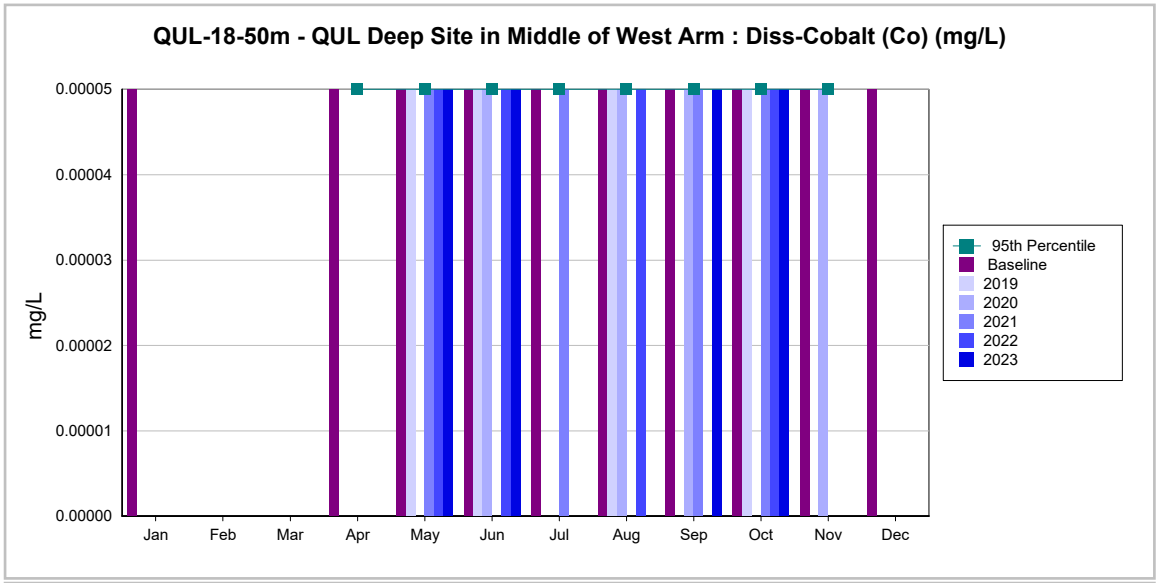

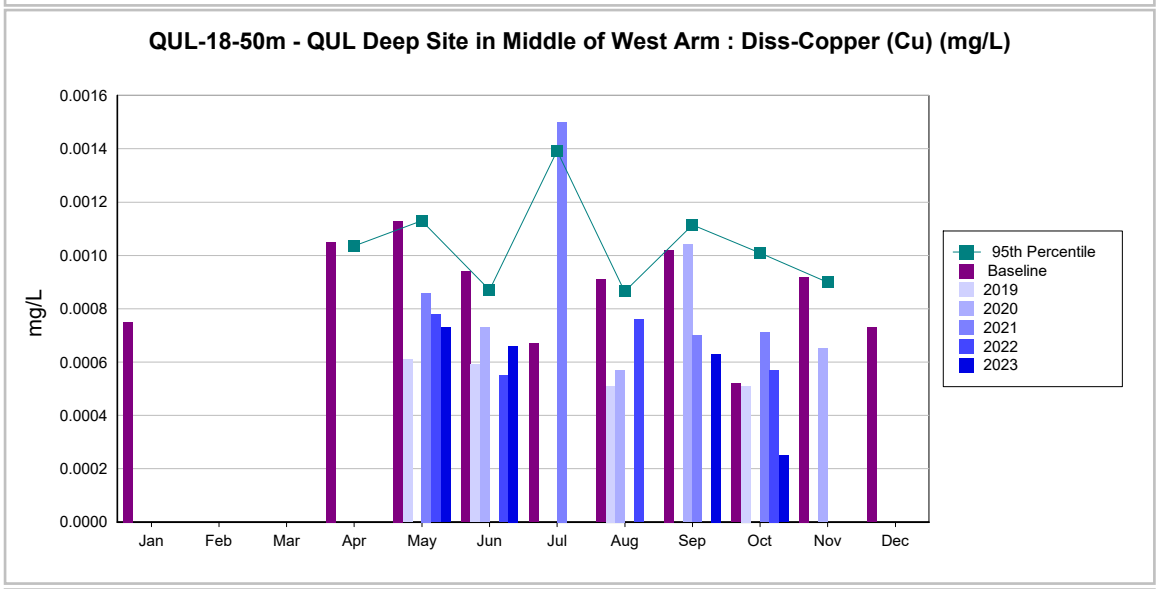

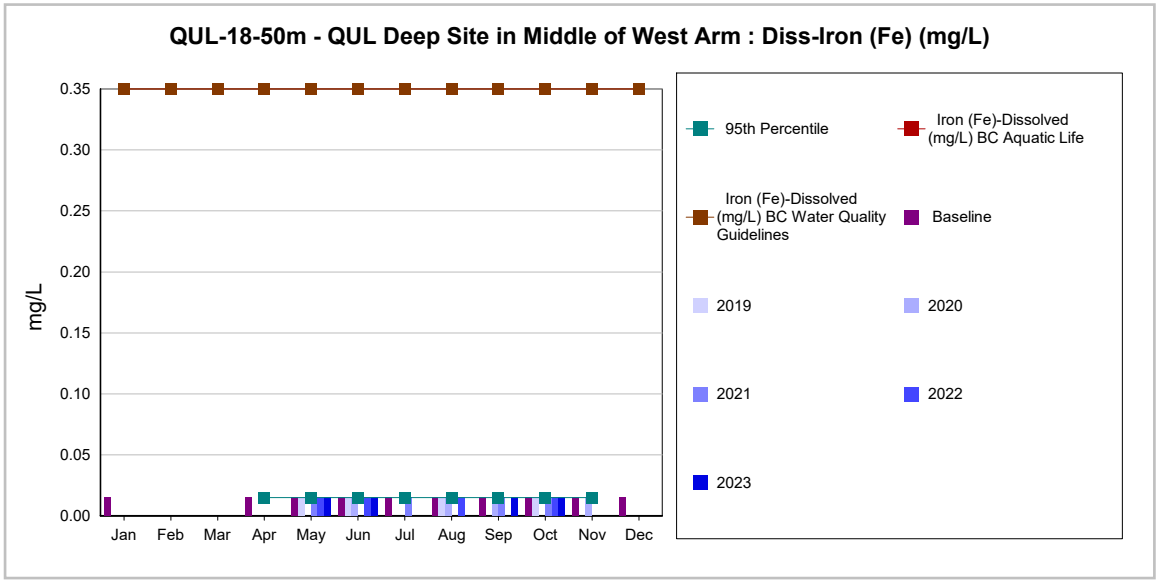

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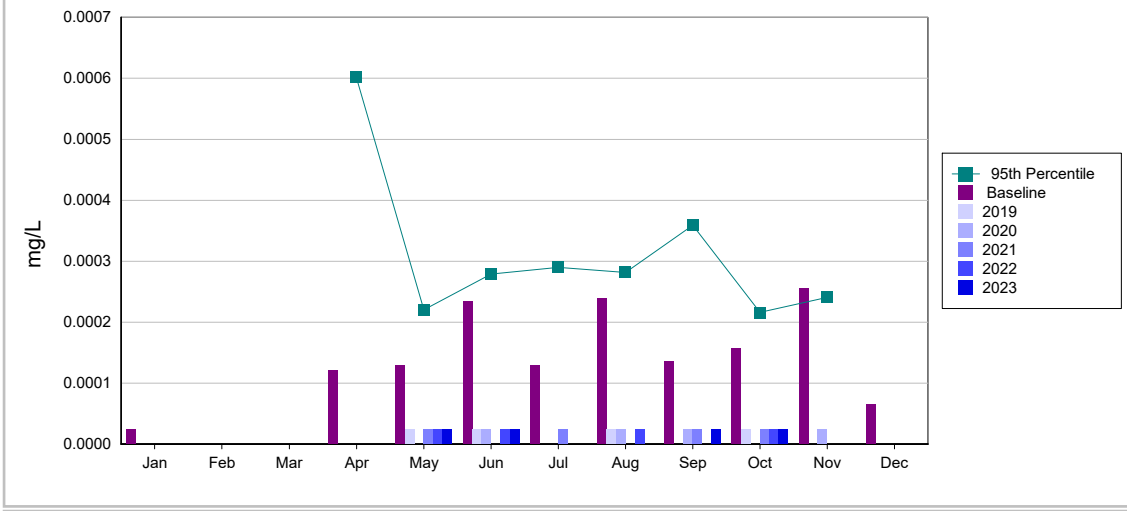

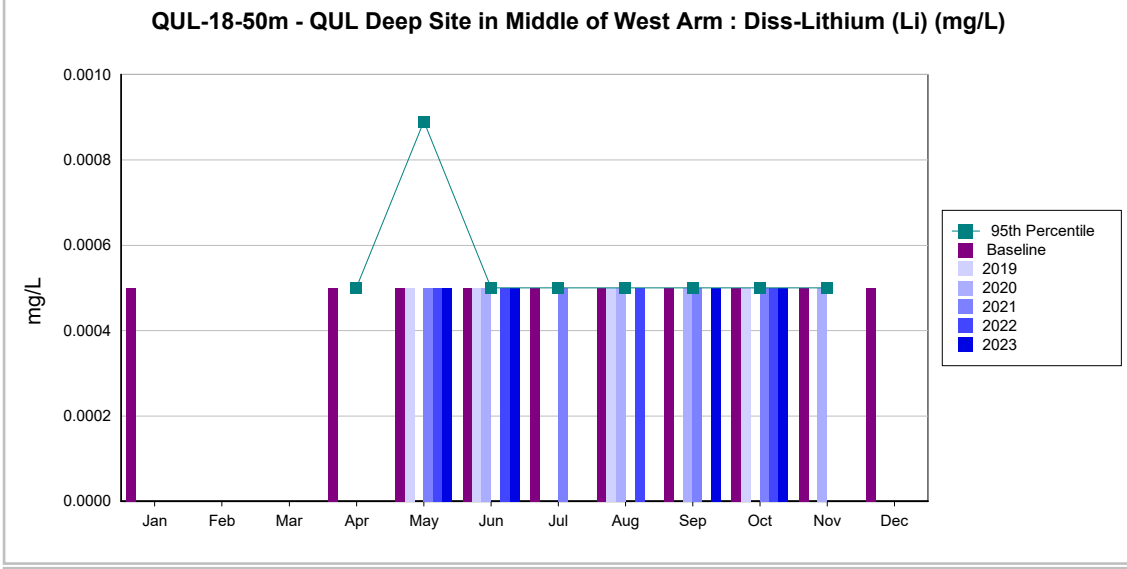

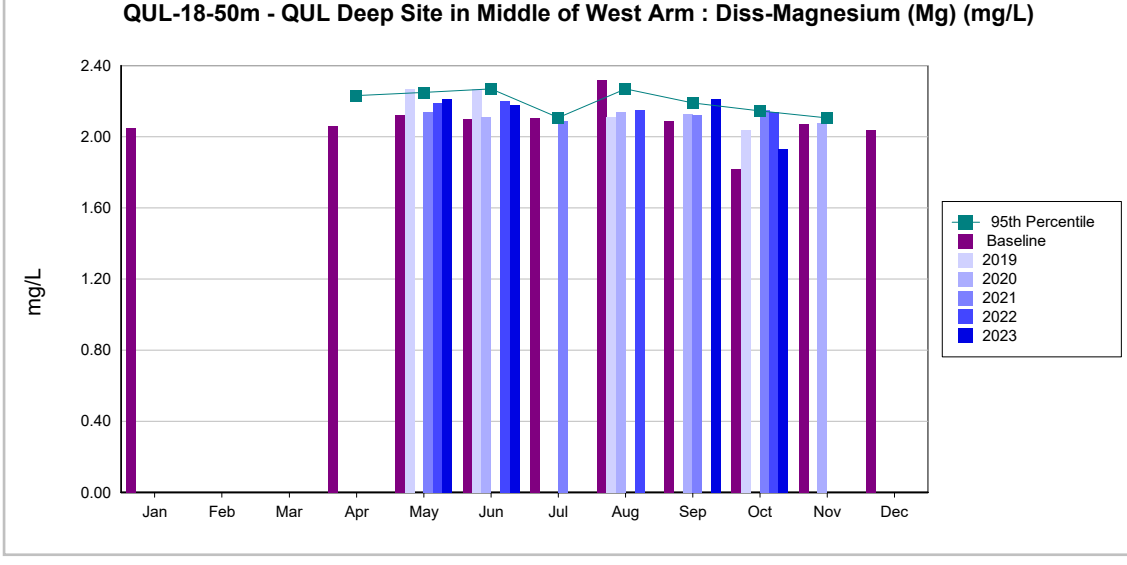

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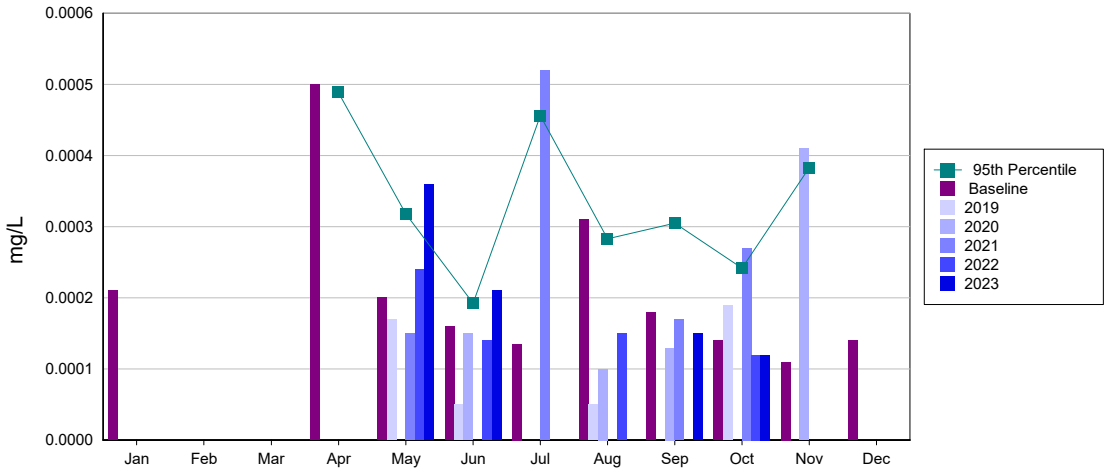

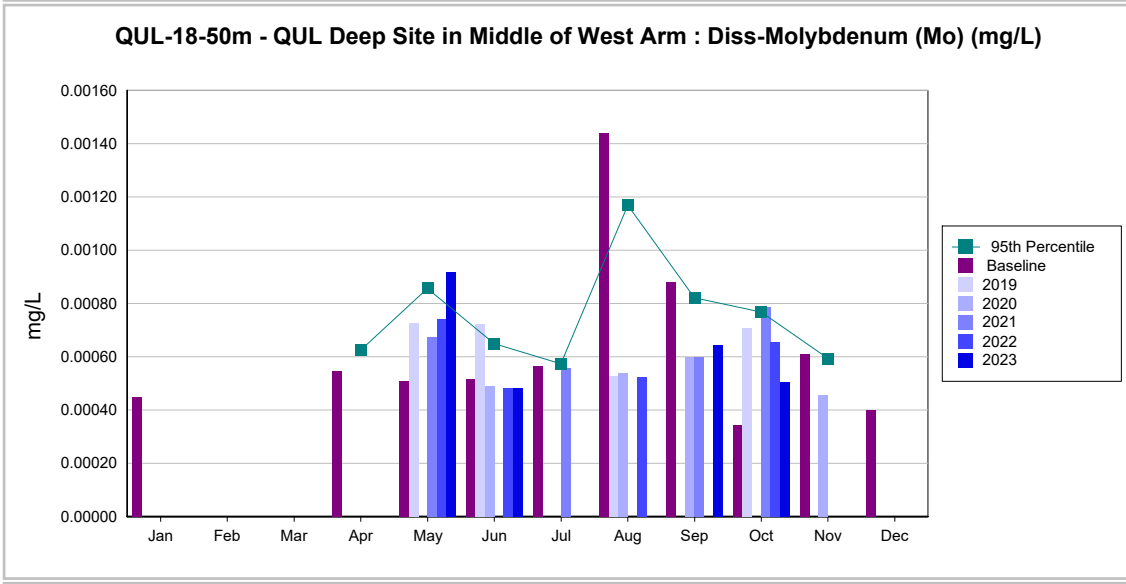

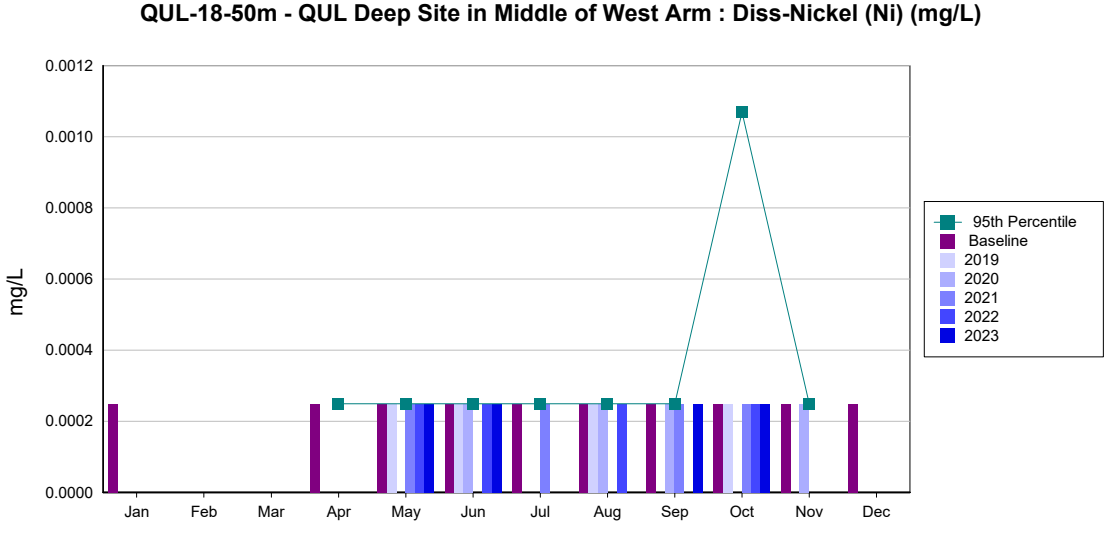

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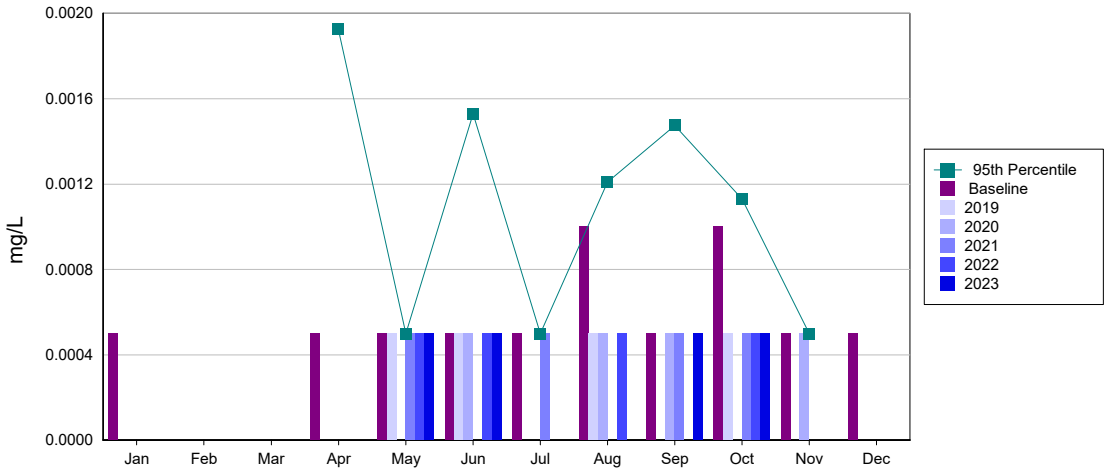

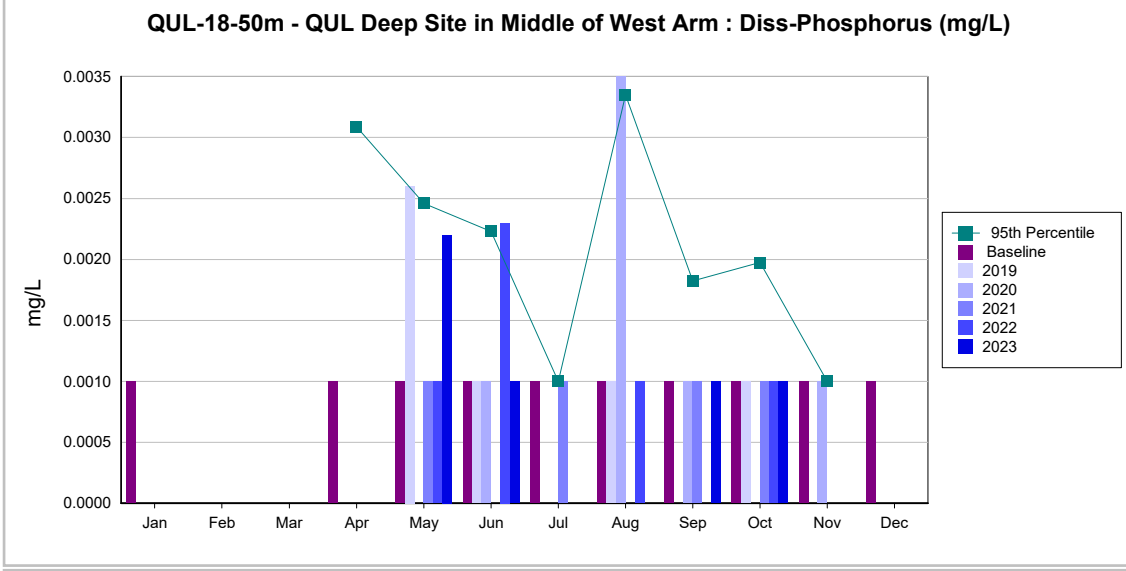

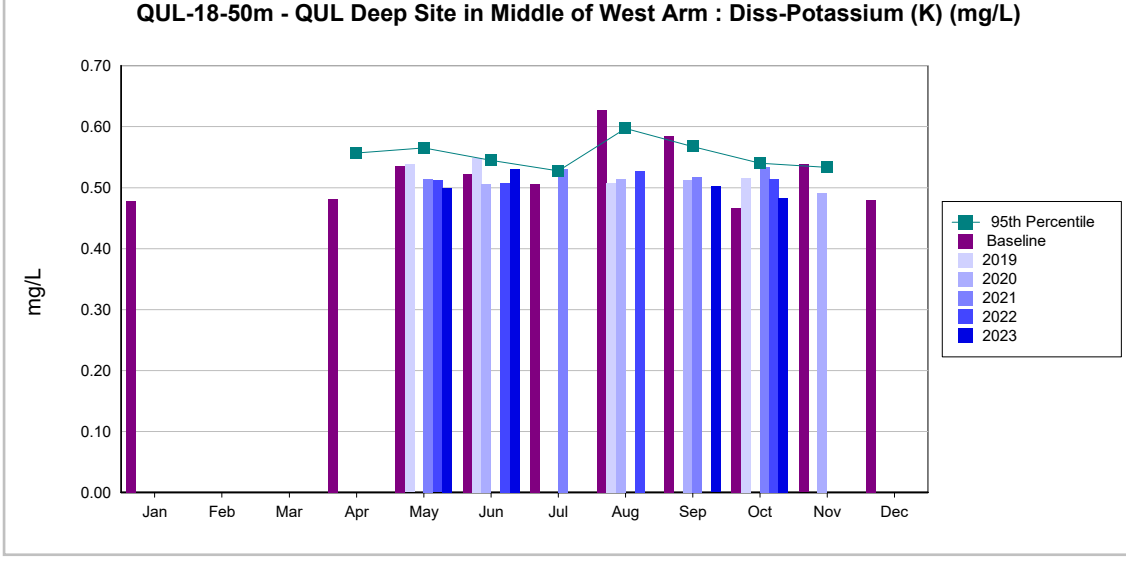

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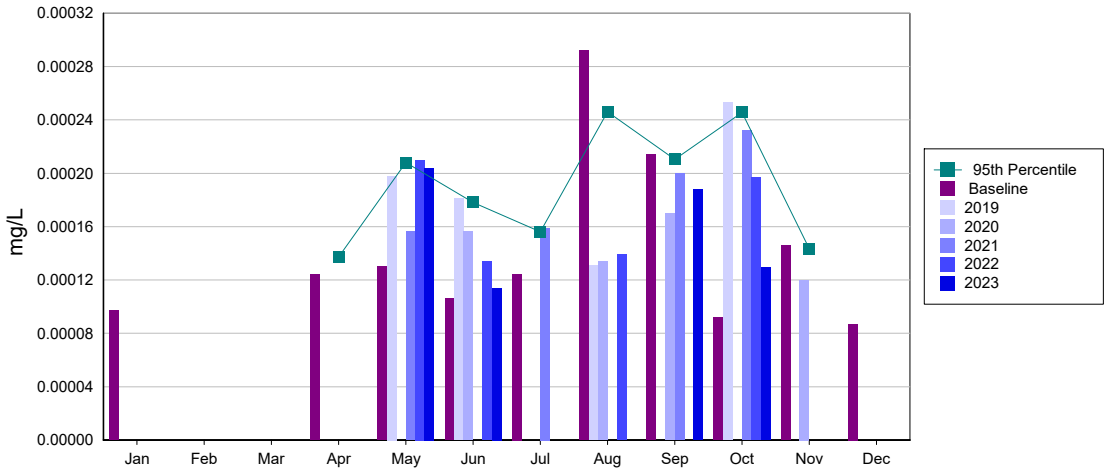

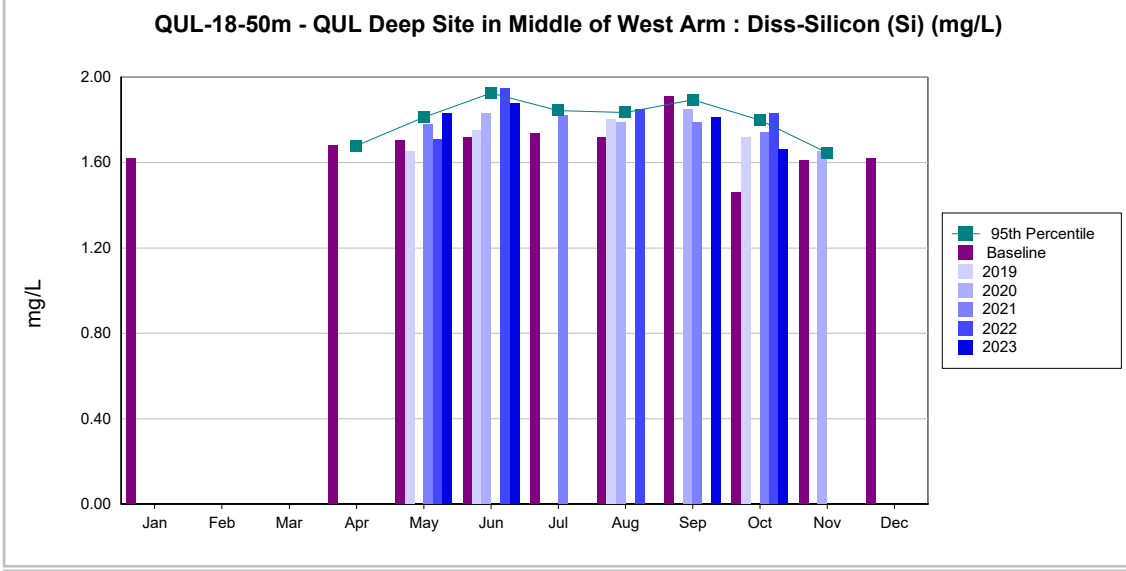

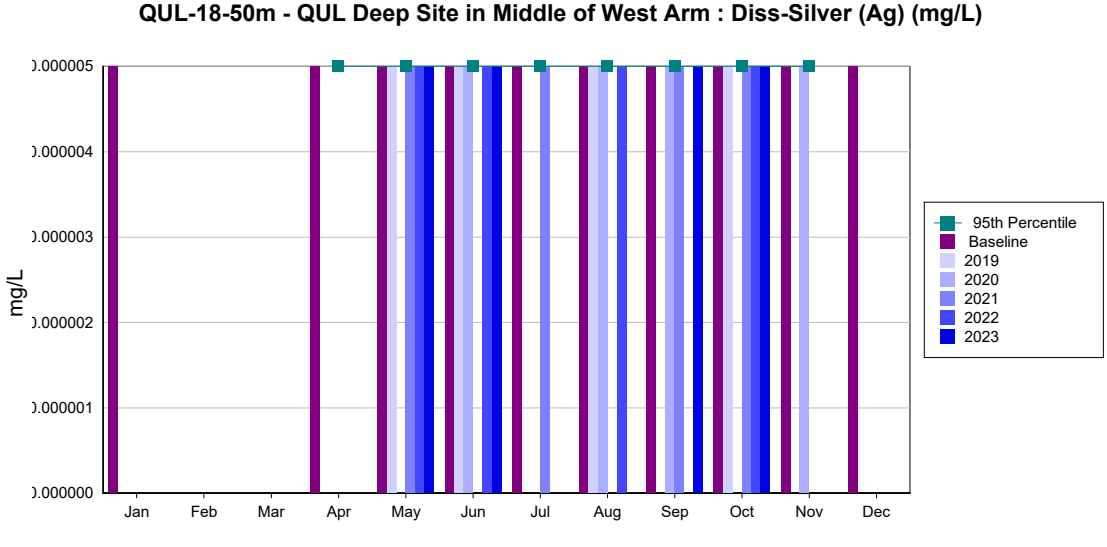

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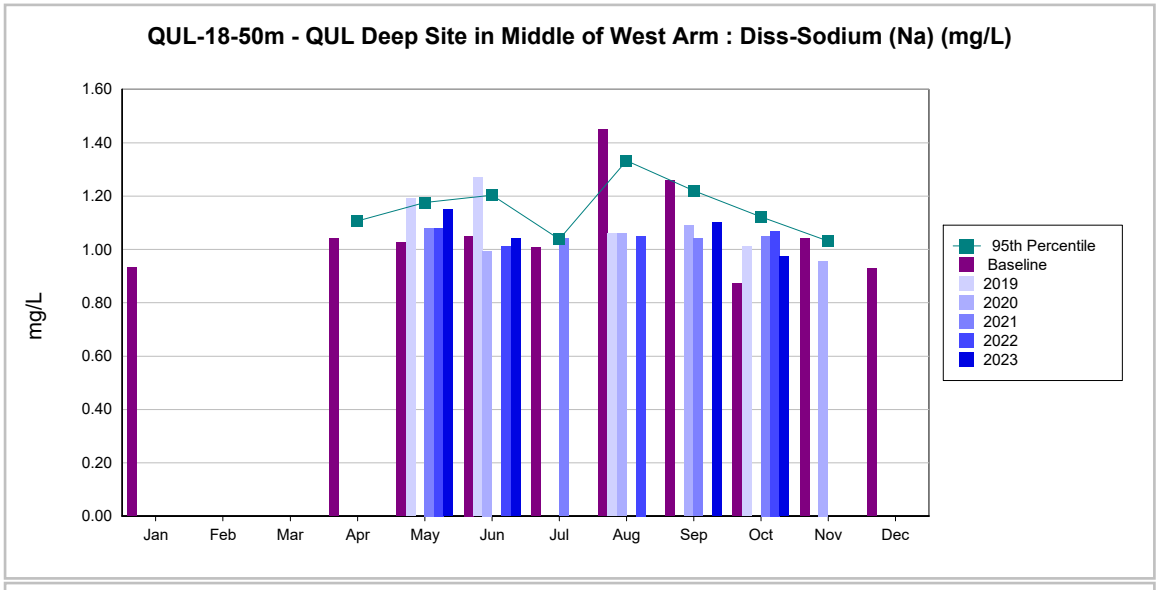

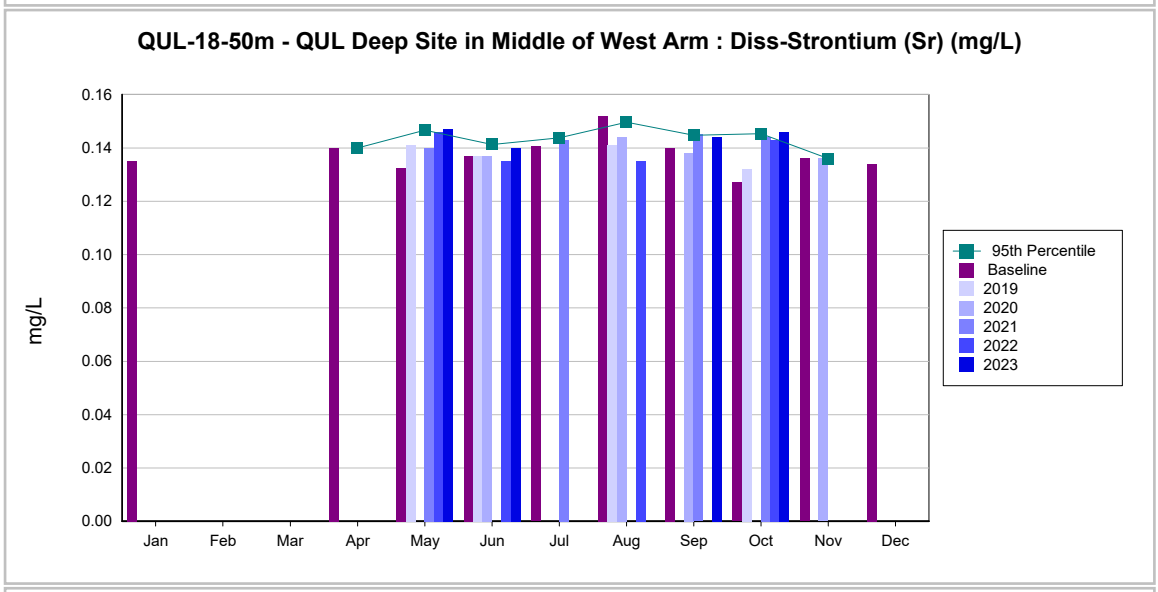

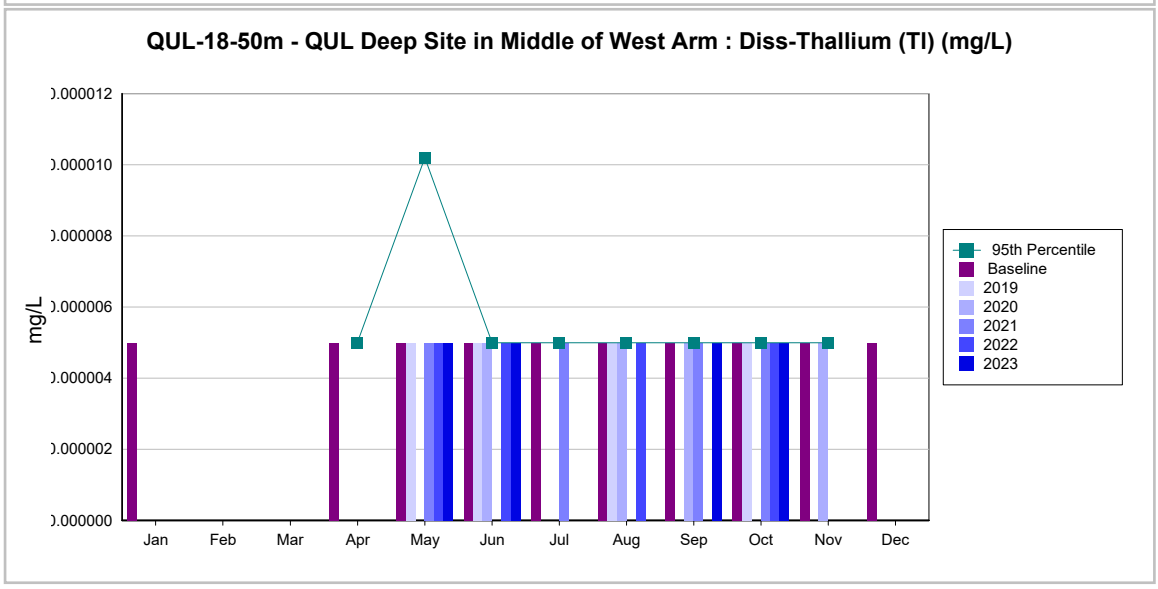

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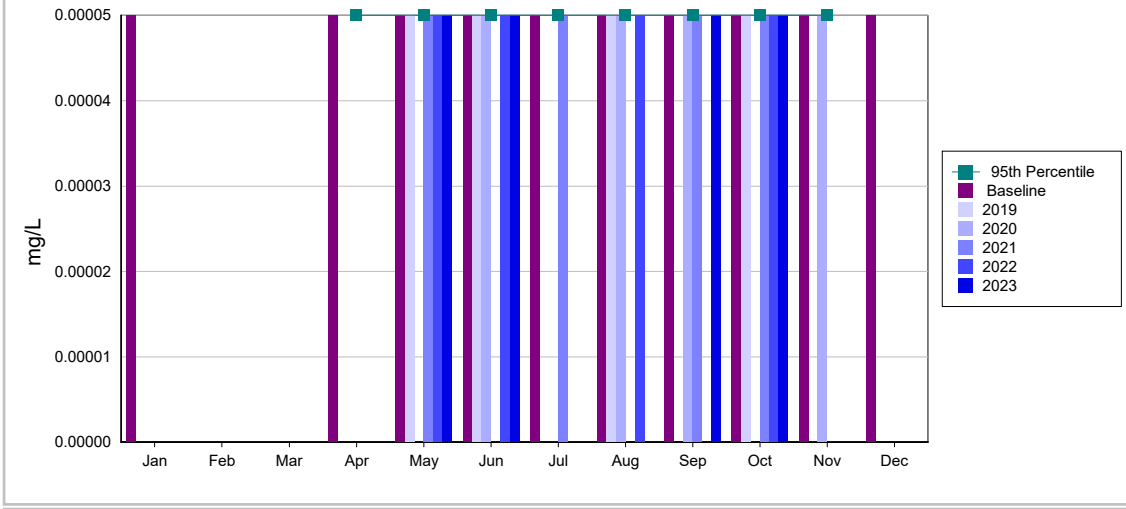

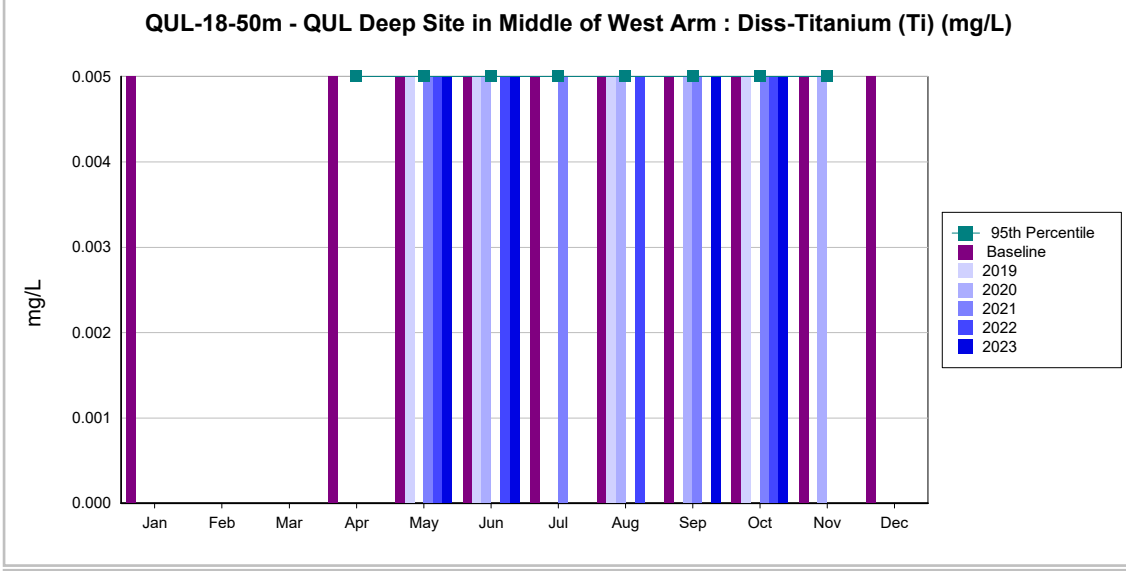

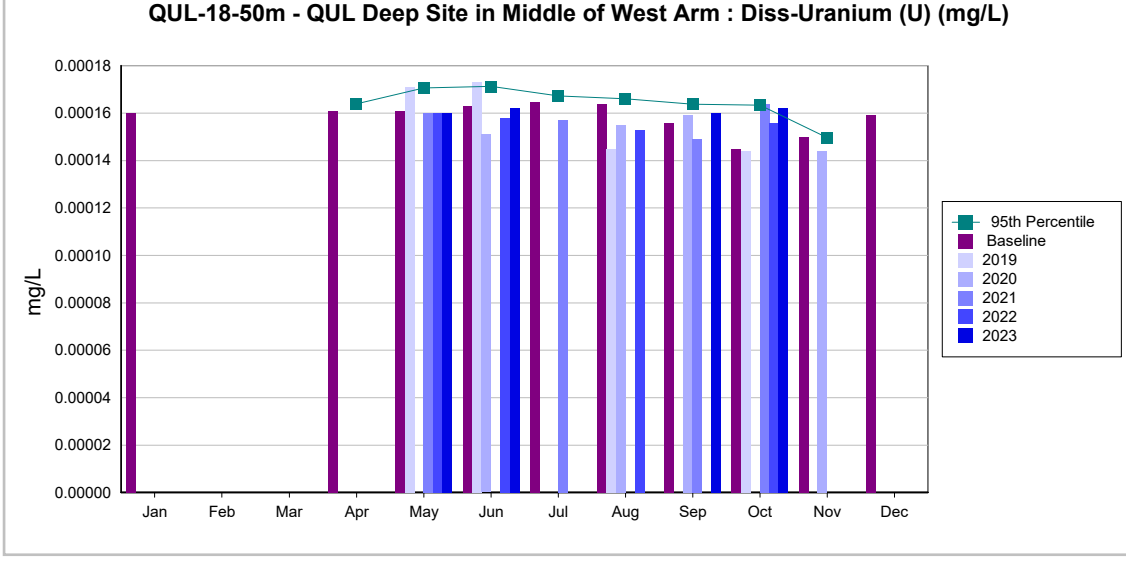

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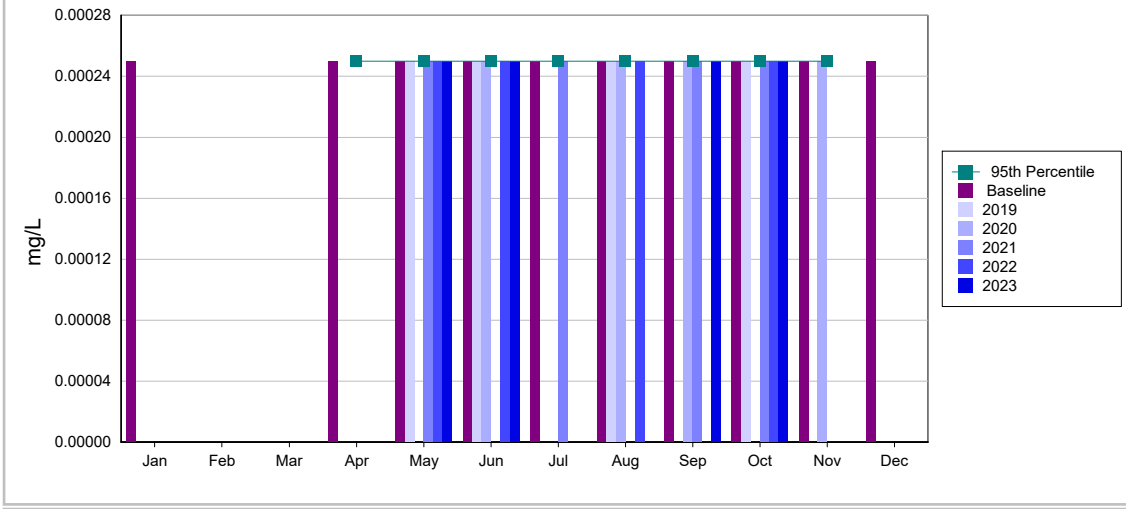

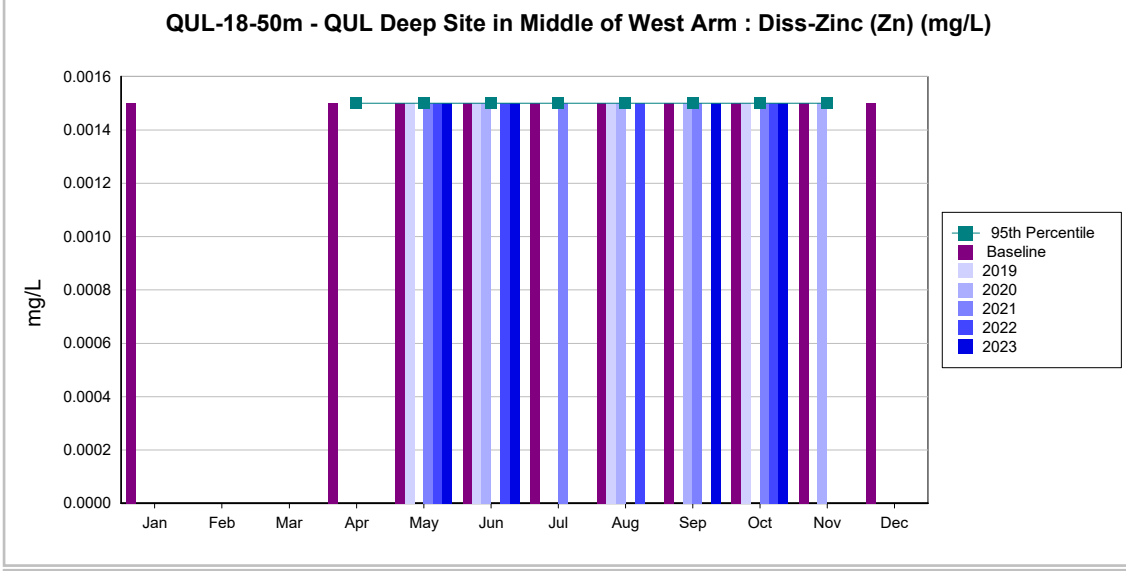

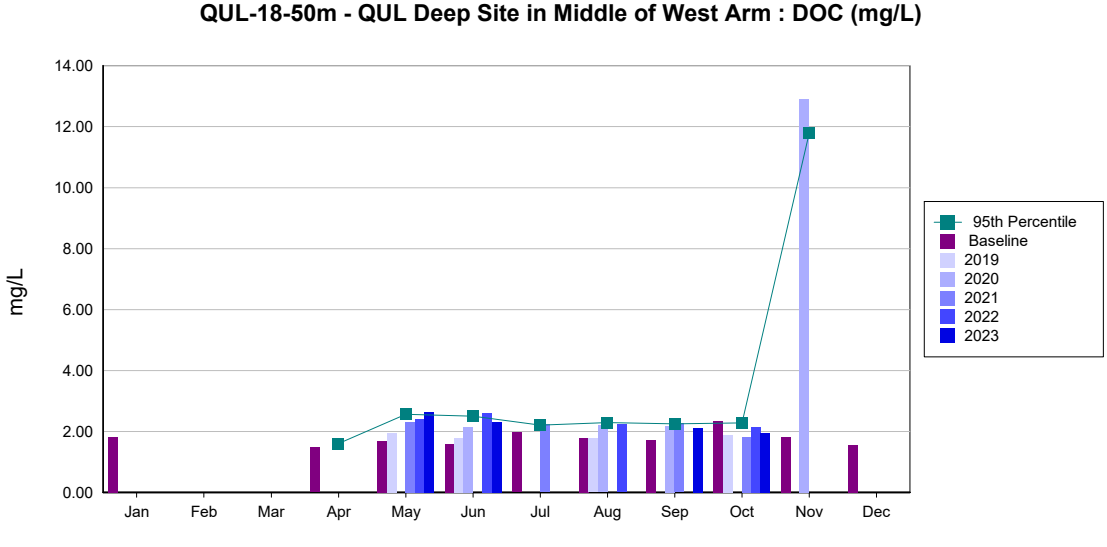

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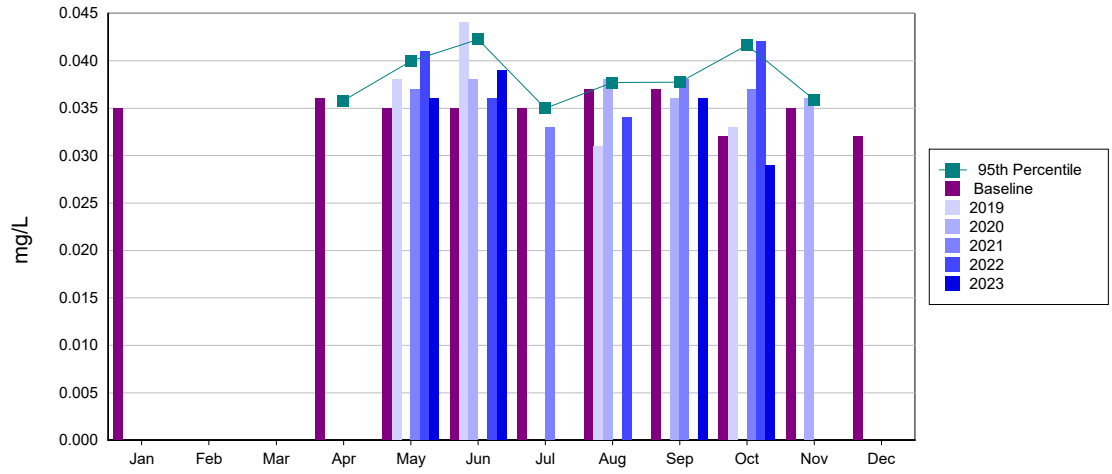
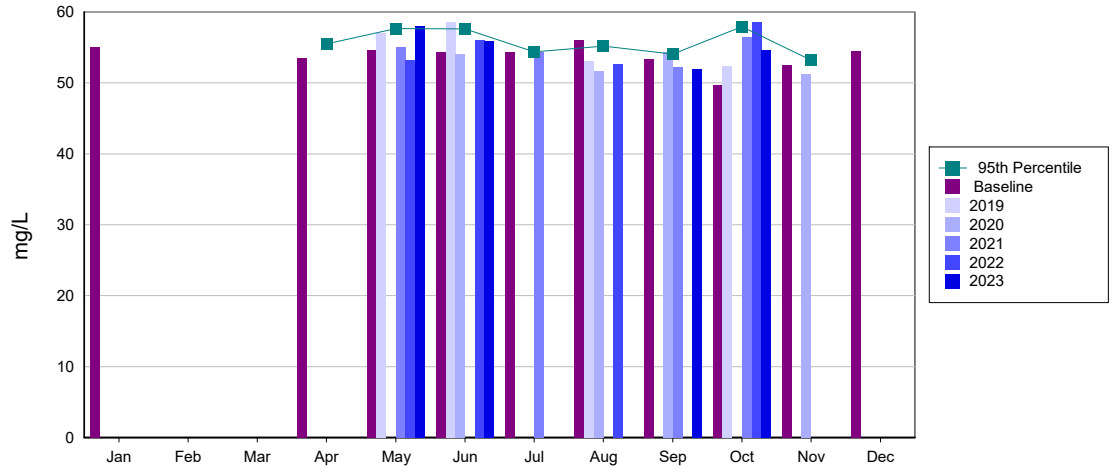
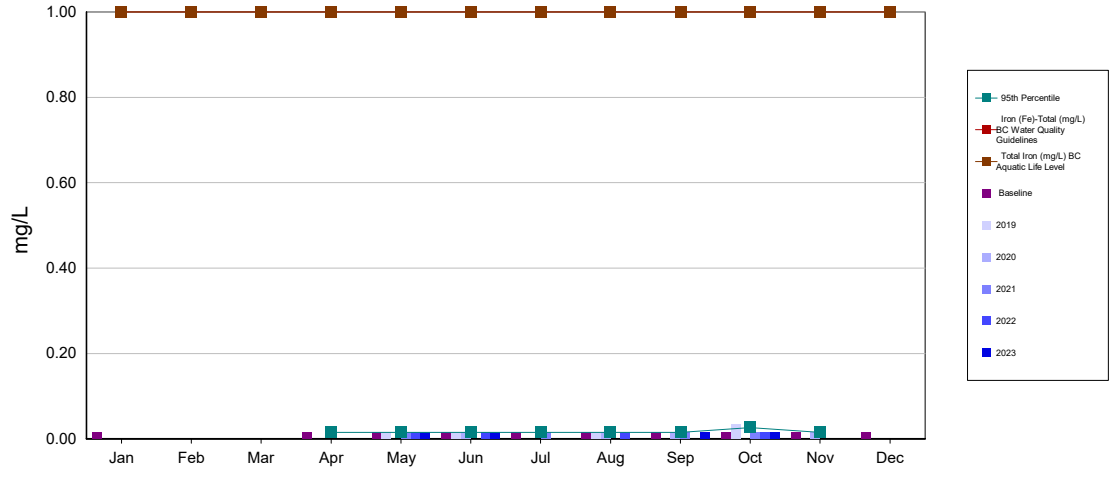
QUL-18-50m - QUL Deep Site in Middle of West Arm : Floride (mg/L)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Hardness (mg/L)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Iron (Fe)-Total (mg/L)



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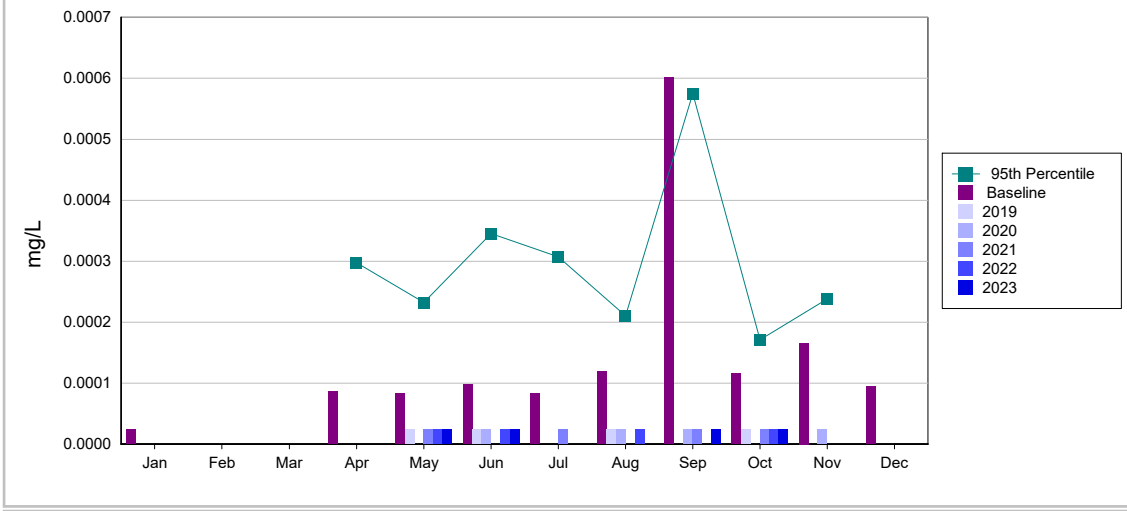

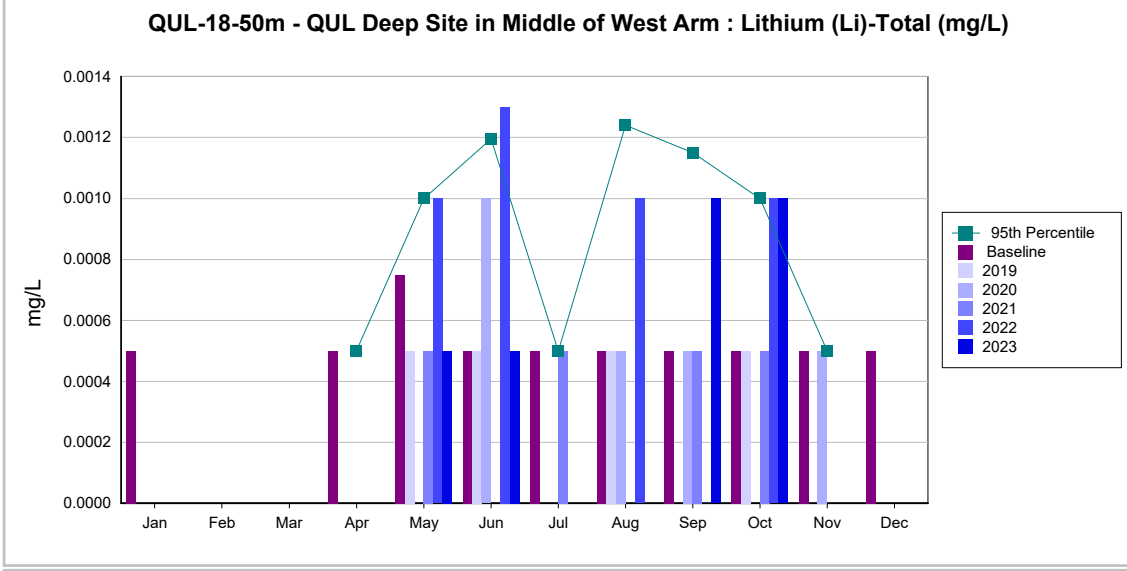

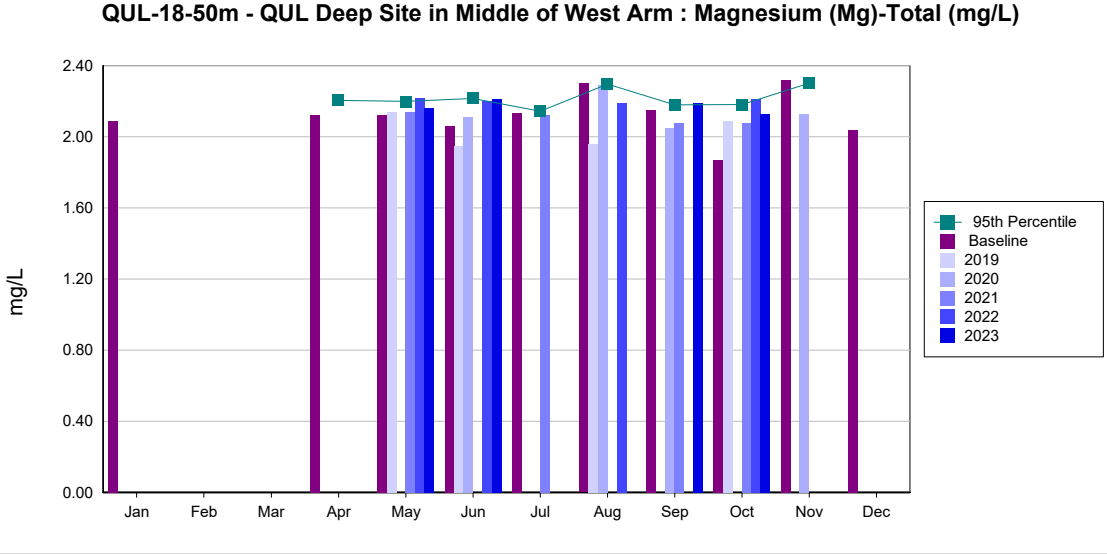

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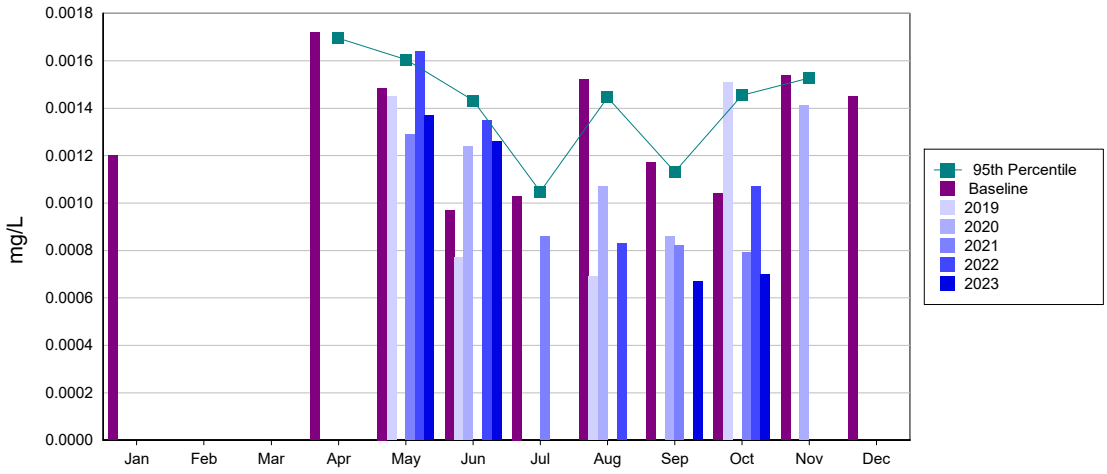
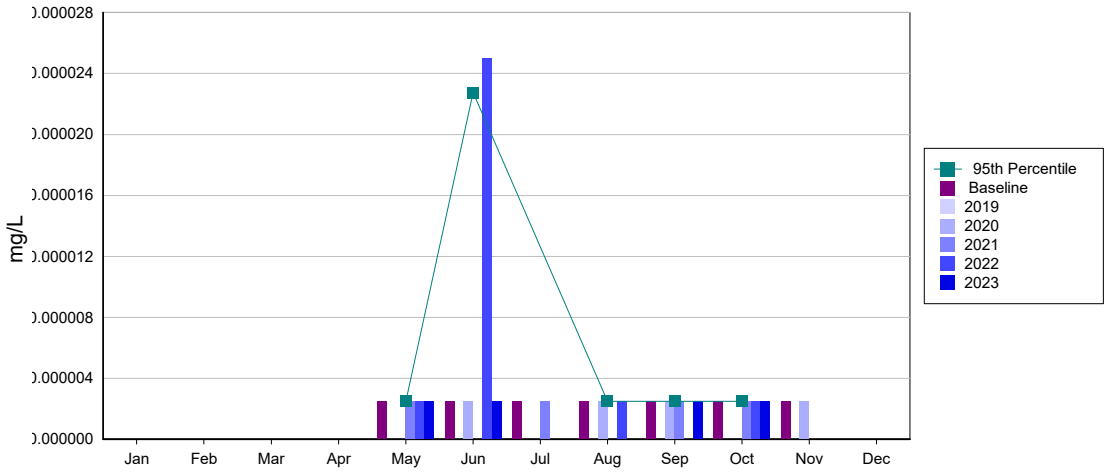
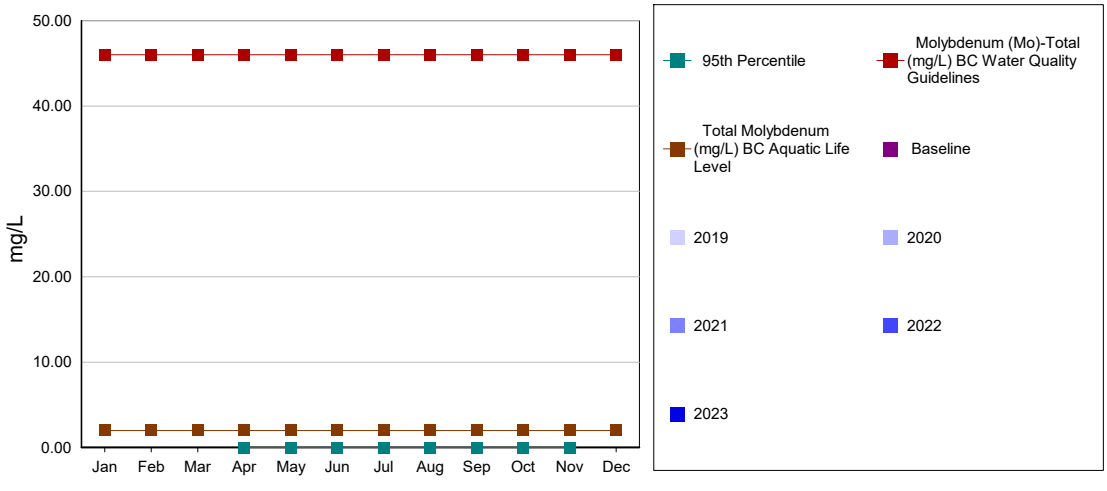
QUL-18-50m - QUL Deep Site in Middle of West Arm : Manganese (Mn)-Total (mg/L)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Mercury (Hg)-Total (mg/L)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Molybdenum (Mo)-Tota (mg/L)



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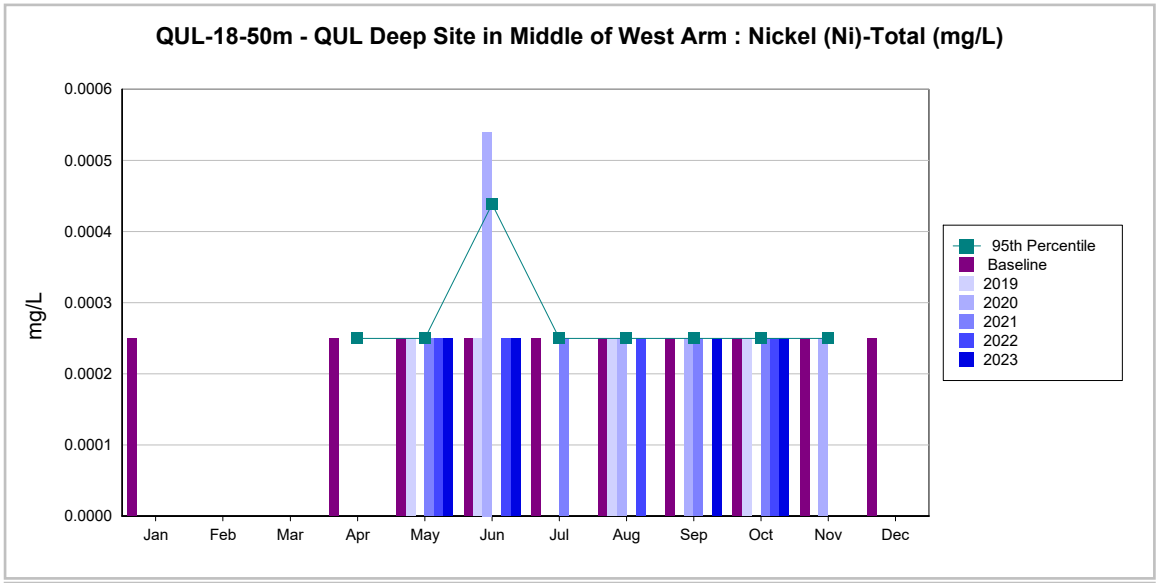

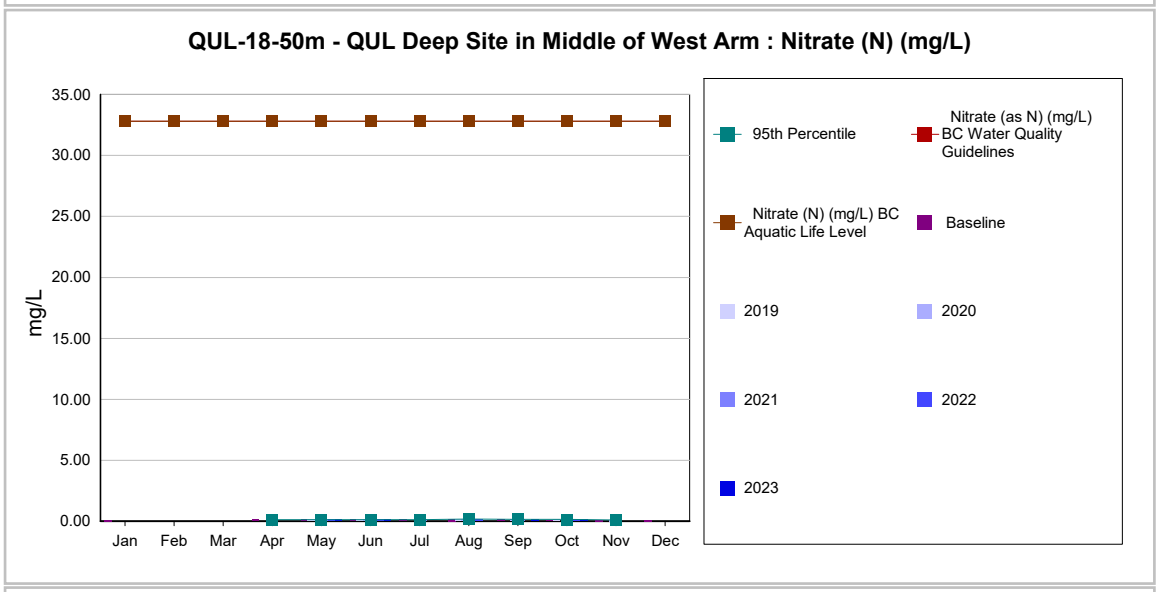

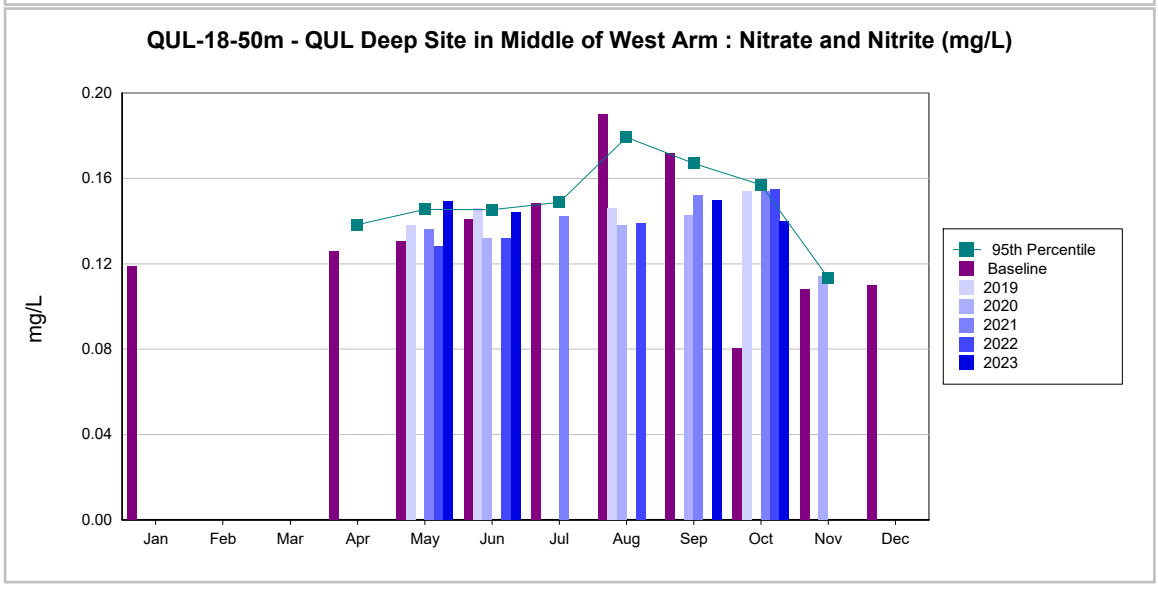

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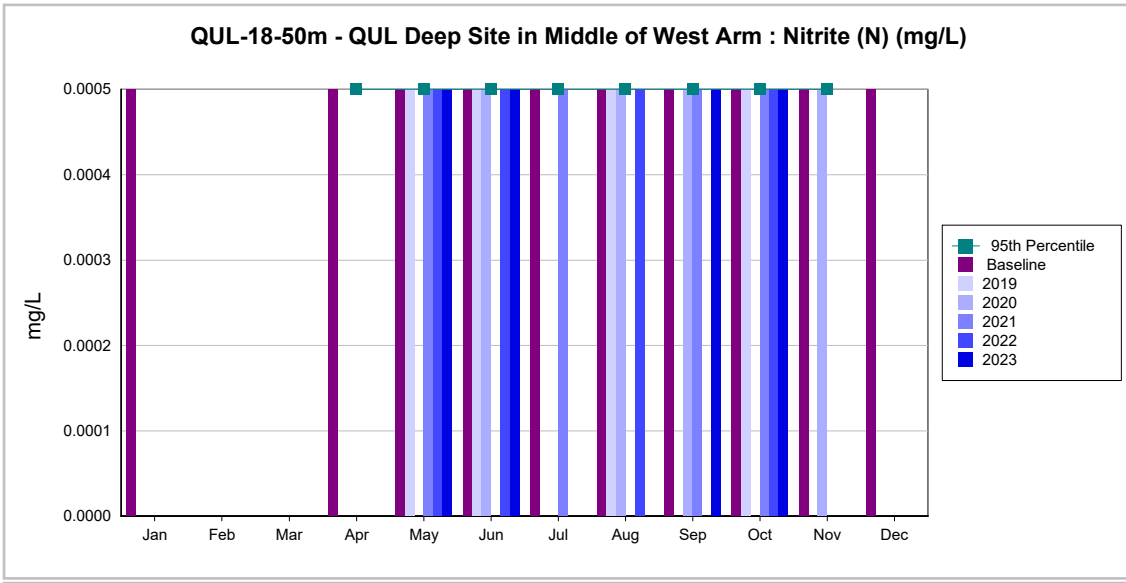

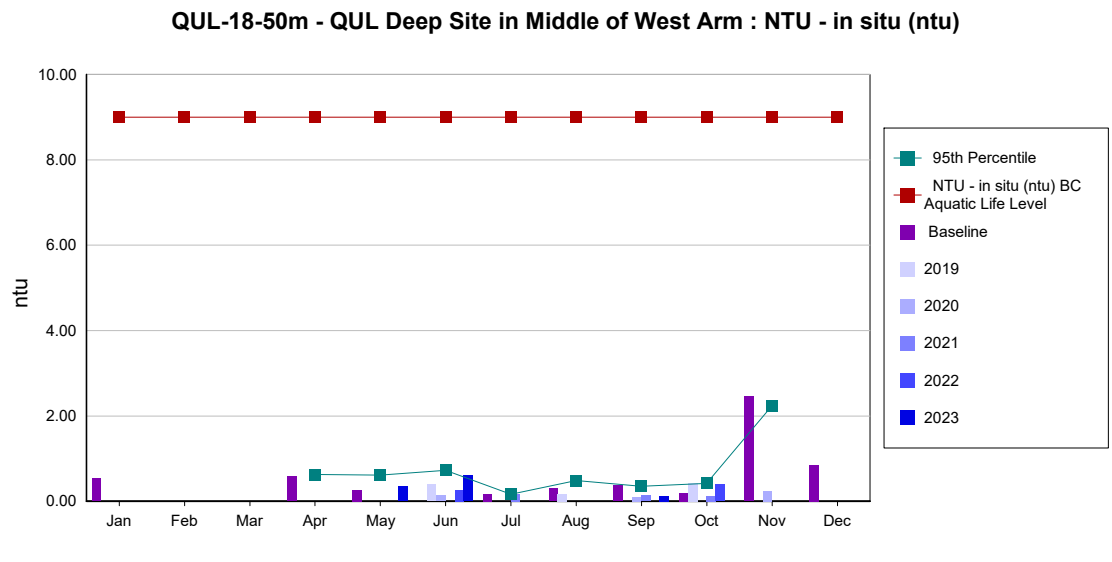

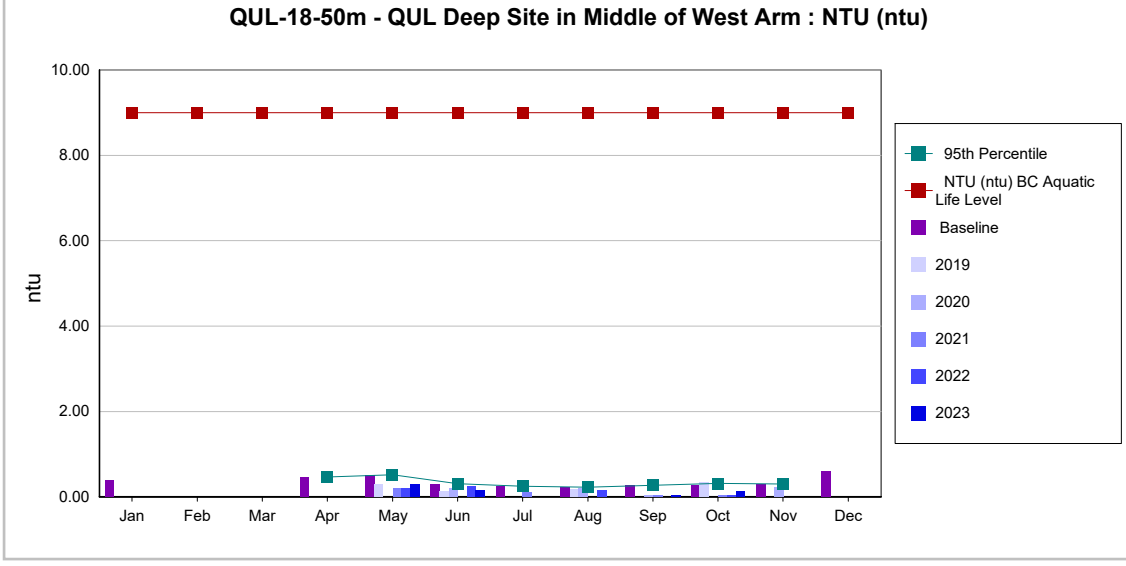

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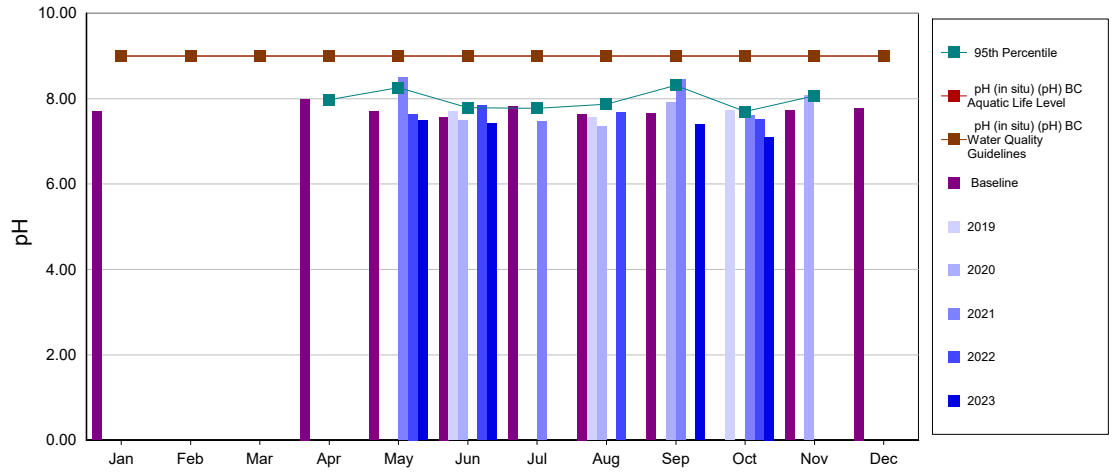
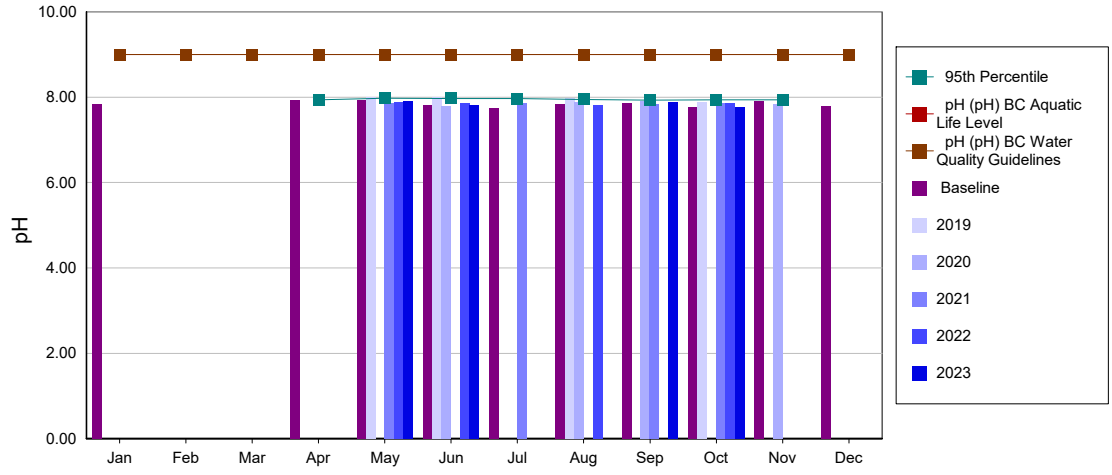
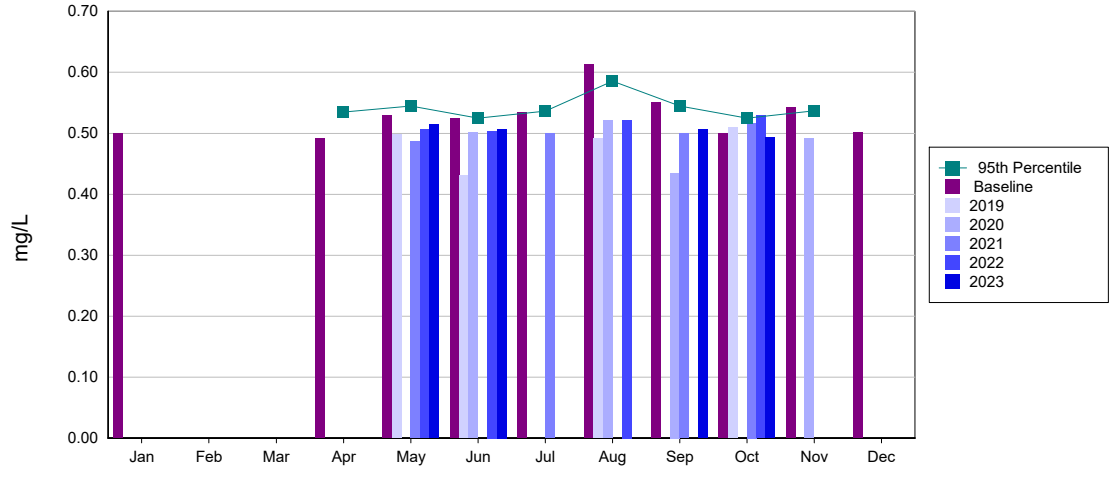
QUL-18-50m - QUL Deep Site in Middle of West Arm : pH (in situ) (pH)



QUL-18-50m - QUL Deep Site in Middle of West Arm : pH (pH)



QUL-18-50m - QUL Deep Site in Middle of West Arm : Potassium (K)-Total (mg/L)



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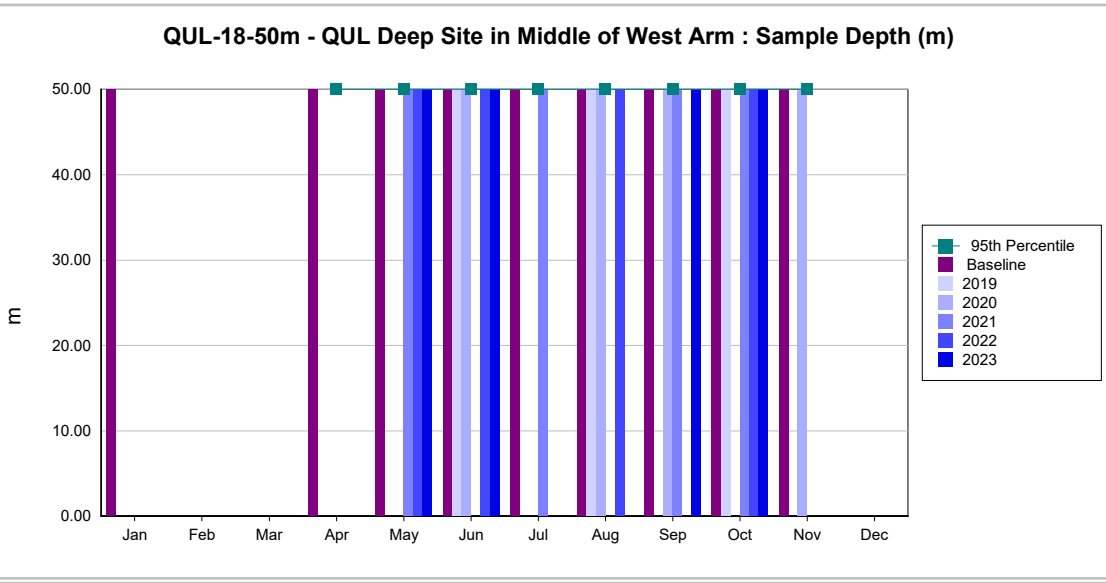

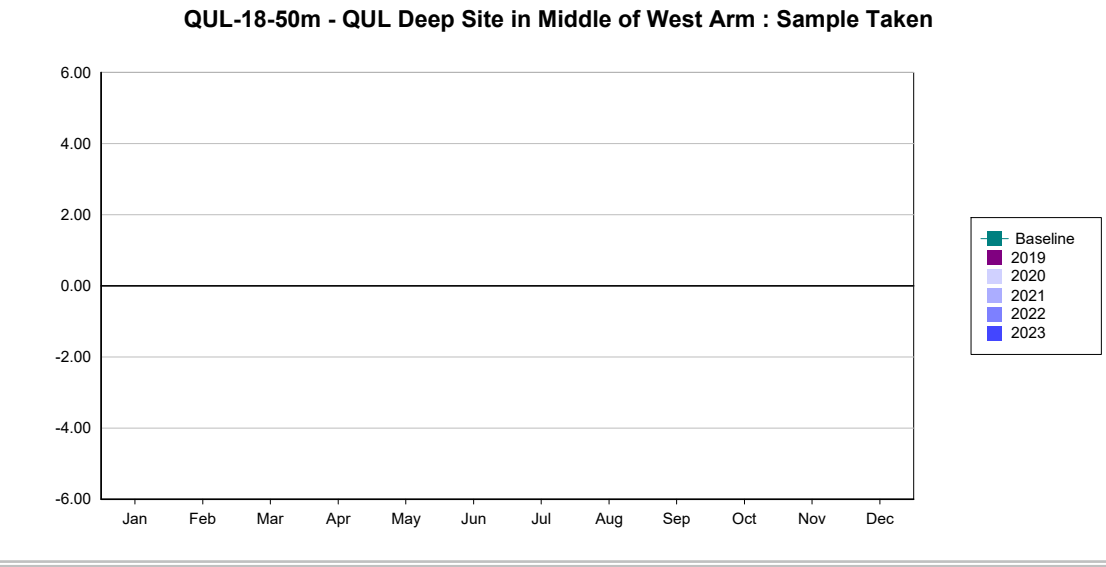

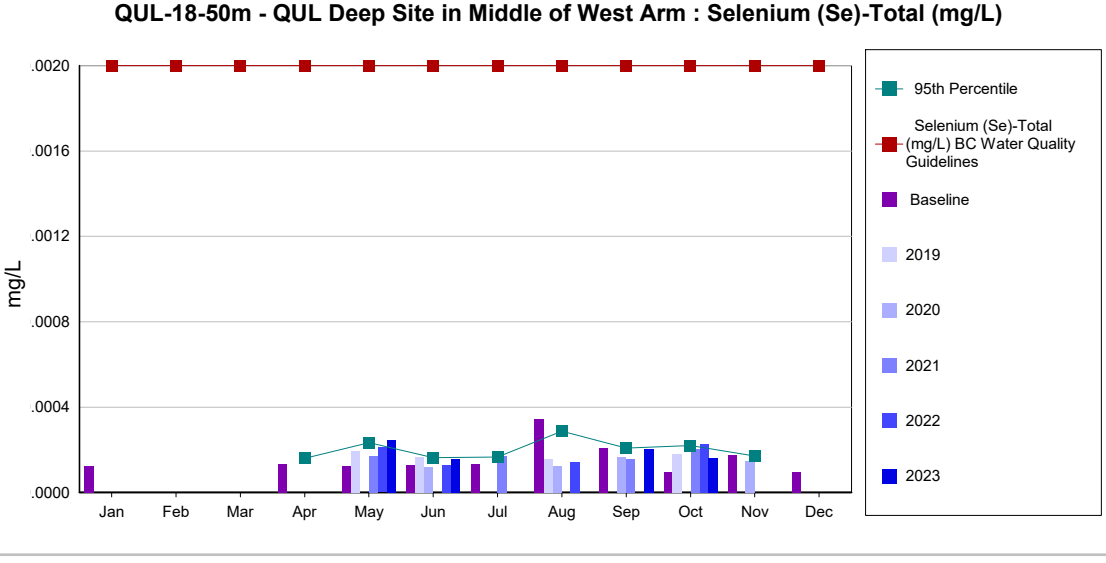

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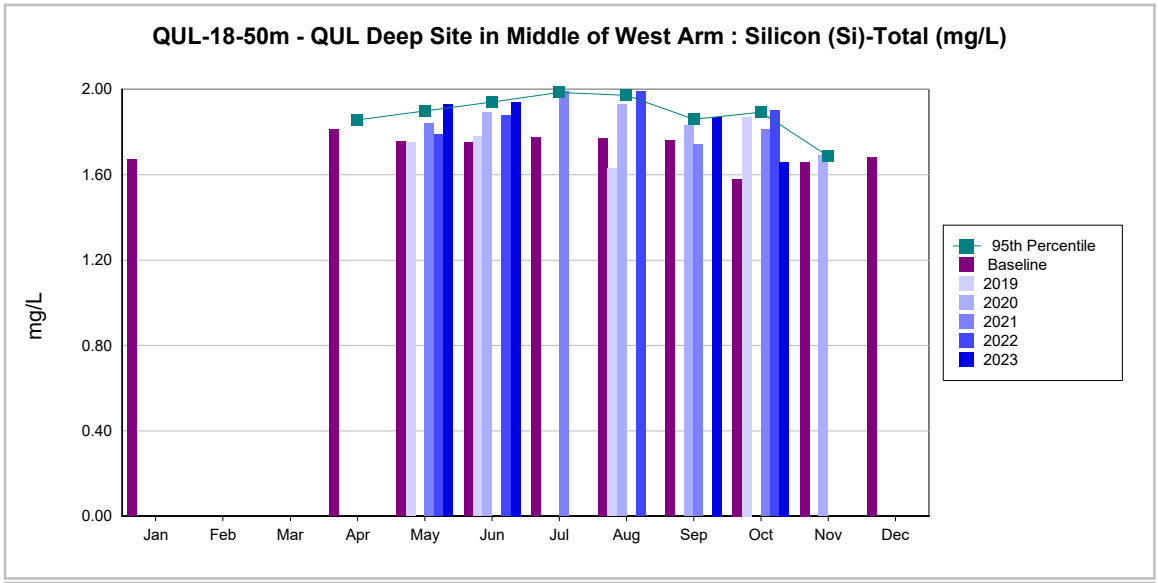

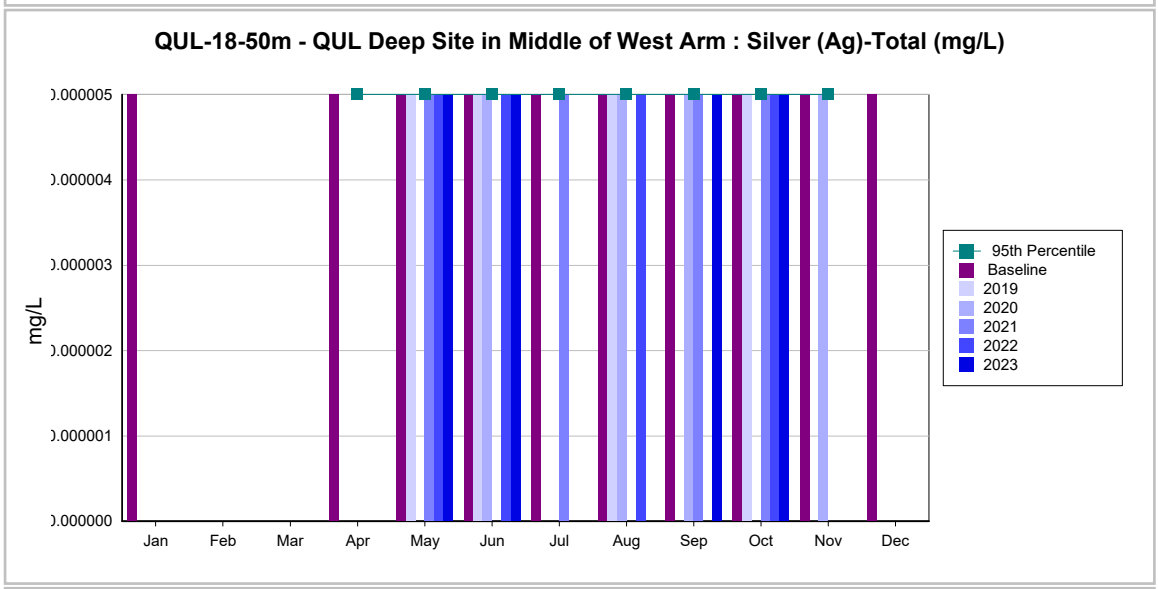

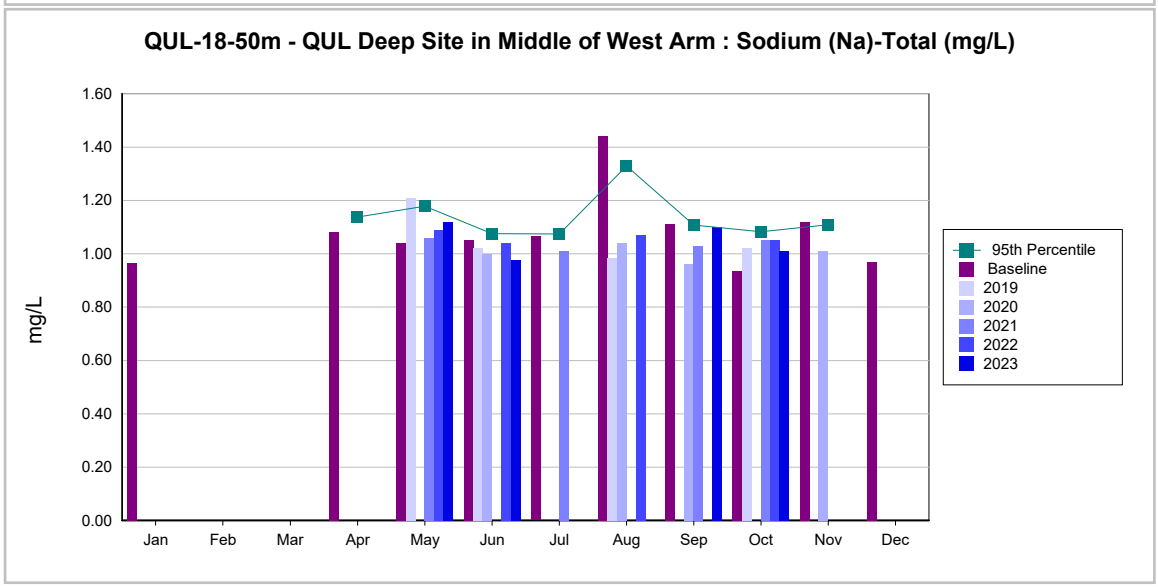

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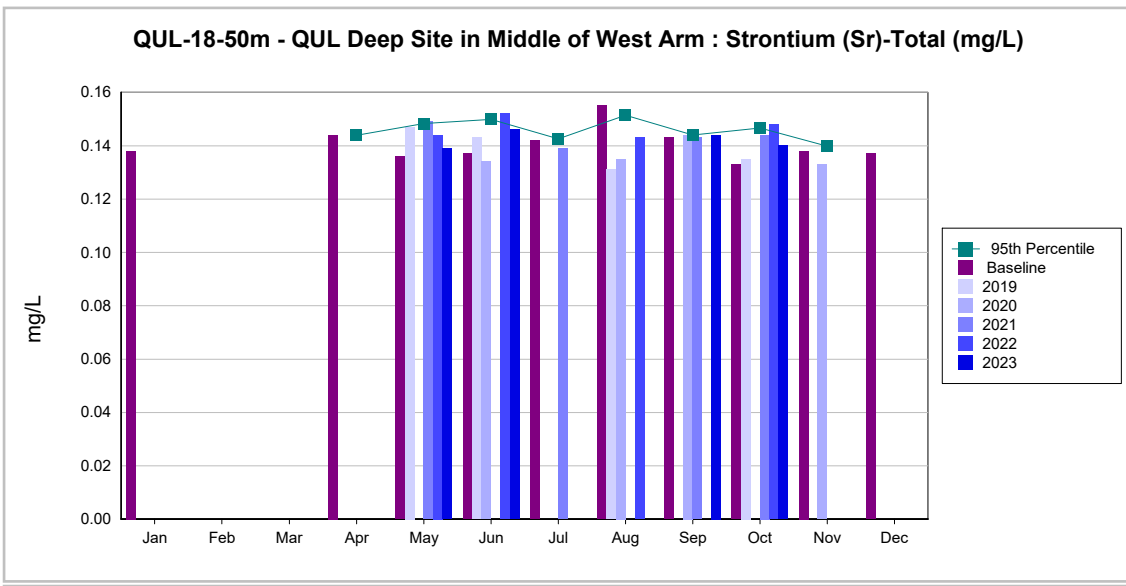

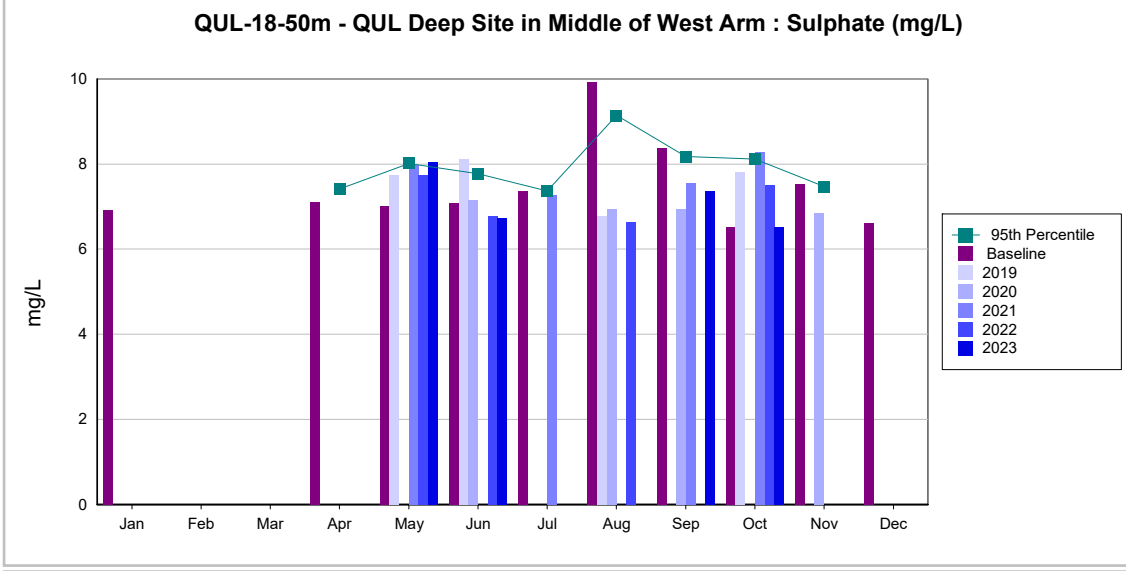

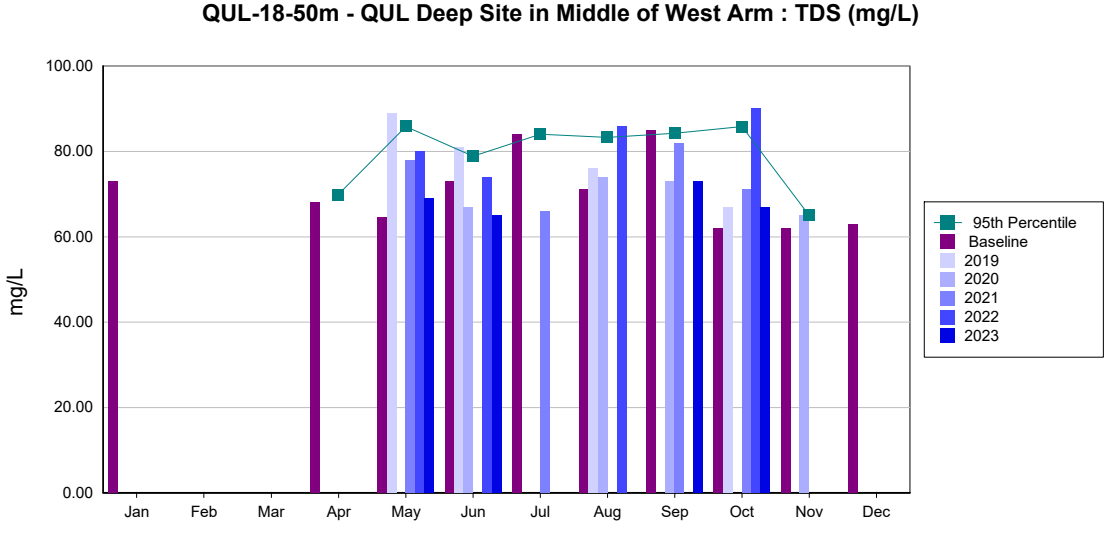

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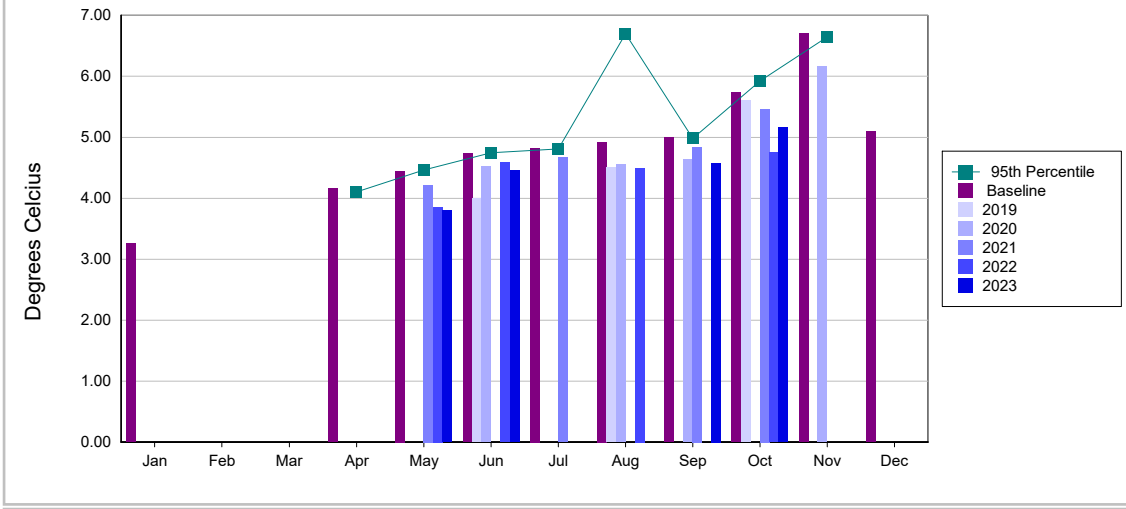

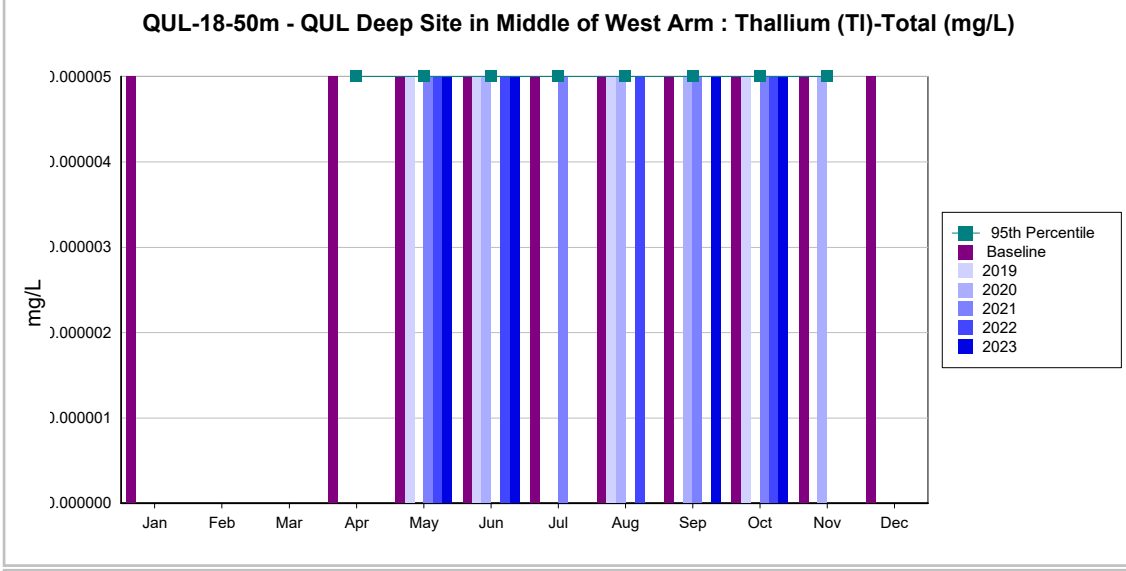

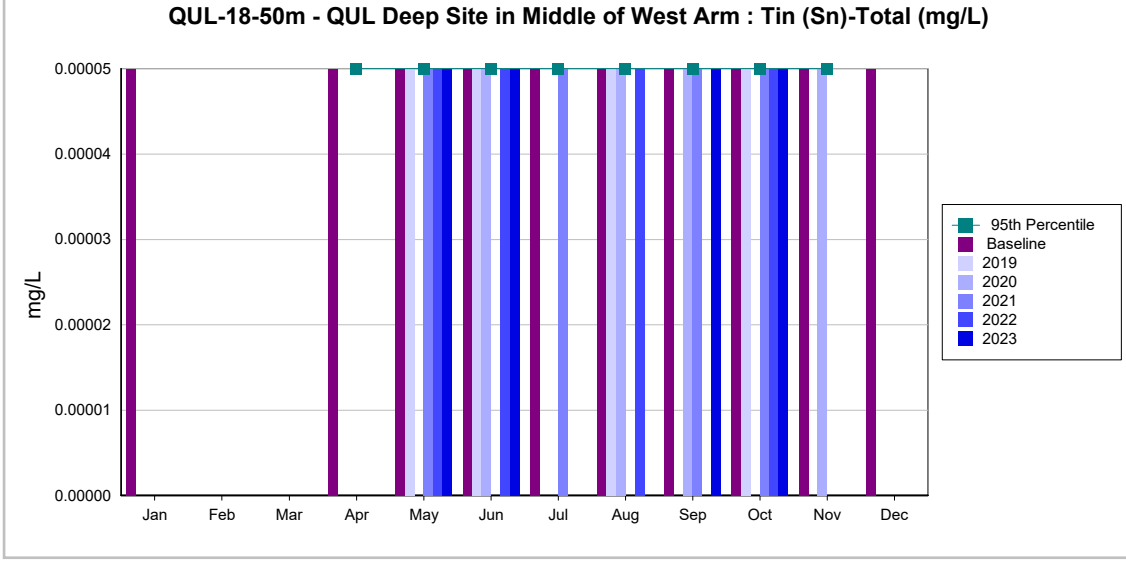

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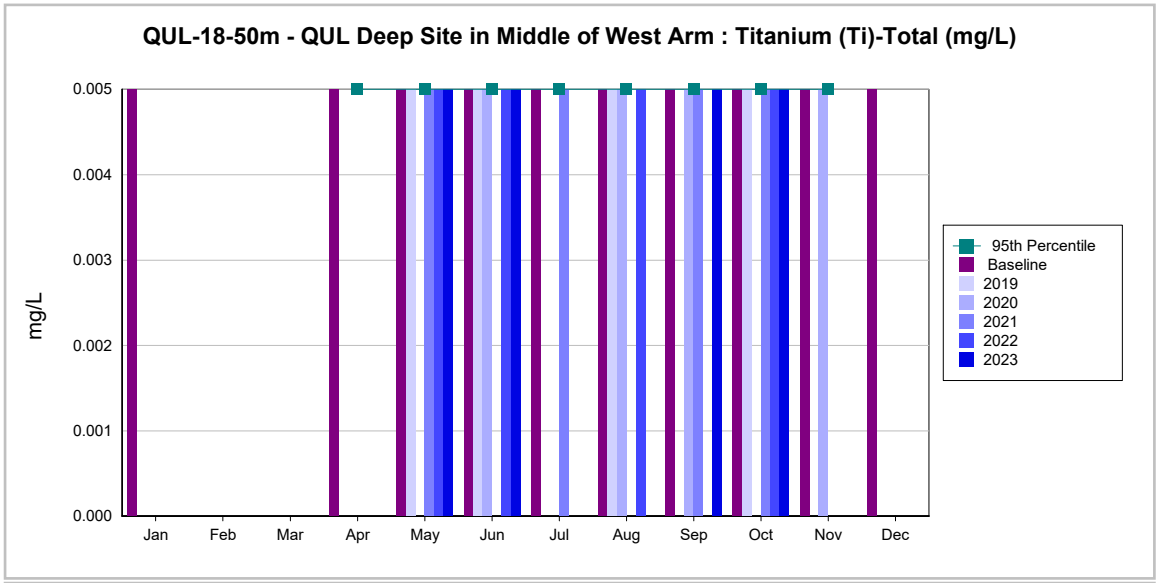

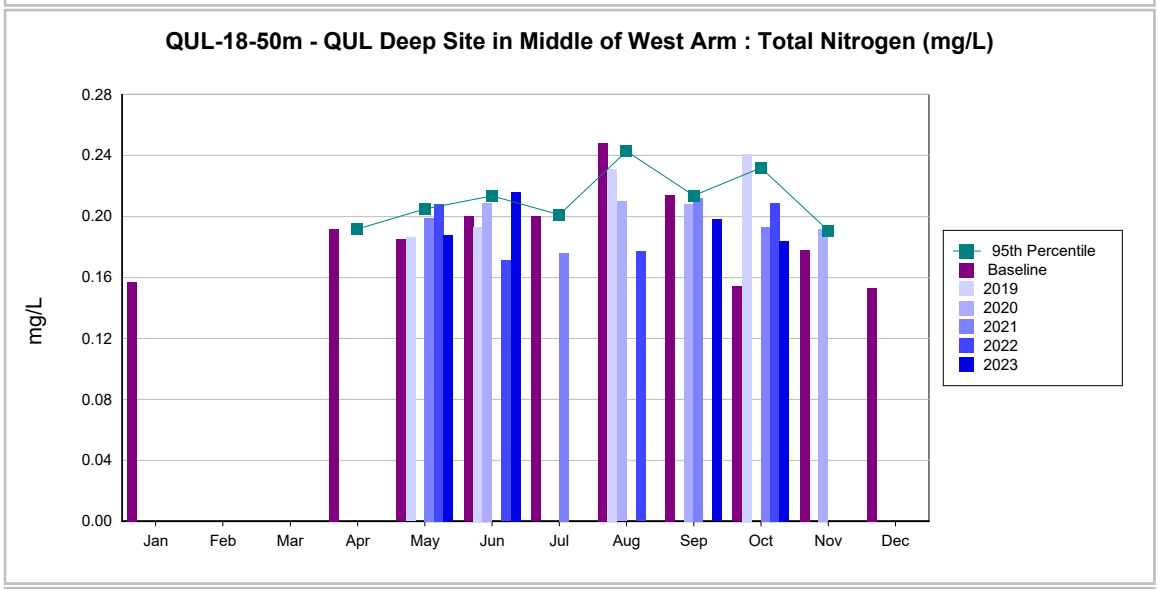

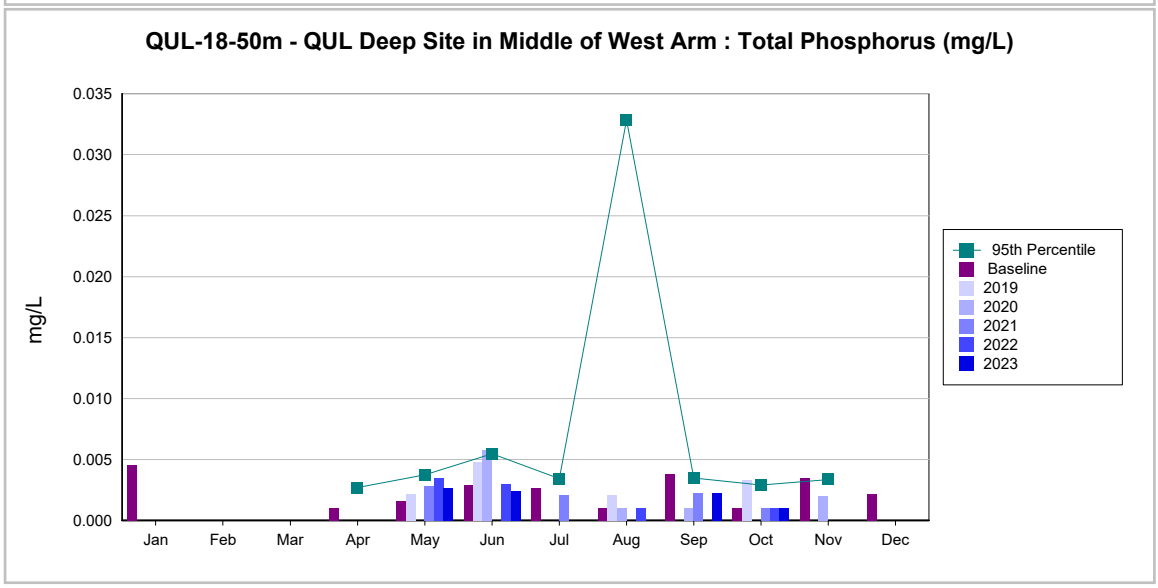

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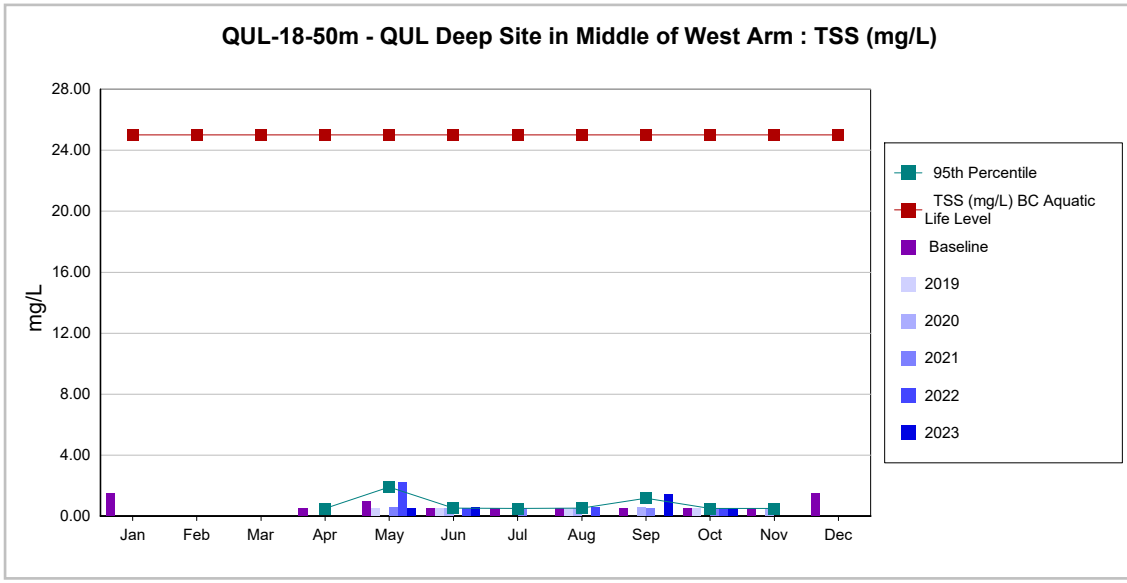

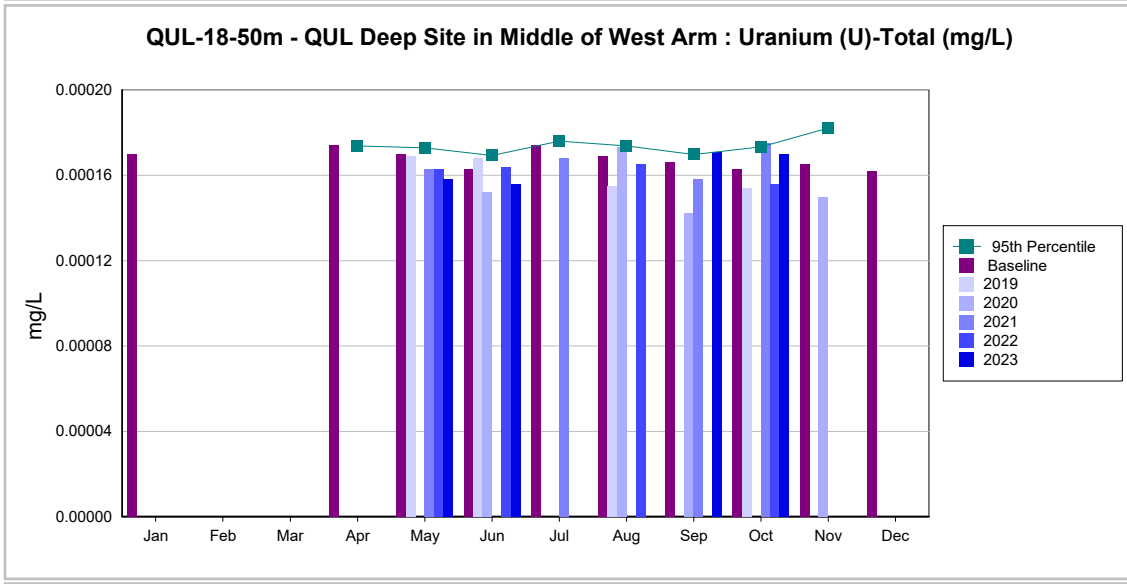

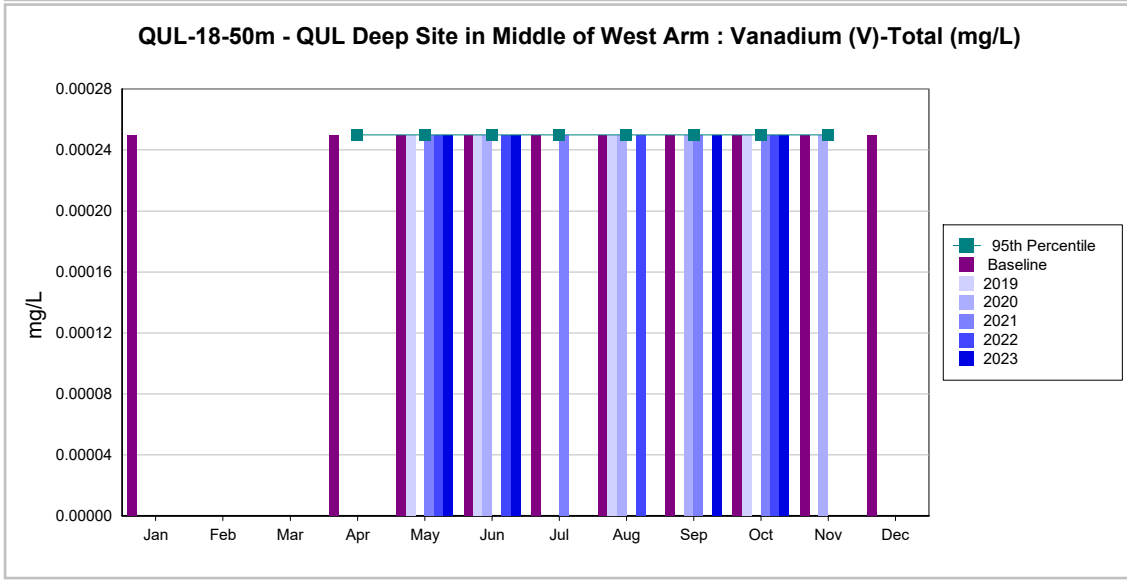

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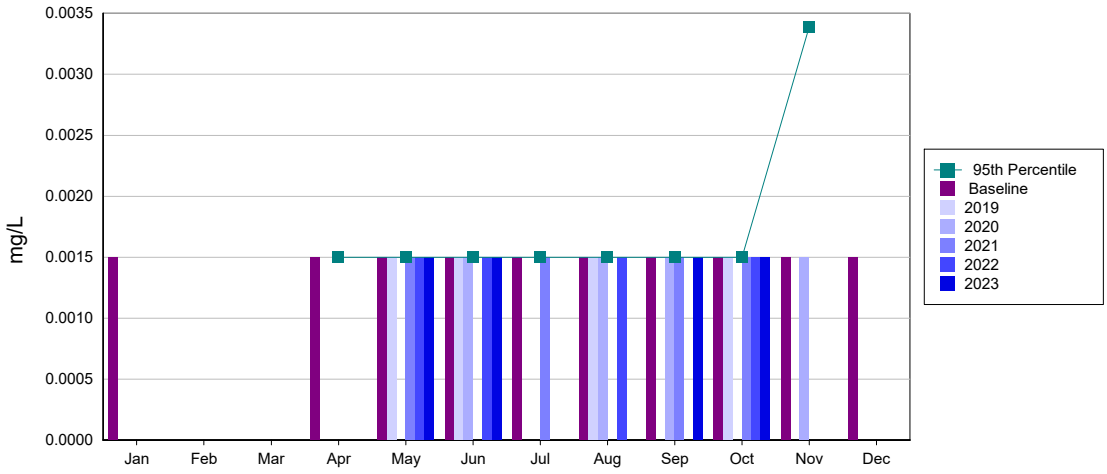
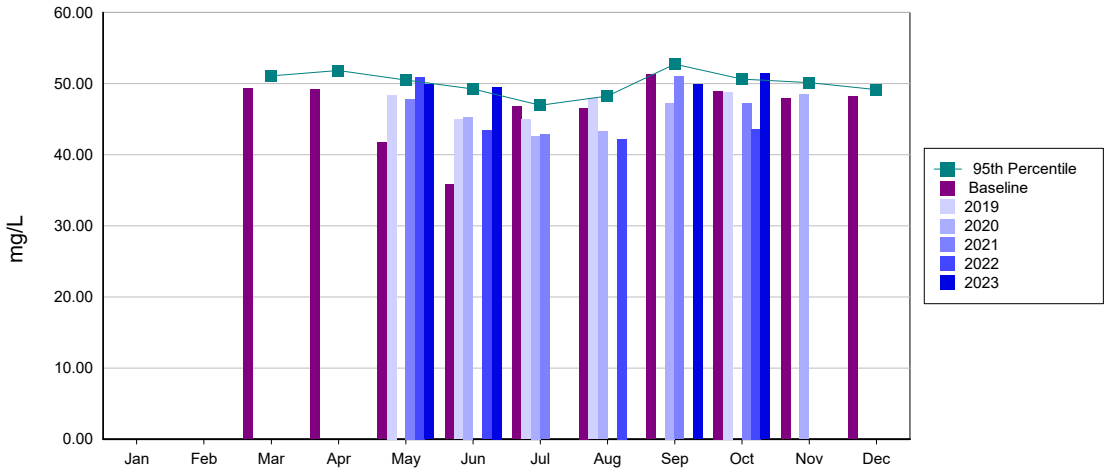
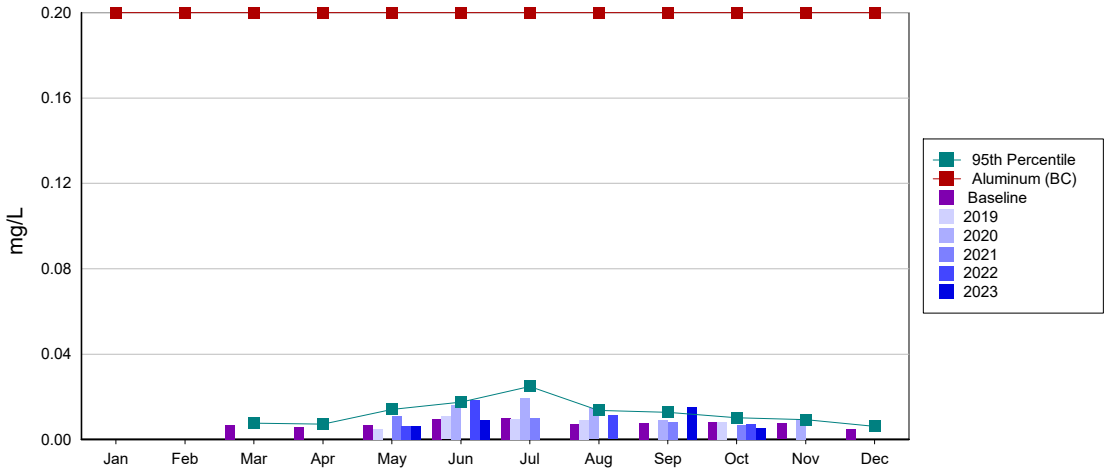
QUL-18-50m - QUL Deep Site in Middle of West Arm : Zinc (Zn)-Total (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Alkalinity (CaCO3) (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Aluminum (Al)-Diss (mg/L)



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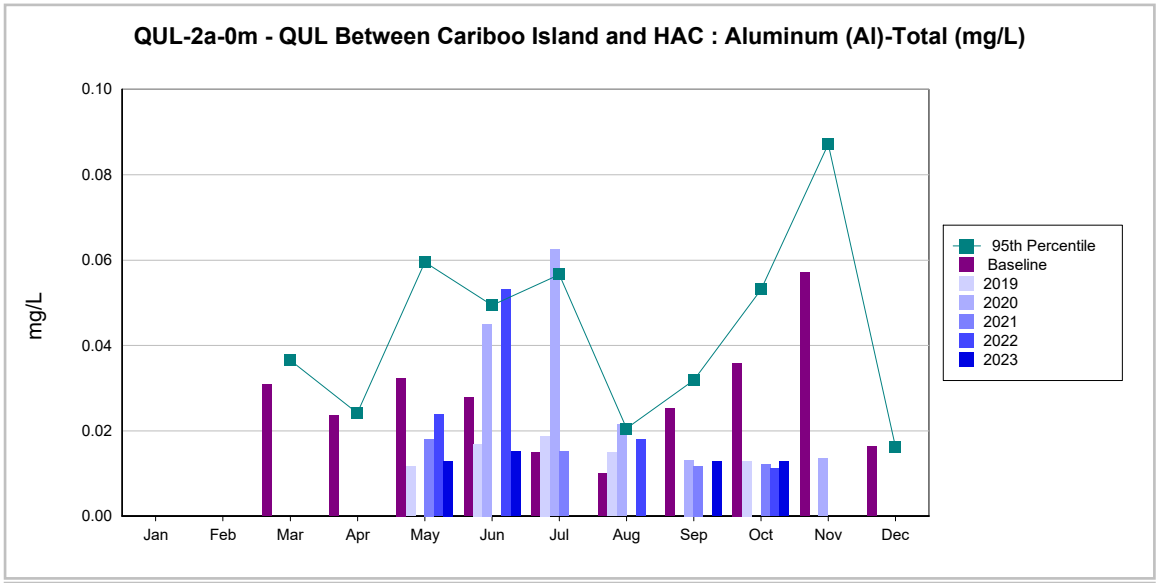

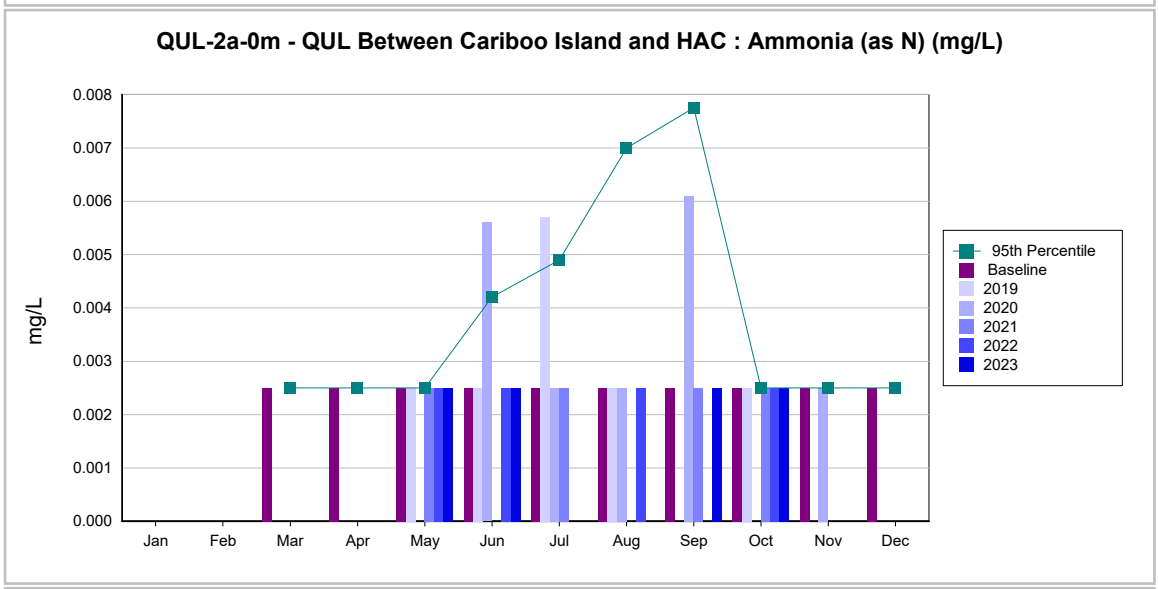

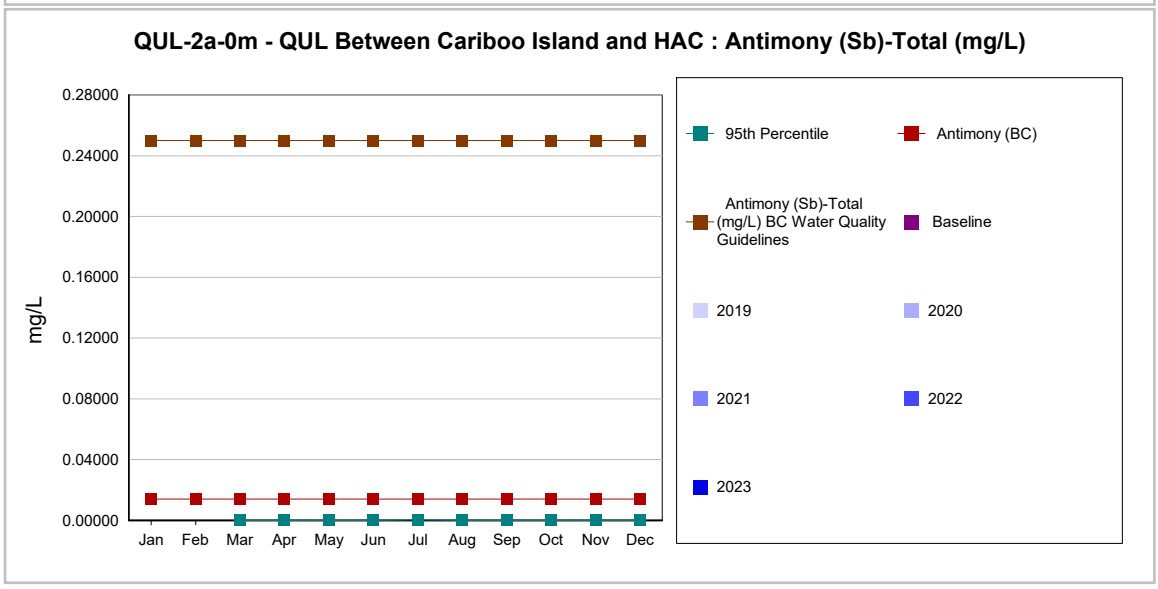

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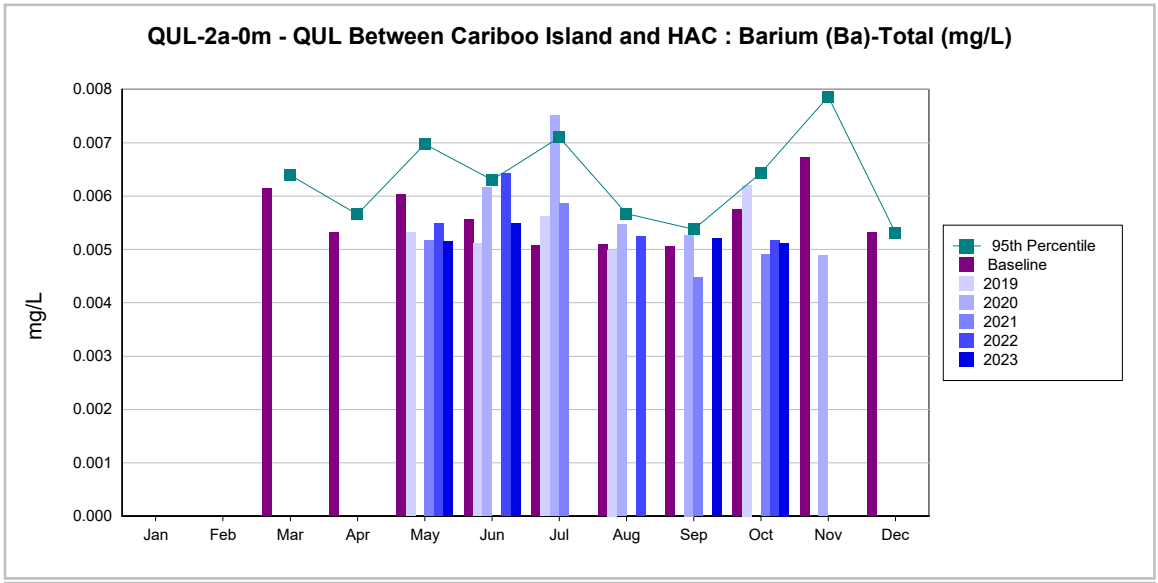

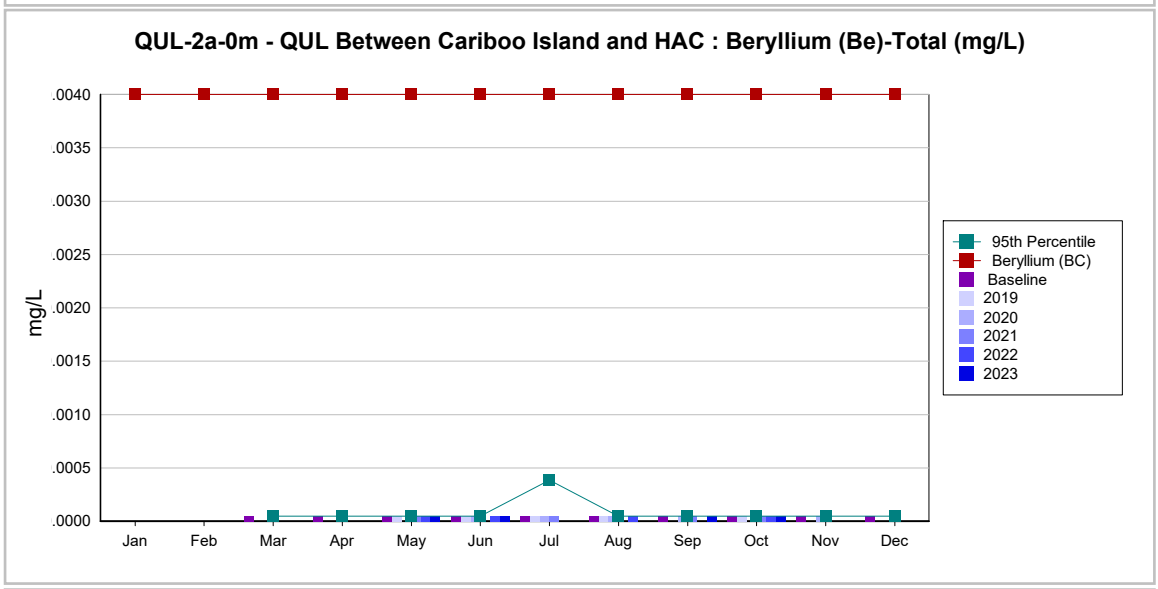

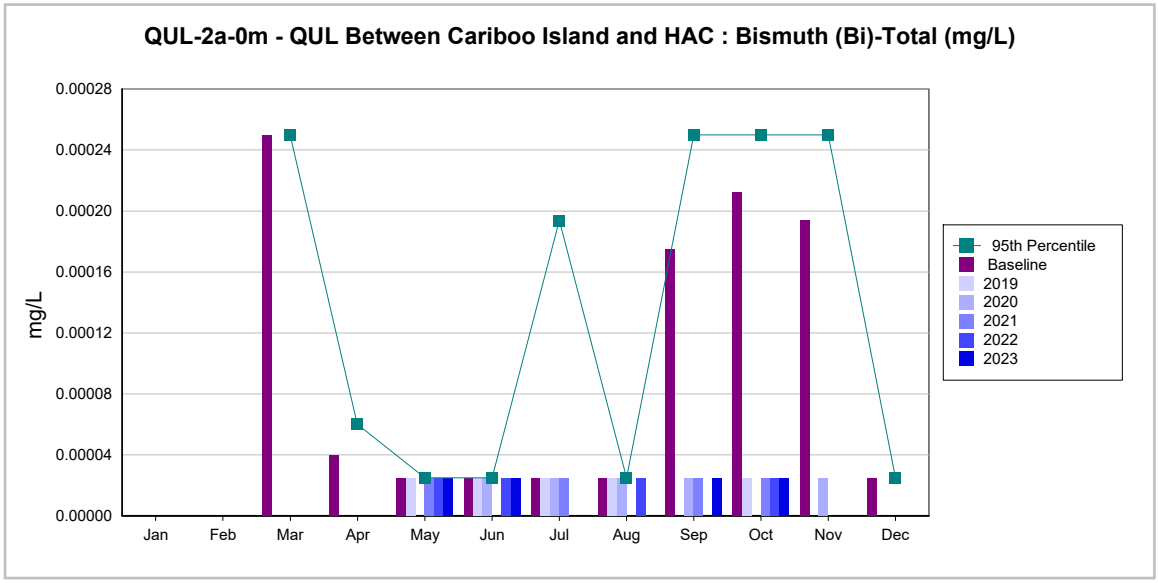

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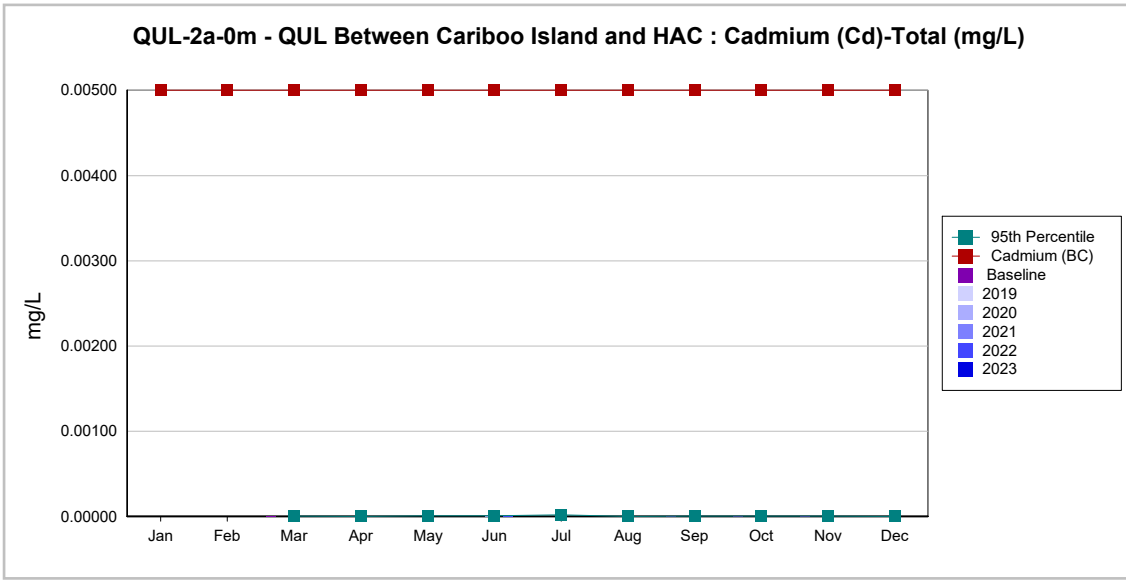

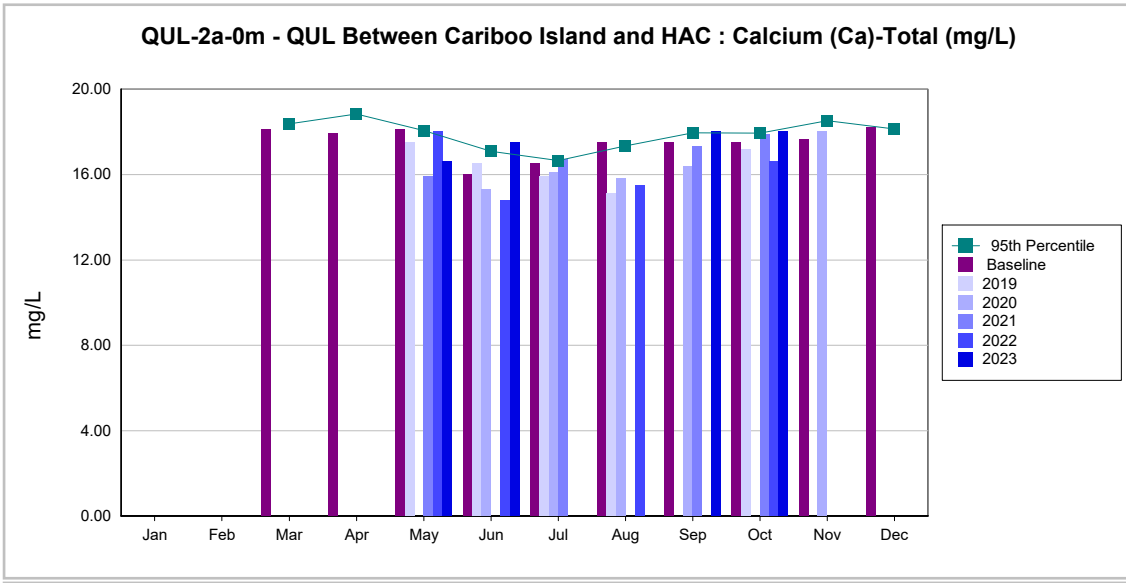

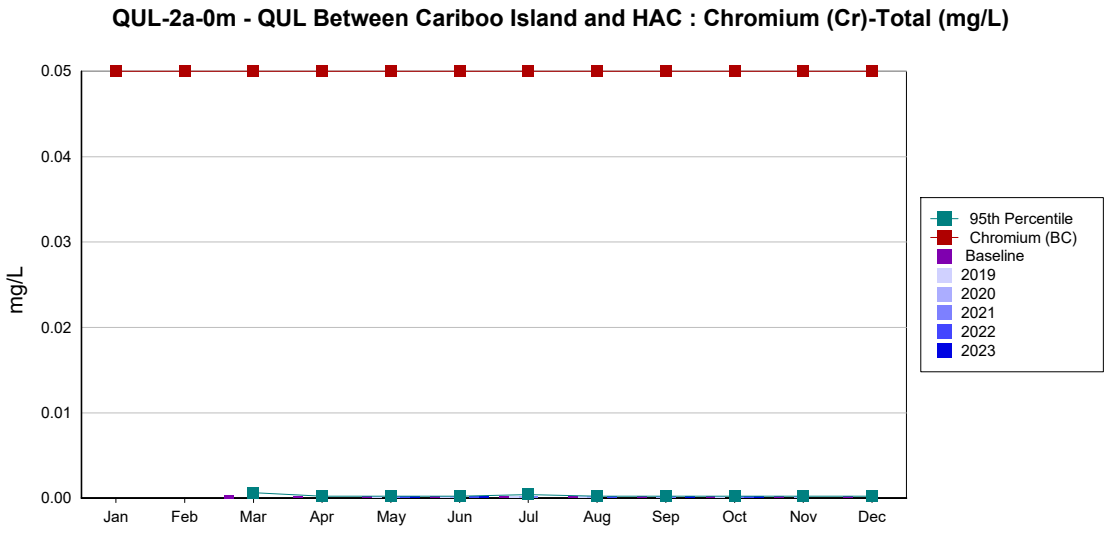

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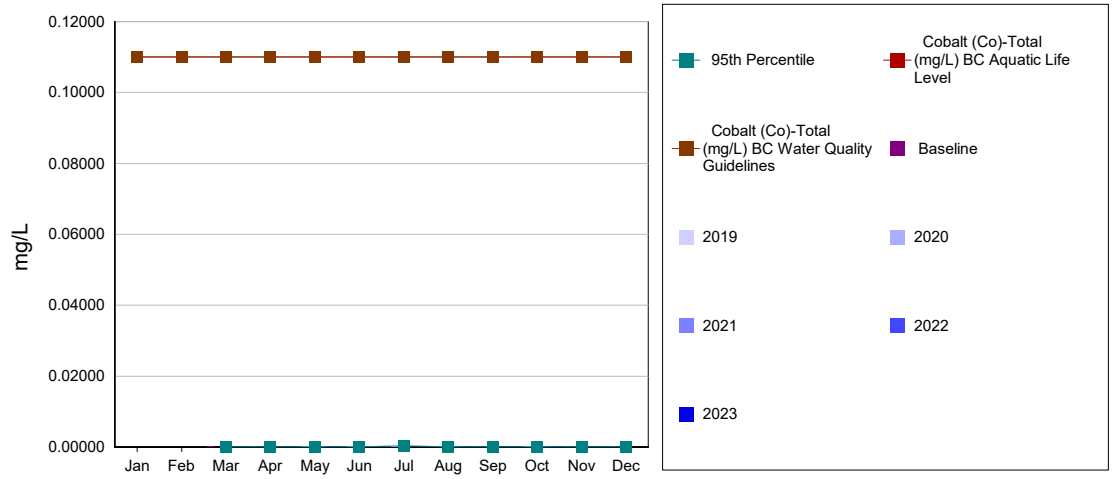
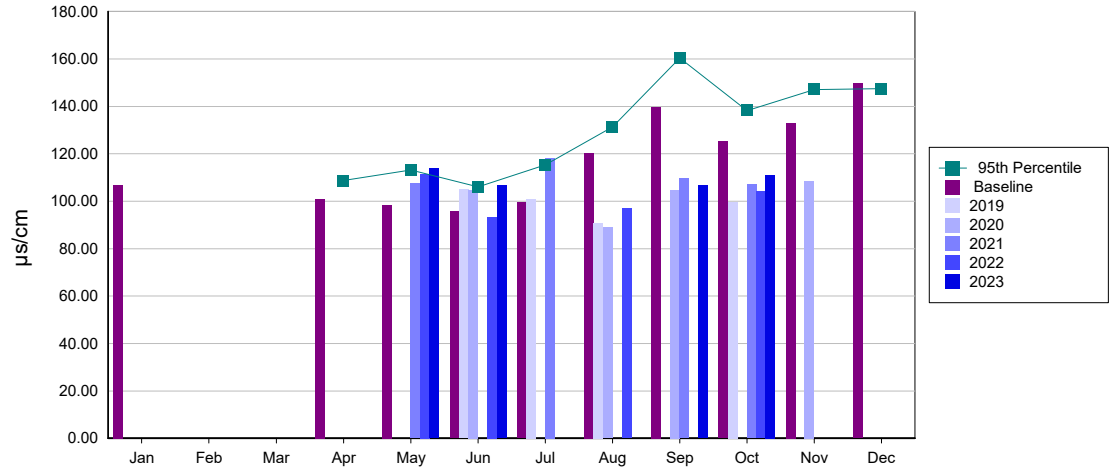
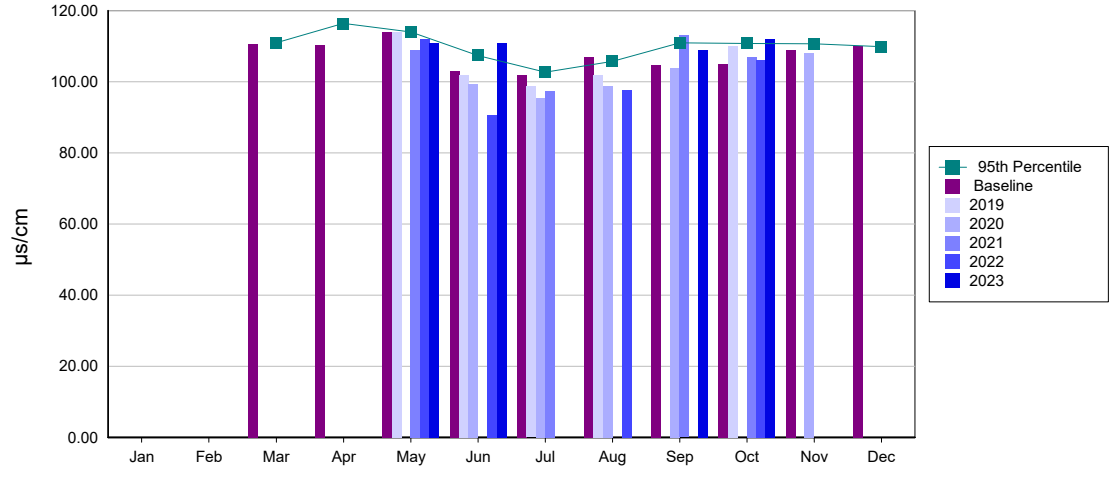
QUL-2a-0m - QUL Between Cariboo Island and HAC : Cobalt (Co)-Total (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Cond (in situ) (µs/cm)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Conductivity (µs/cm)



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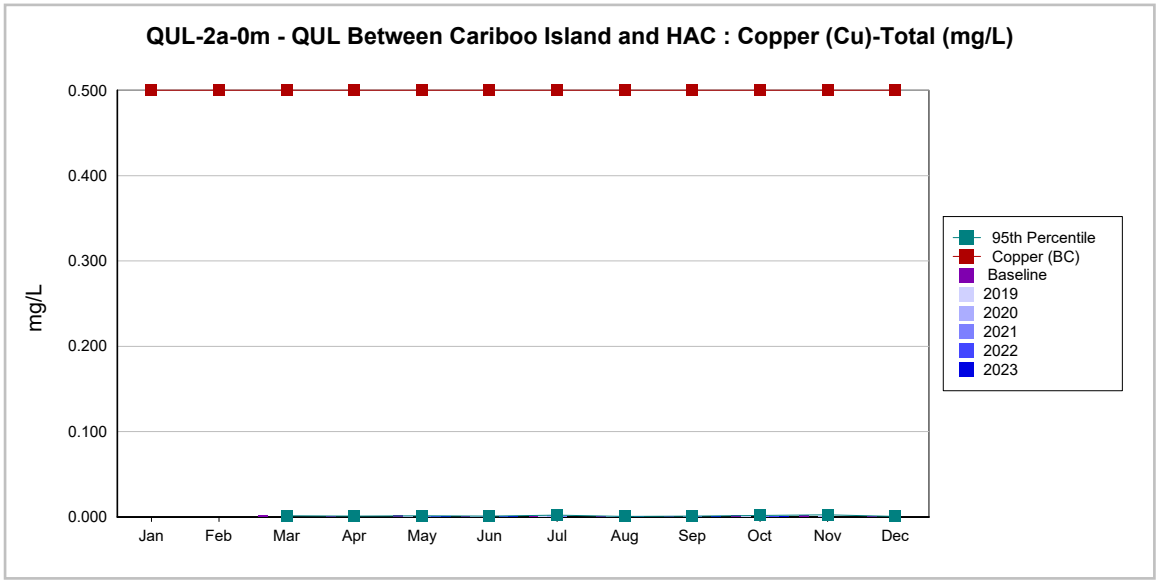

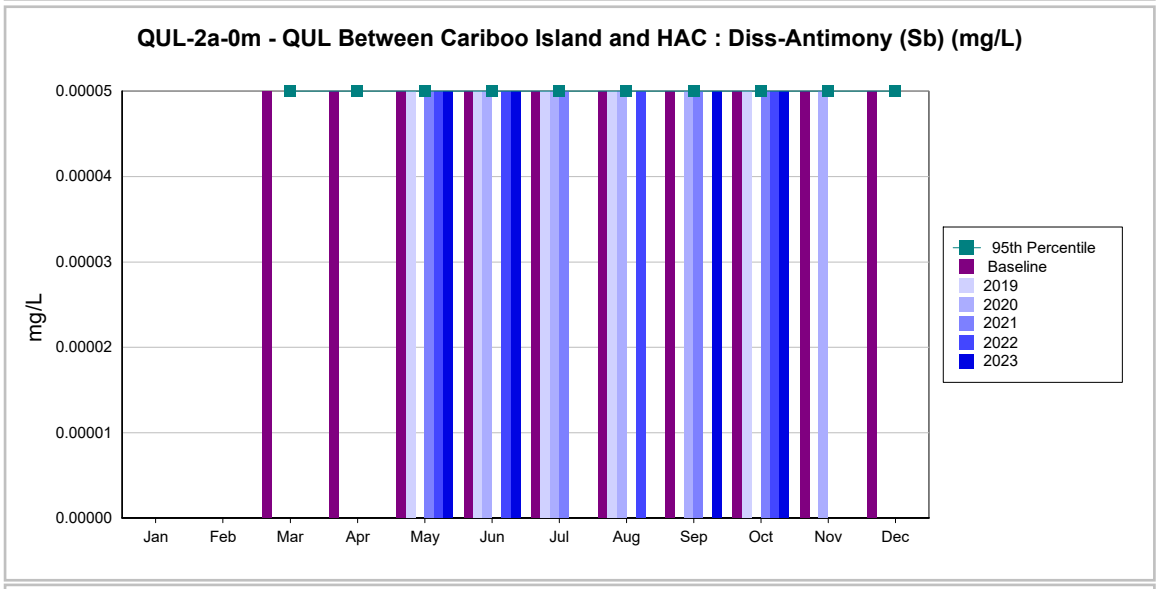

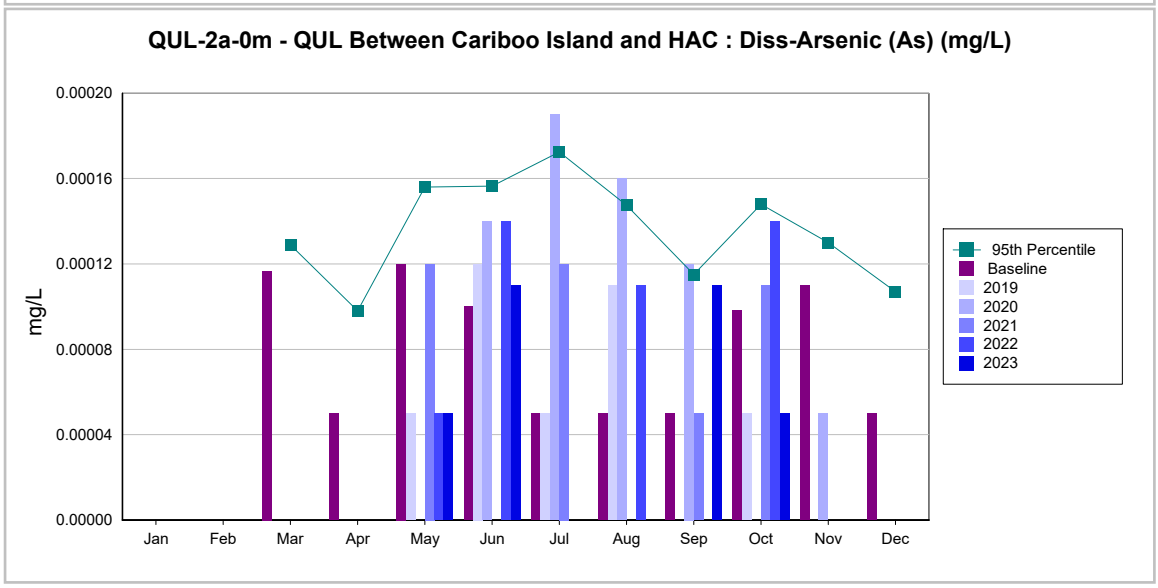

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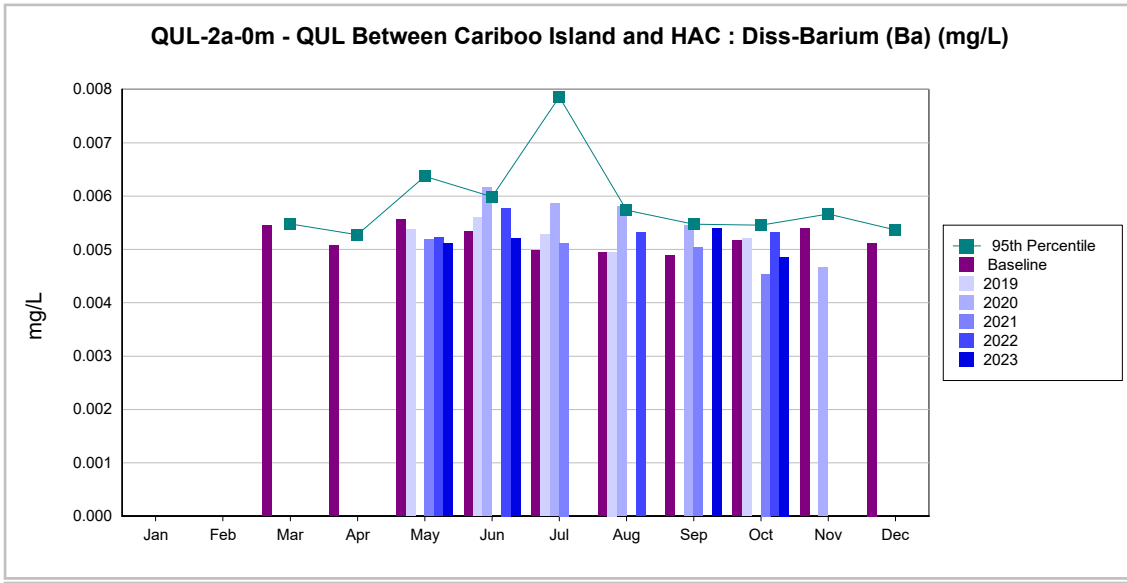

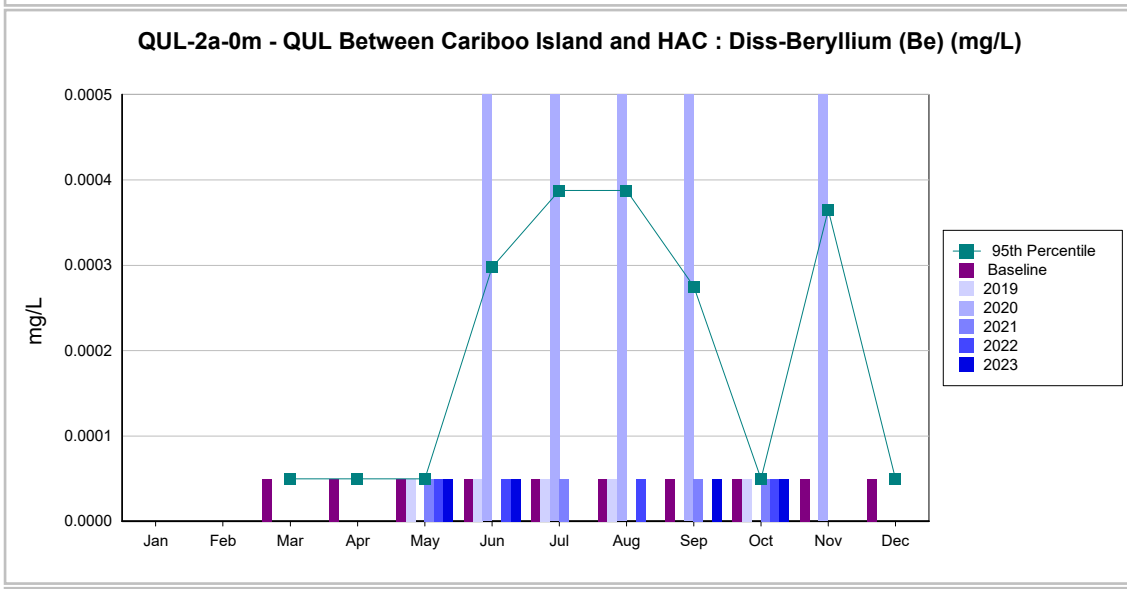

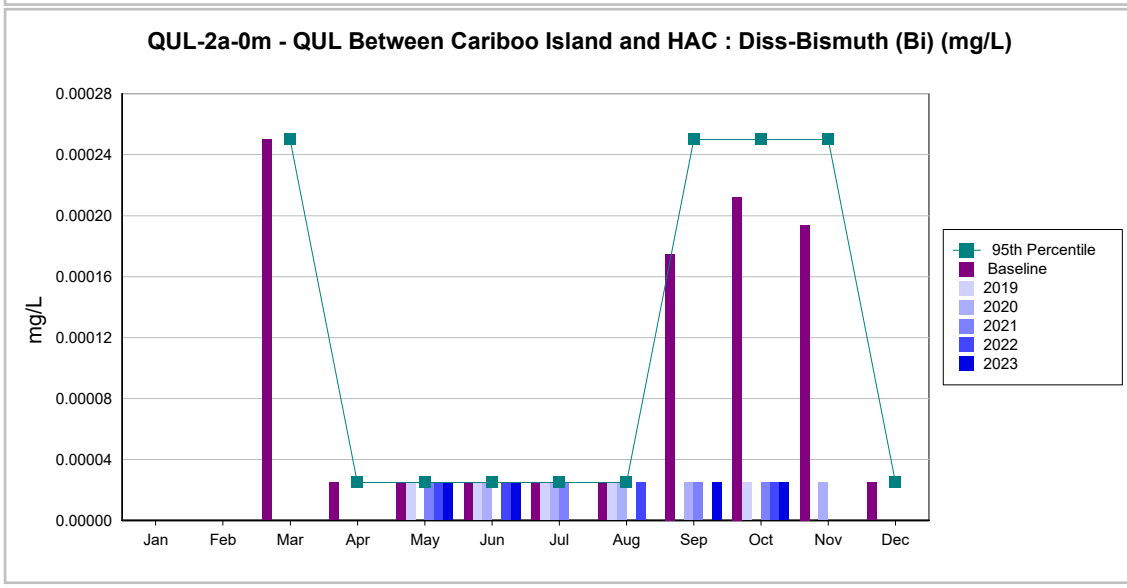

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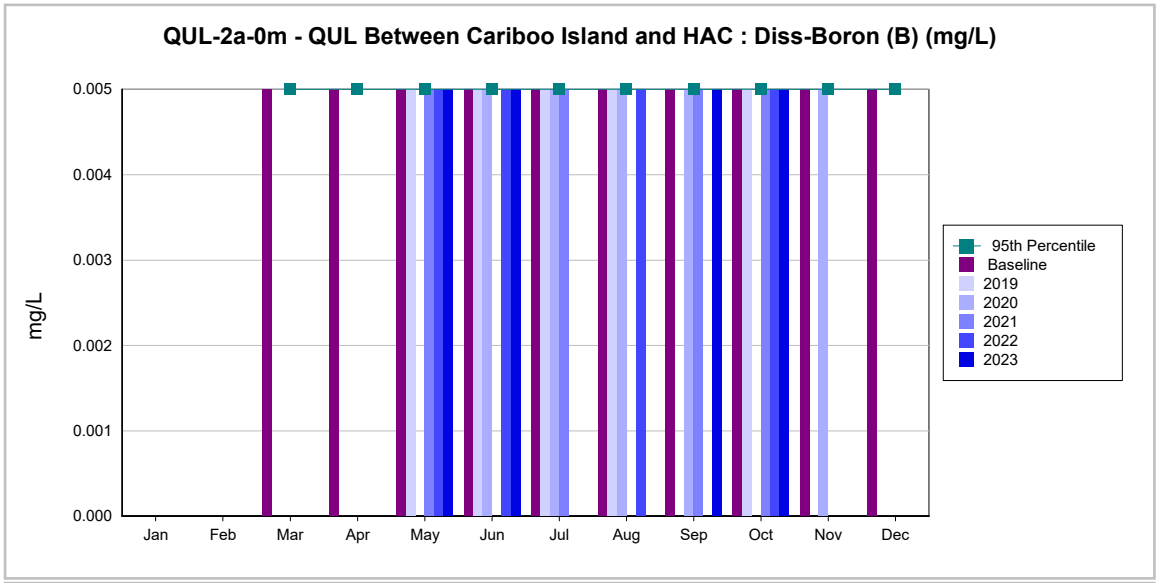

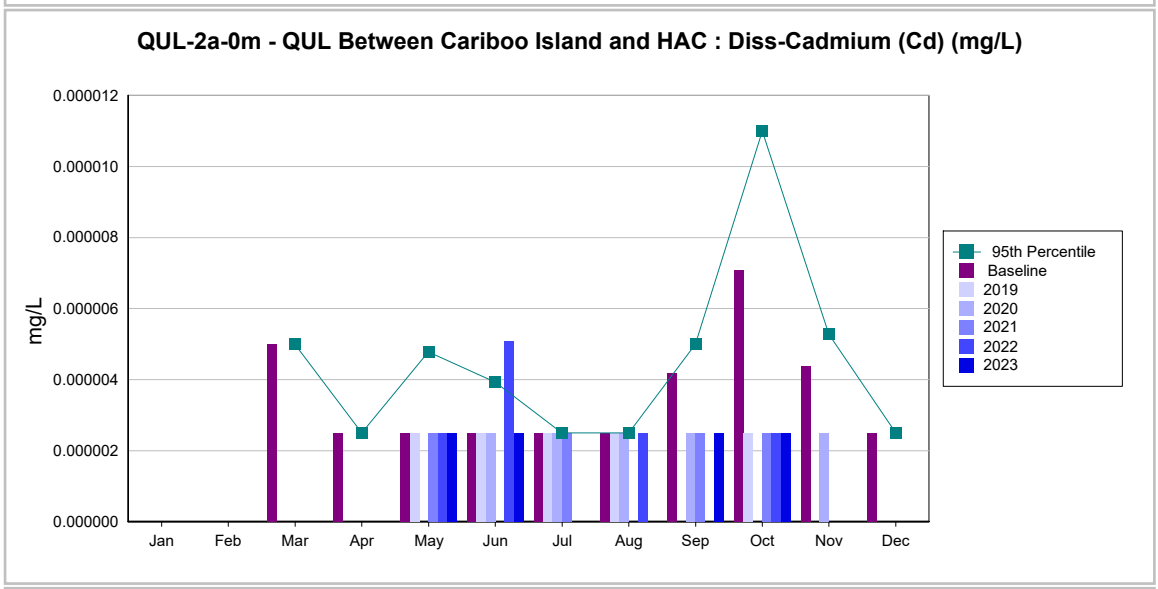

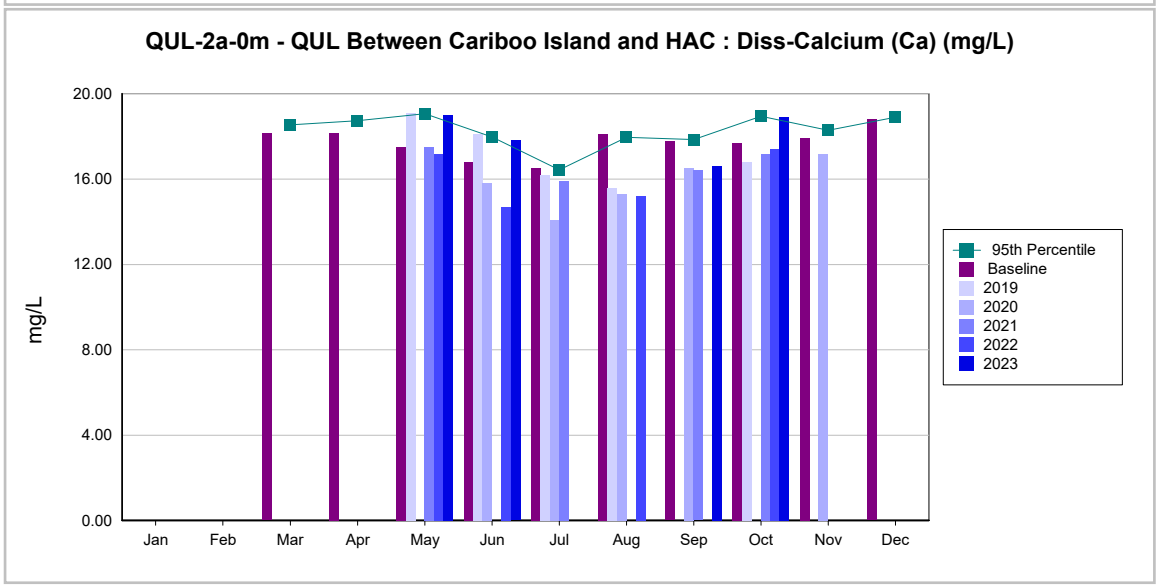

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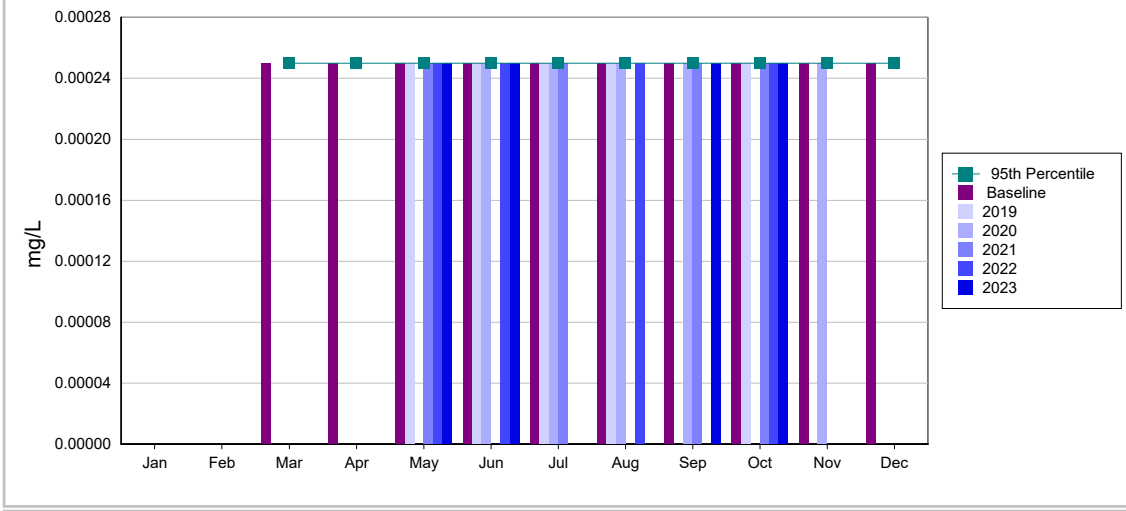

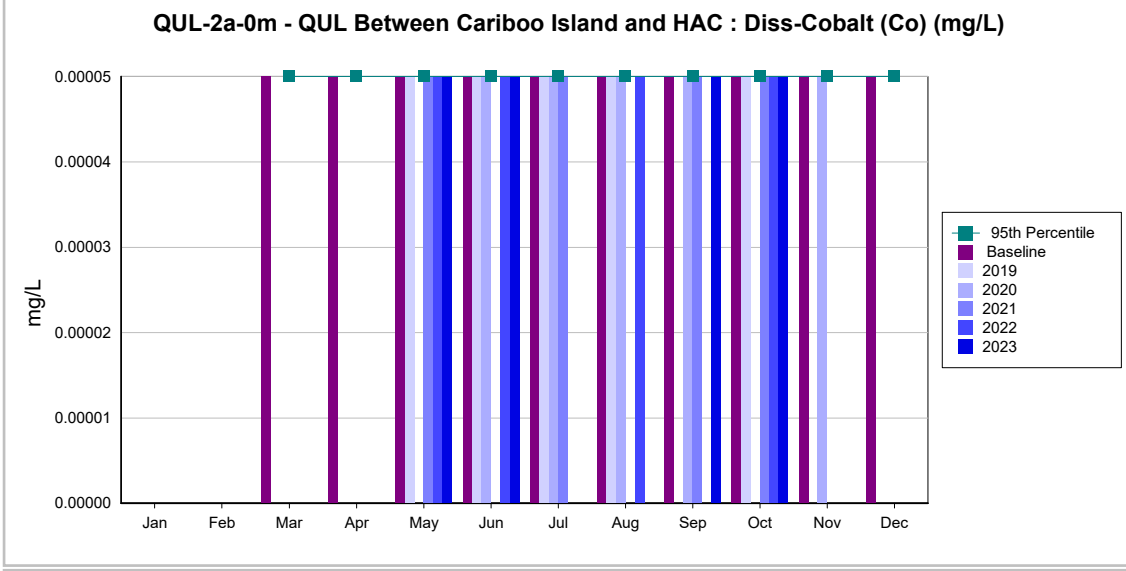

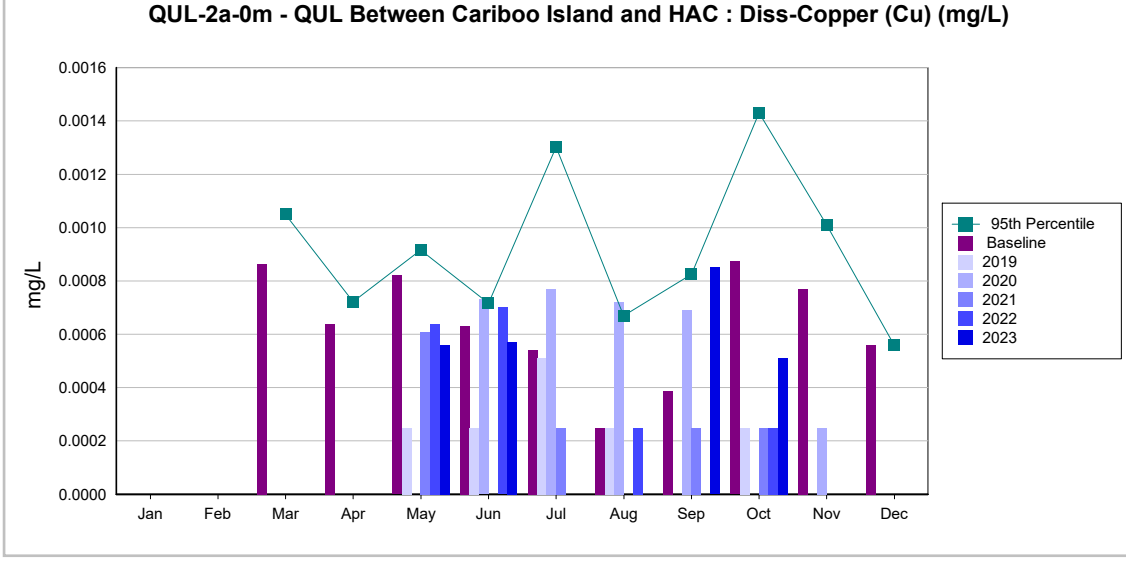

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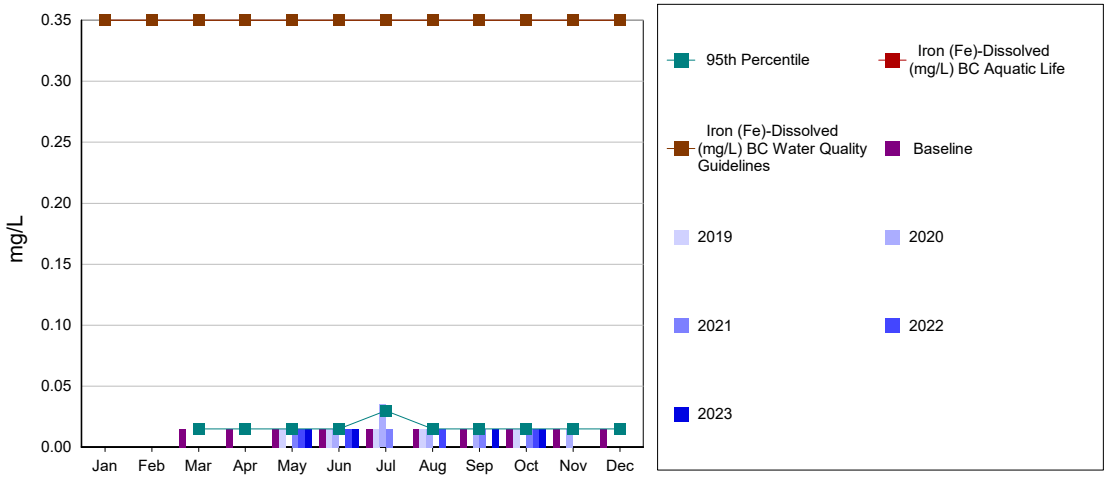
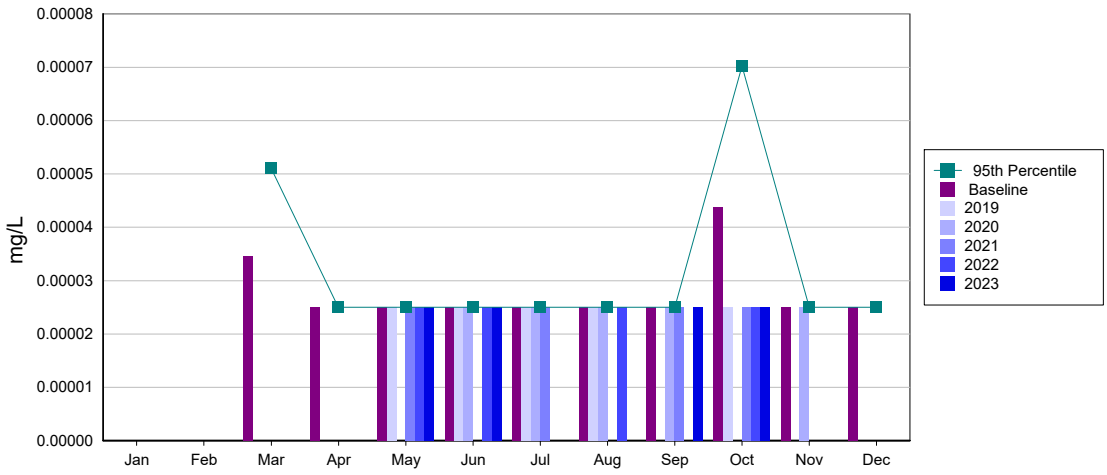
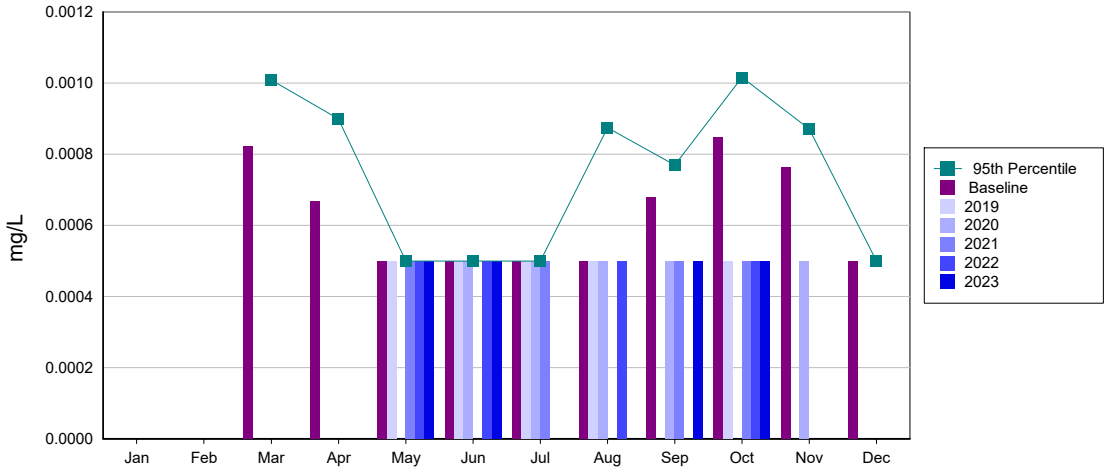
QUL-2a-0m - QUL Between Cariboo Island and HAC : Diss-Iron (Fe) (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Diss-Lead (Pb) (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Diss-Lithium (Li) (mg/L)



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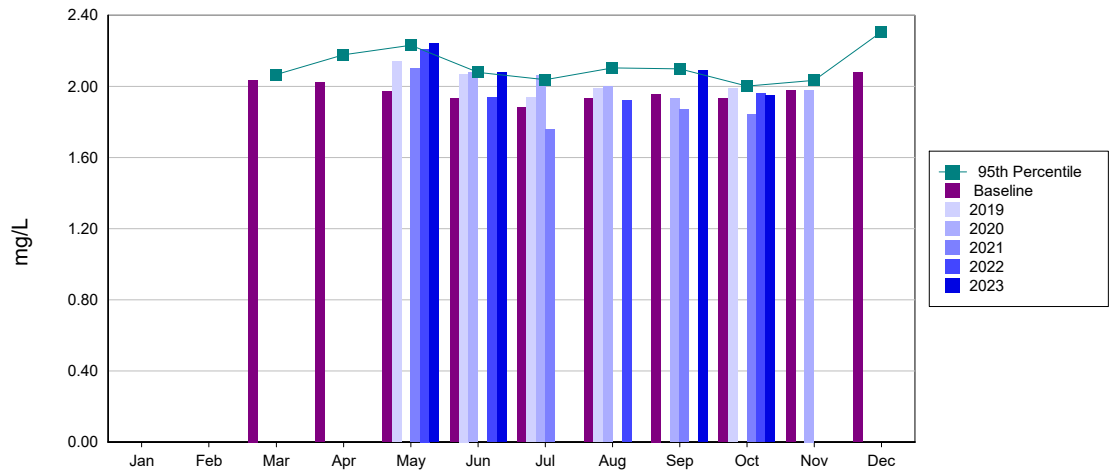
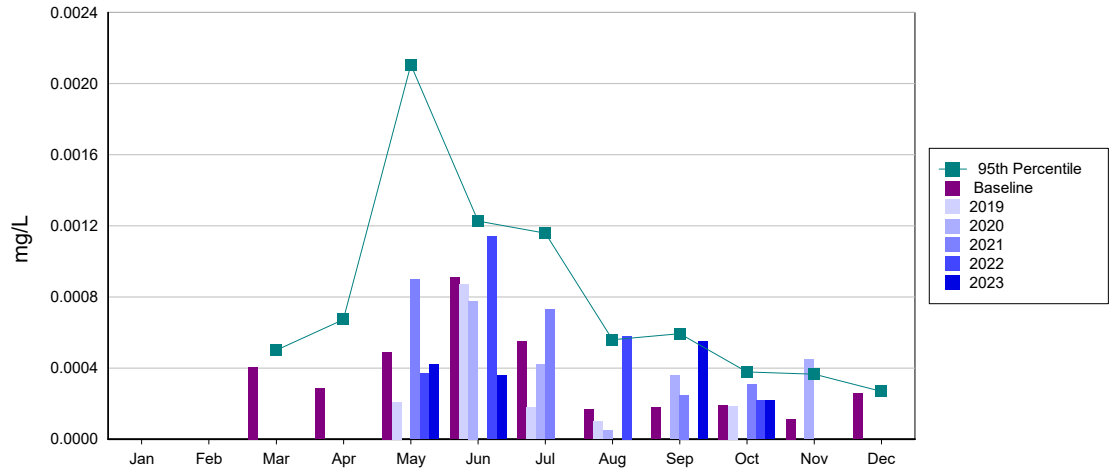
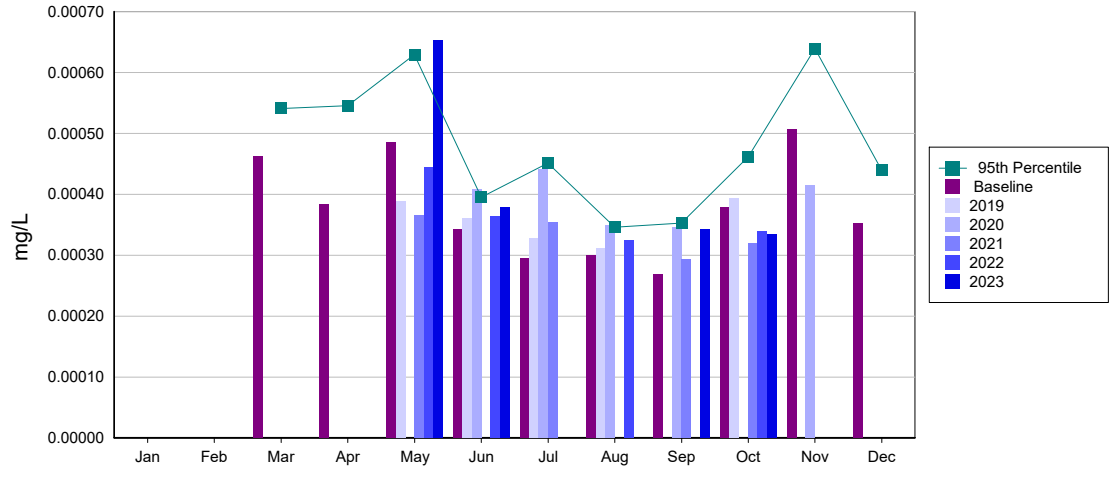
QUL-2a-0m - QUL Between Cariboo Island and HAC : Diss-Magnesium (Mg) (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Diss-Manganese (Mn) (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Diss-Molybdenum (Mo) (mg/L)



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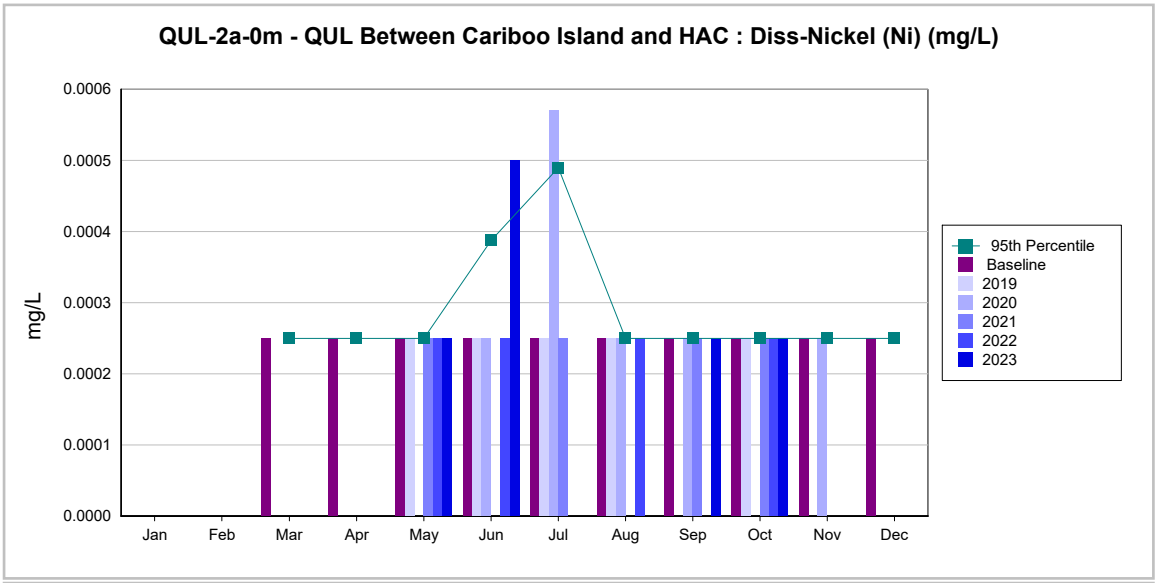

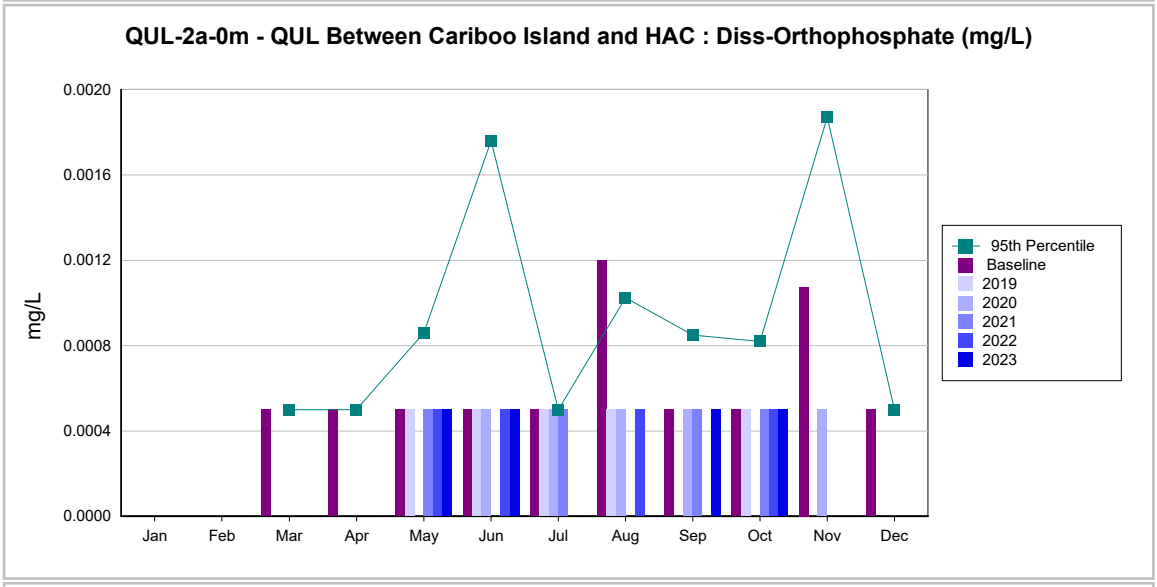

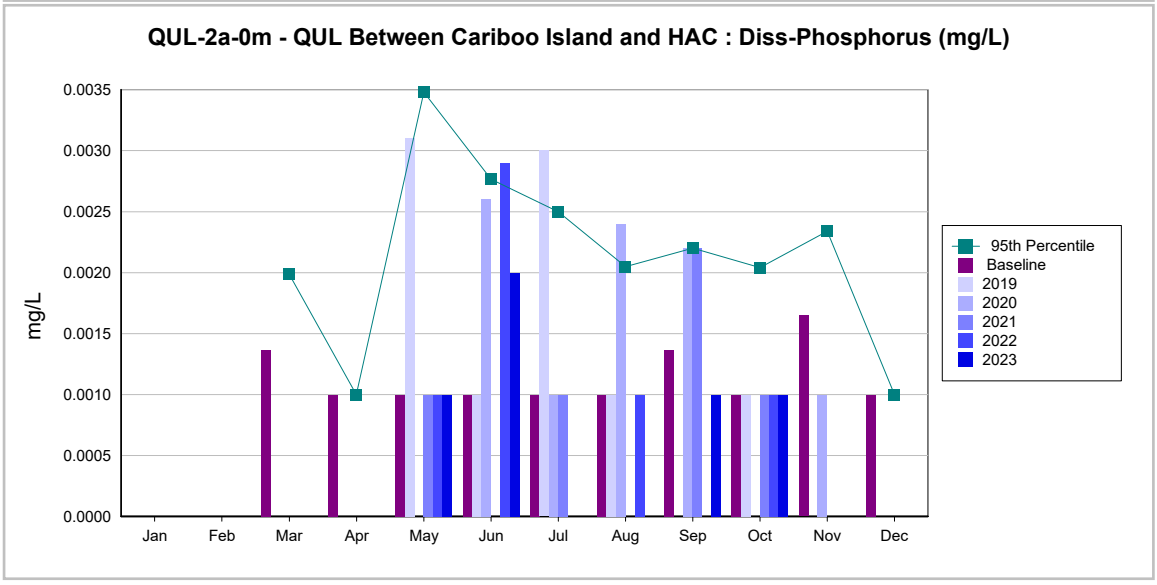

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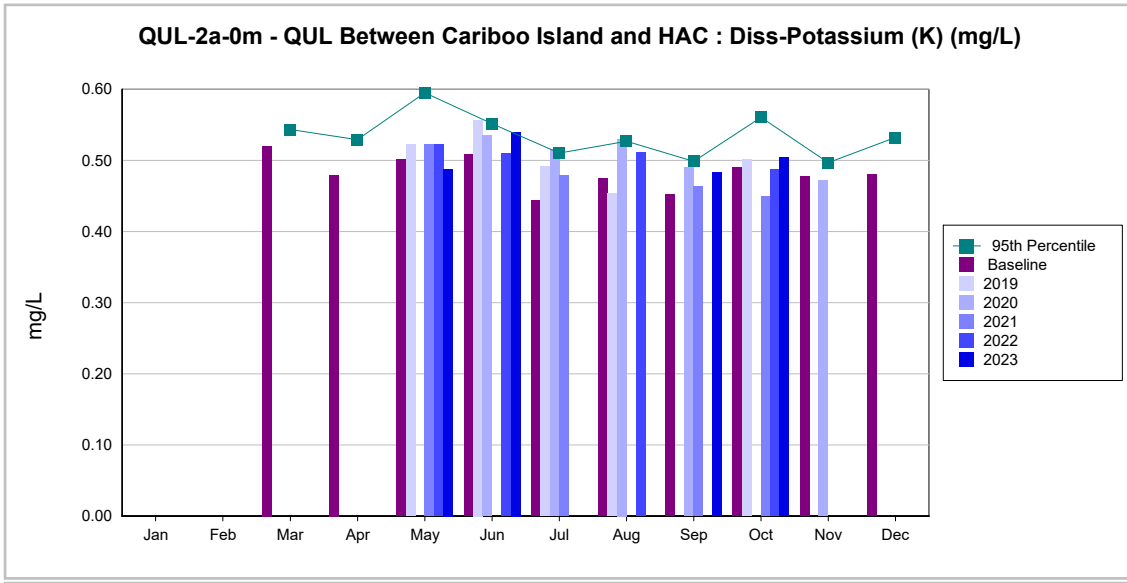

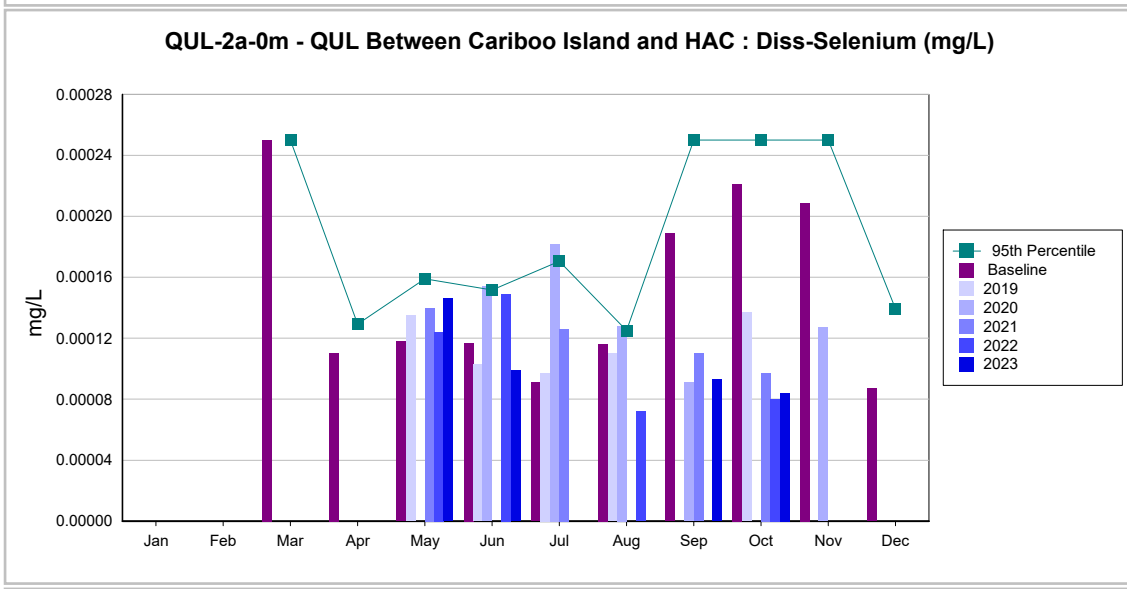

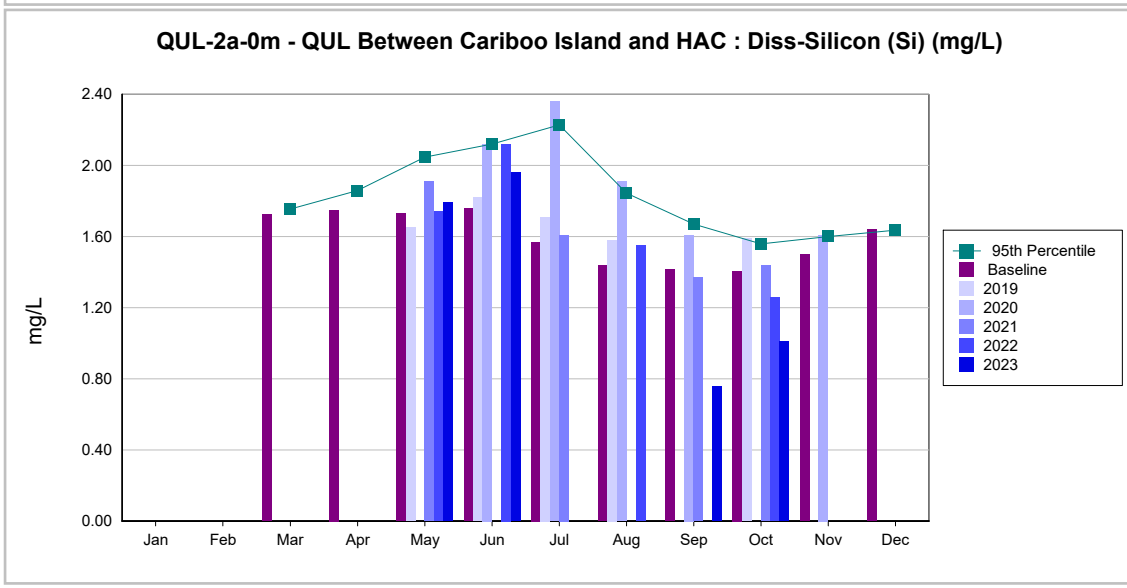

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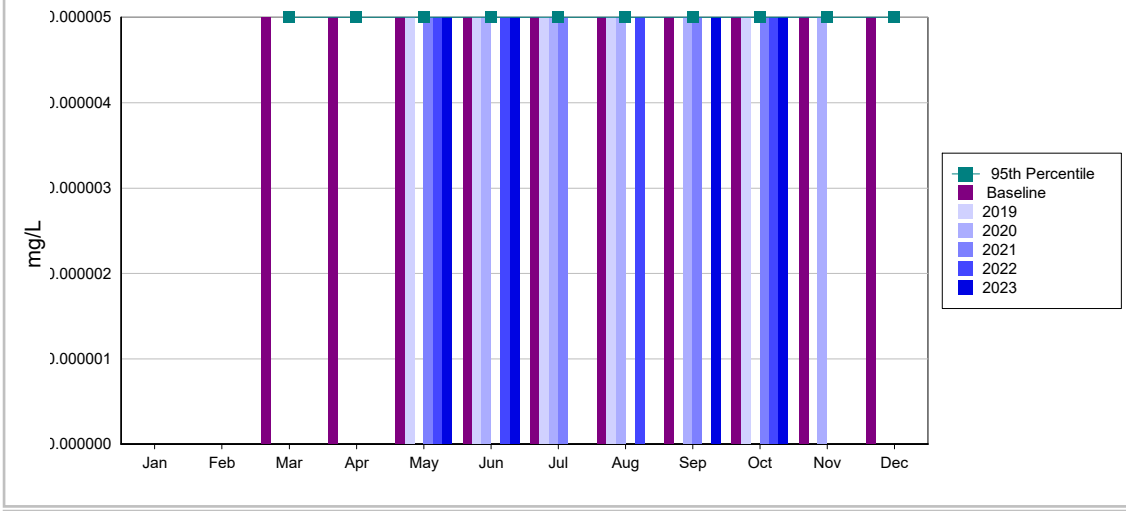

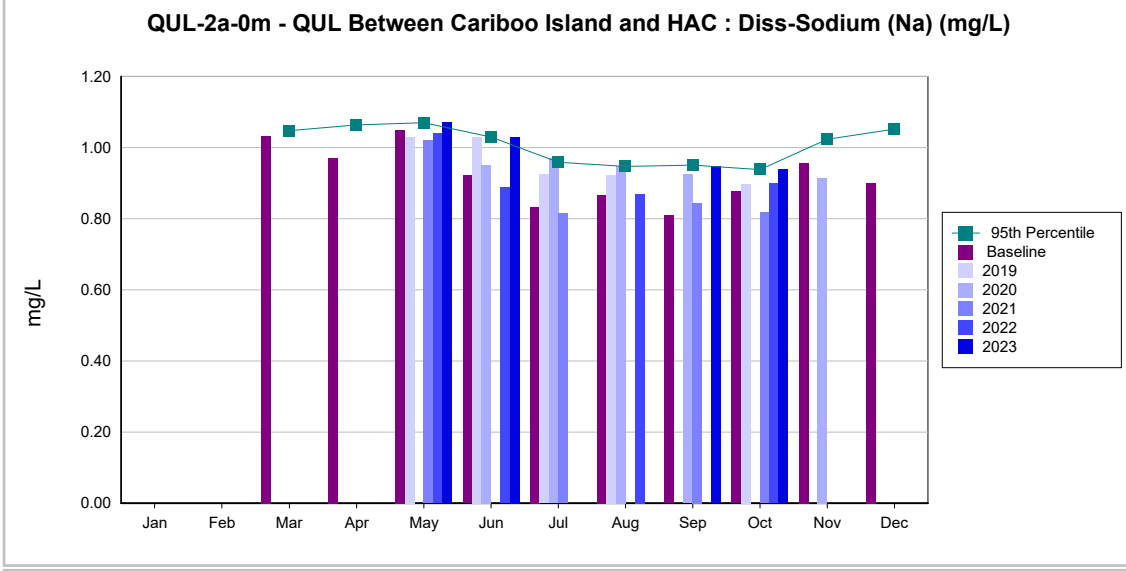

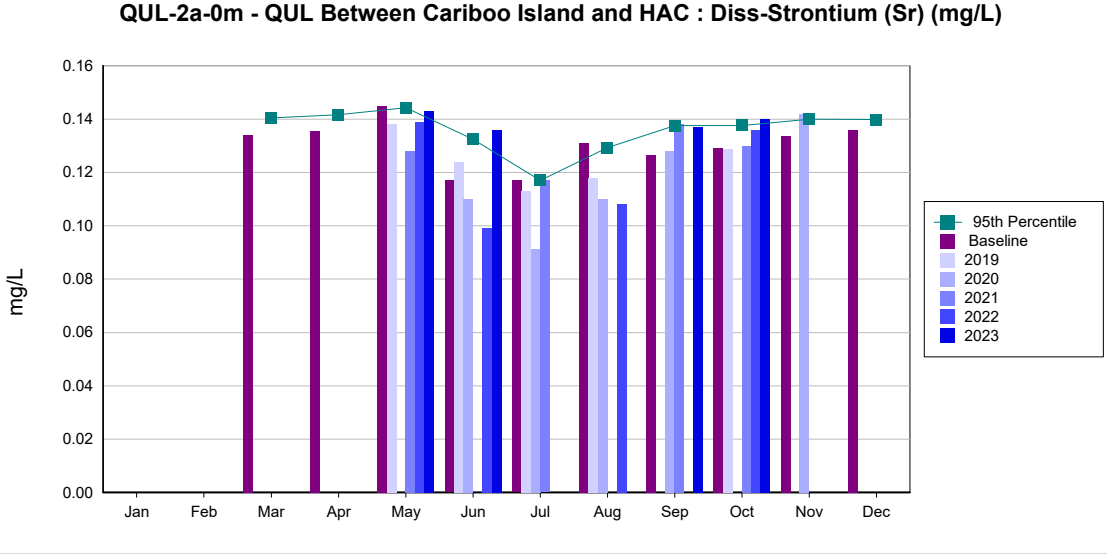

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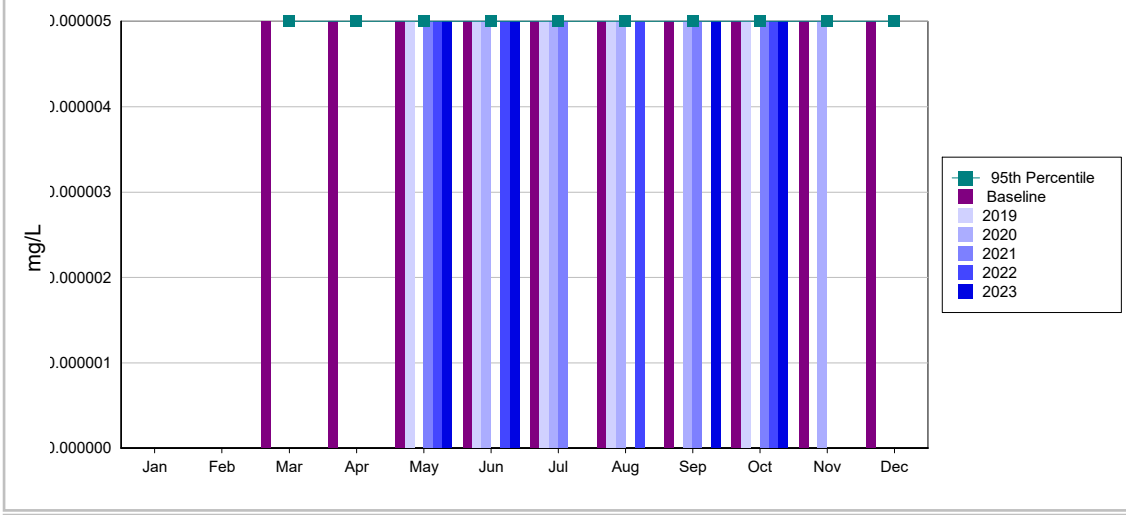

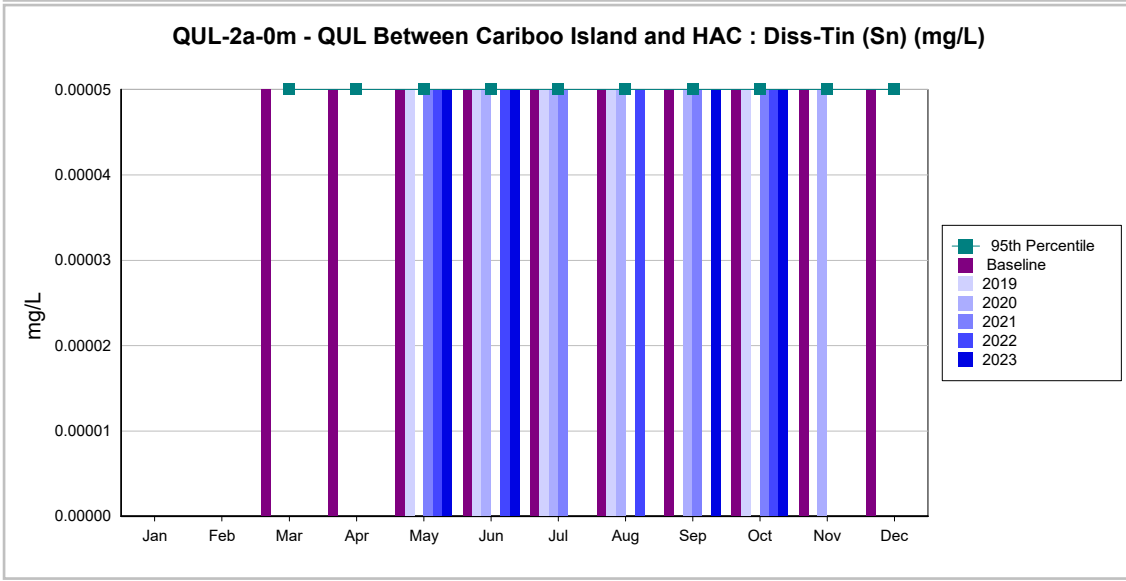

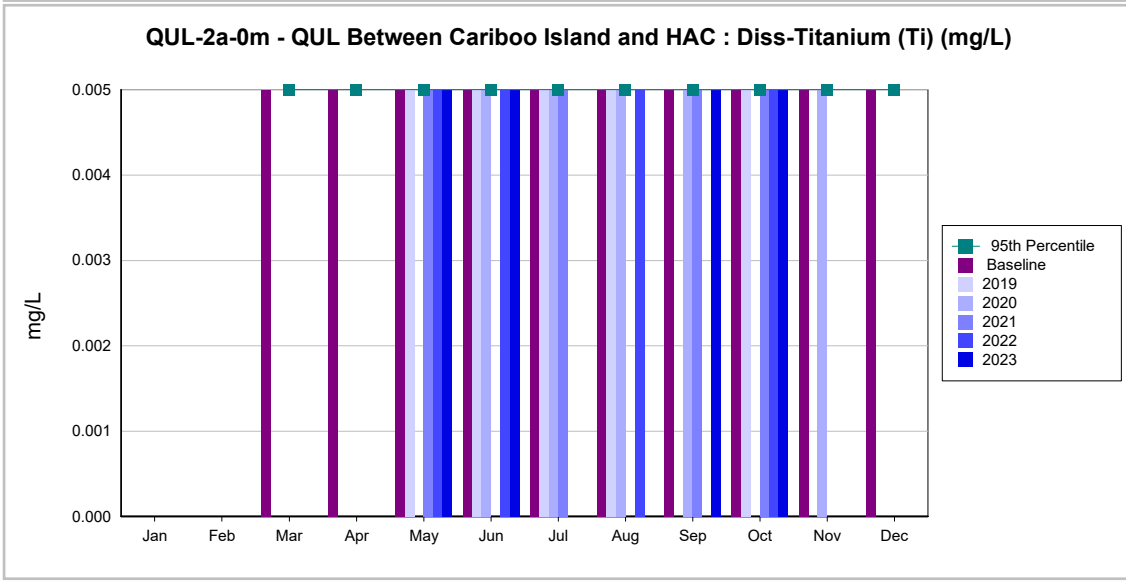

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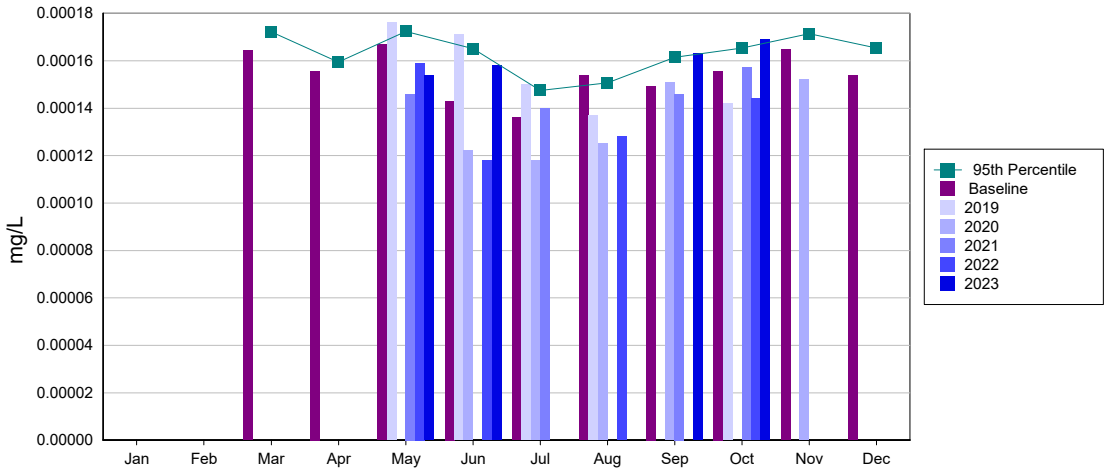

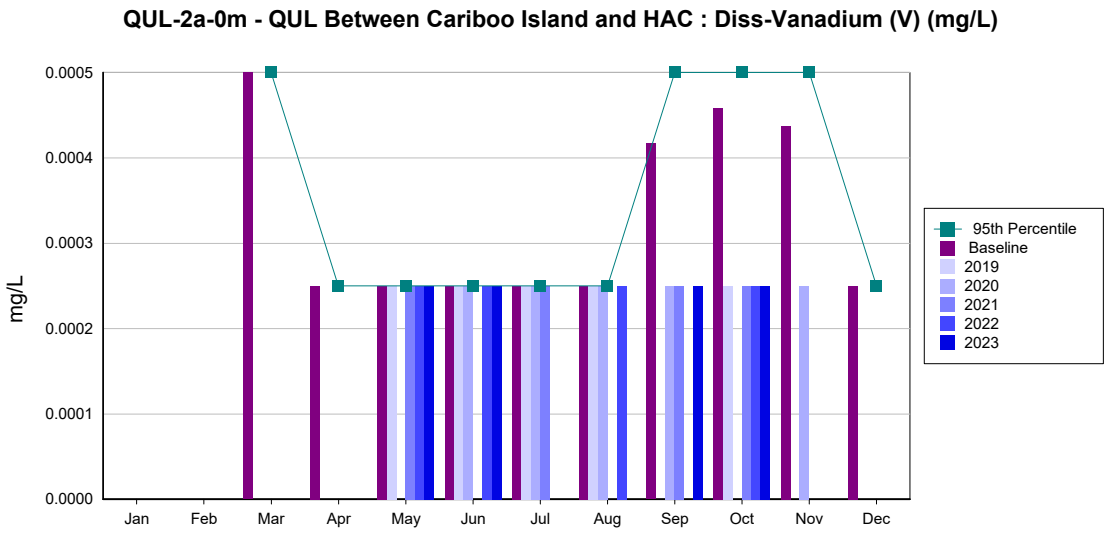

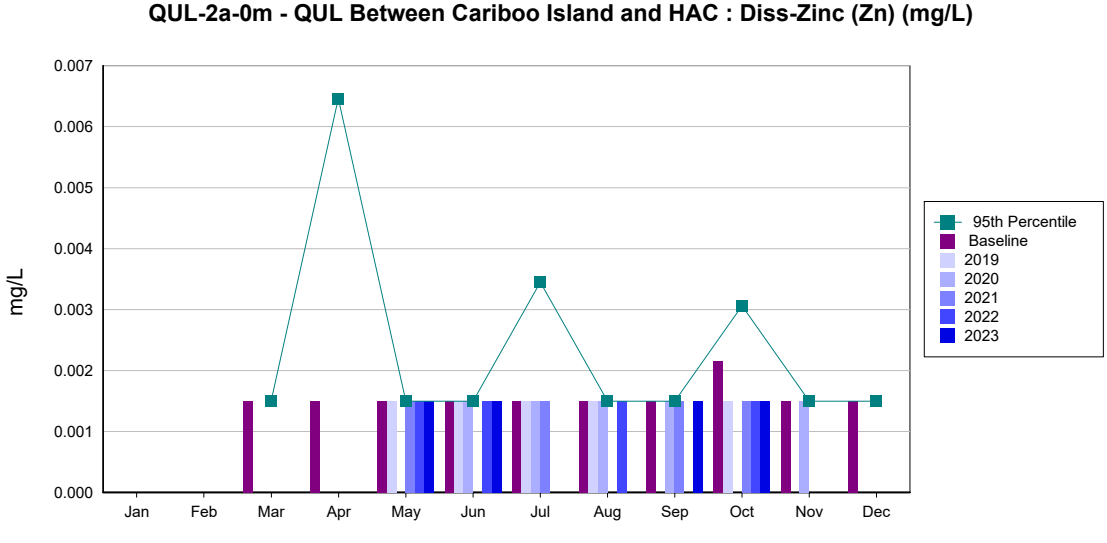

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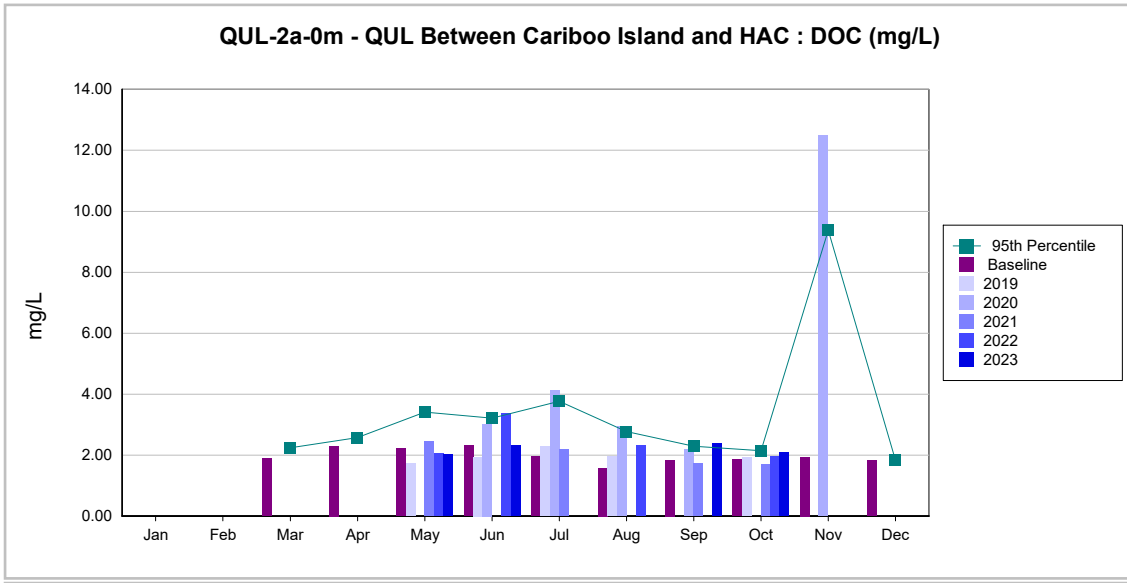

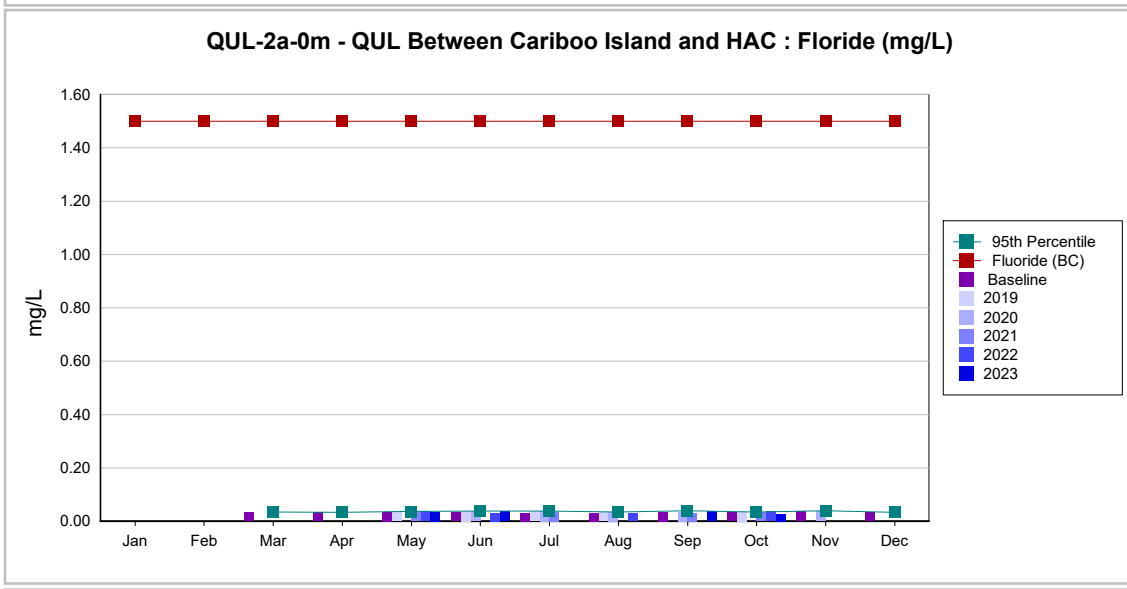

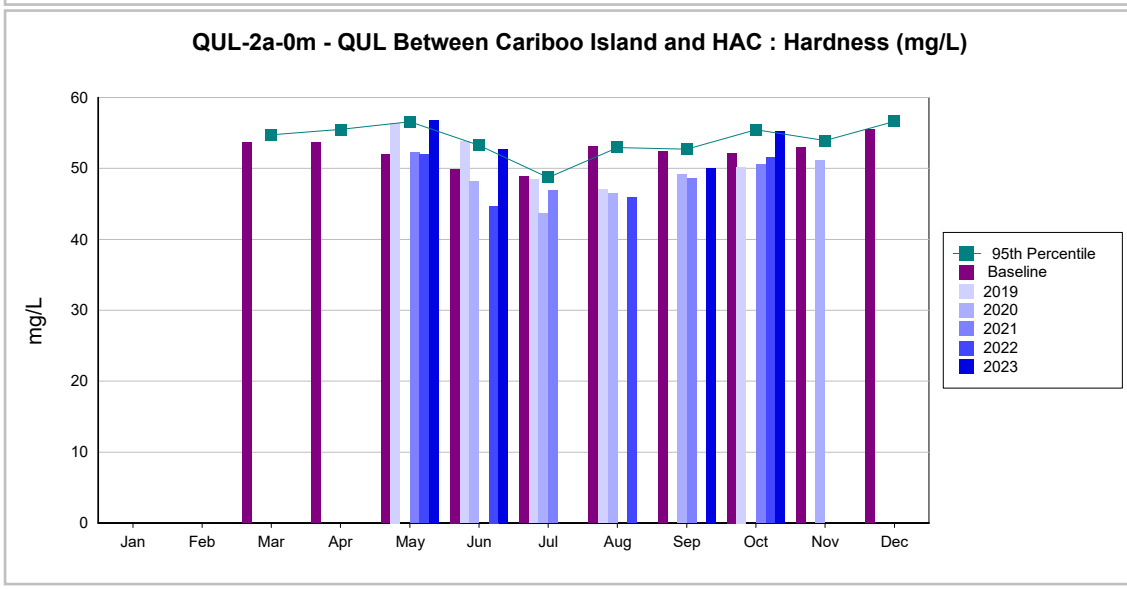

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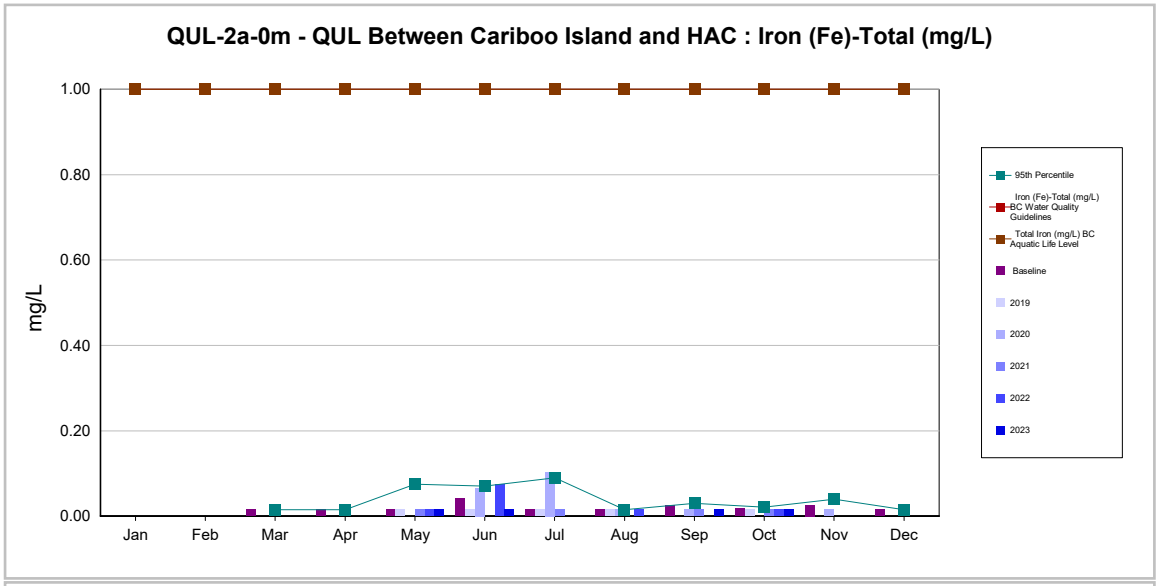

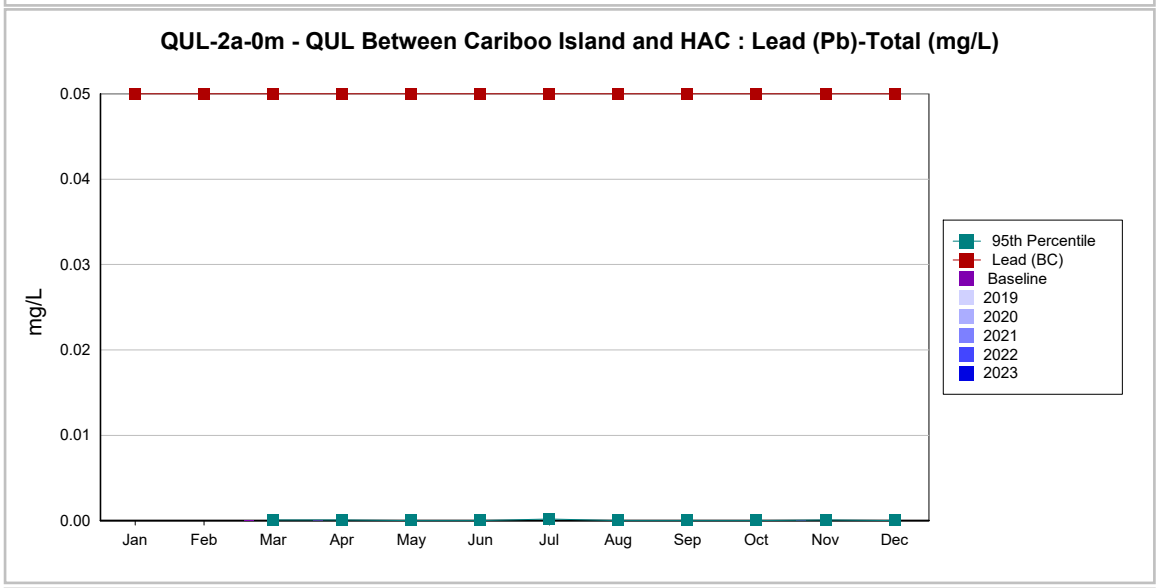

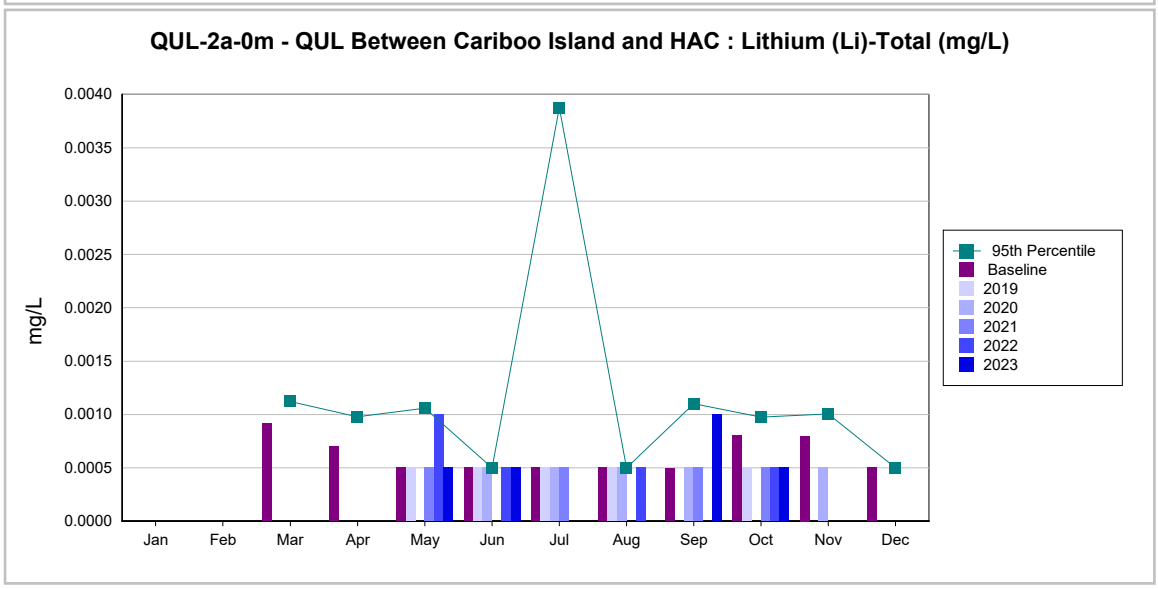

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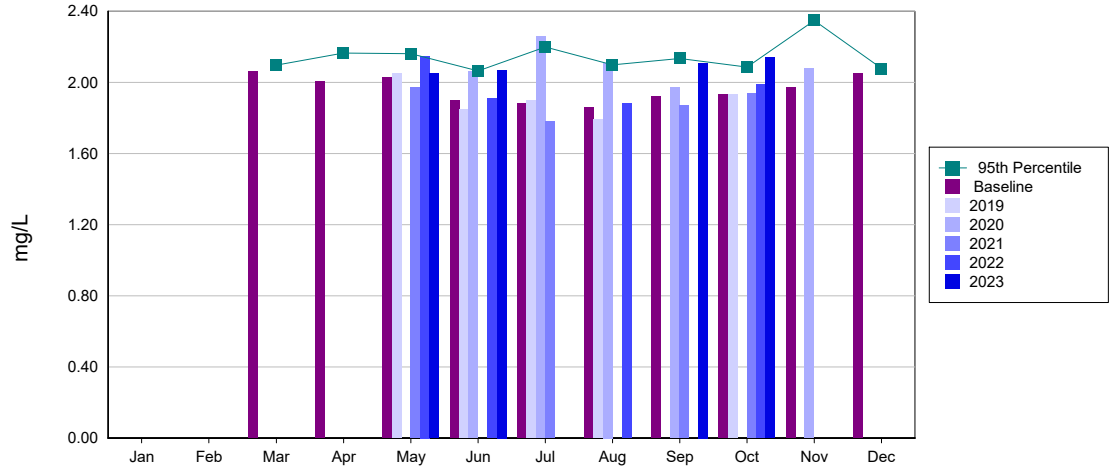

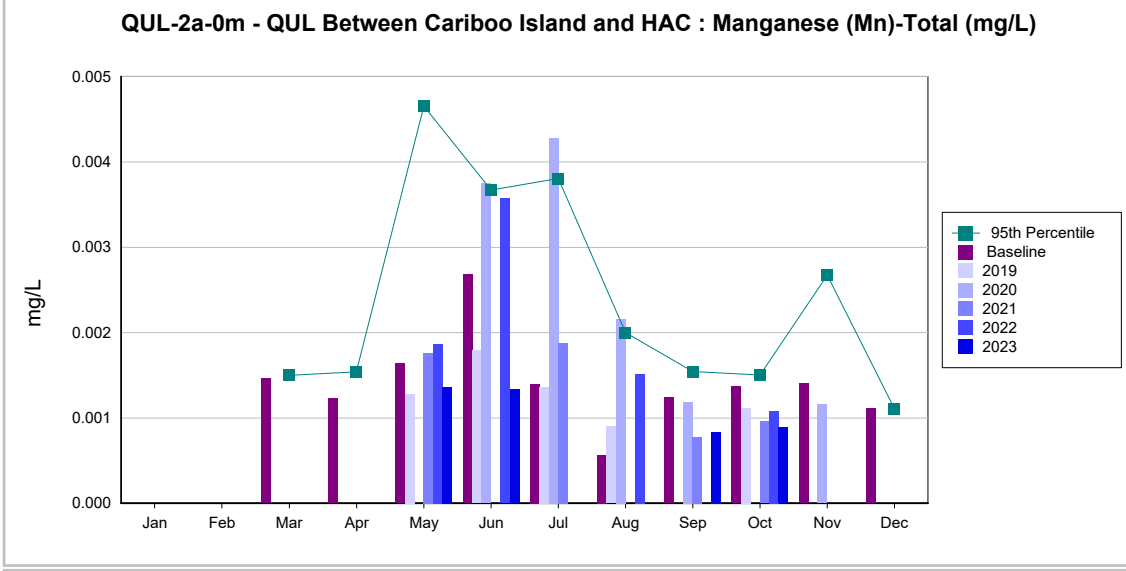

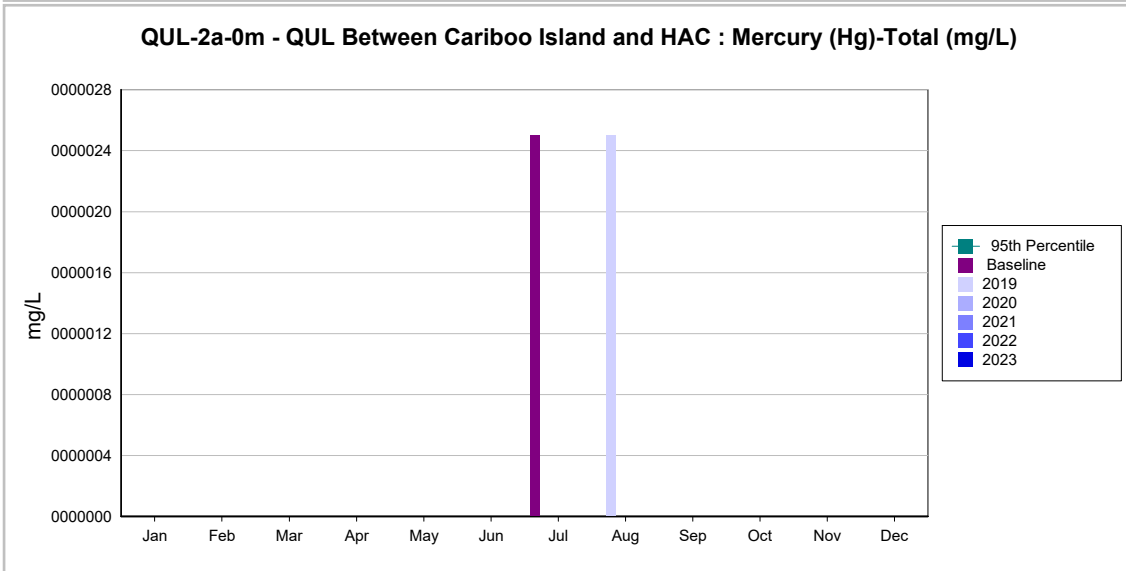

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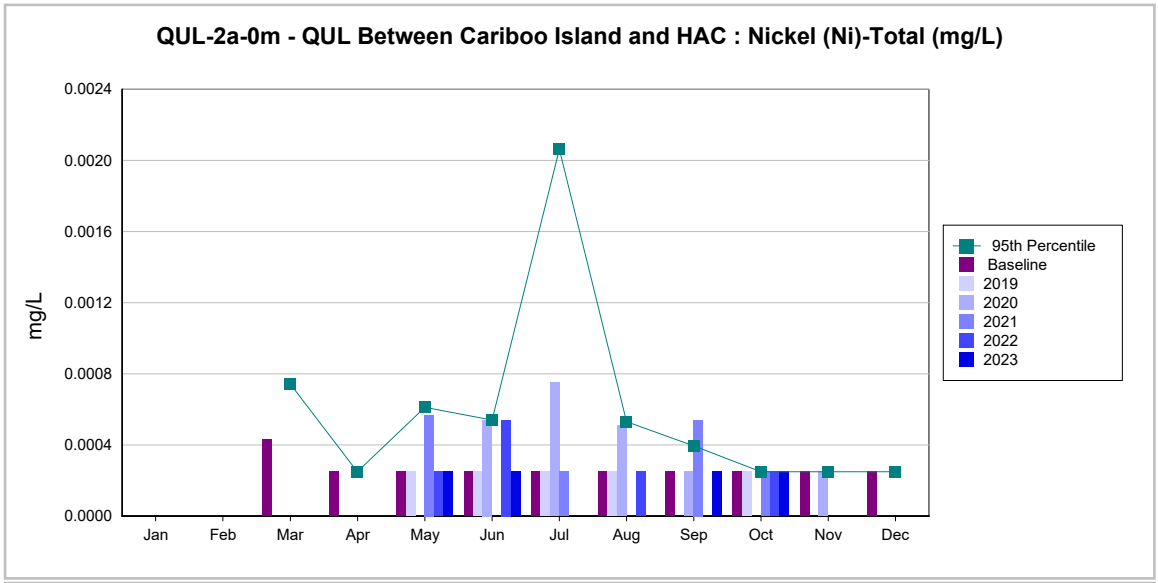

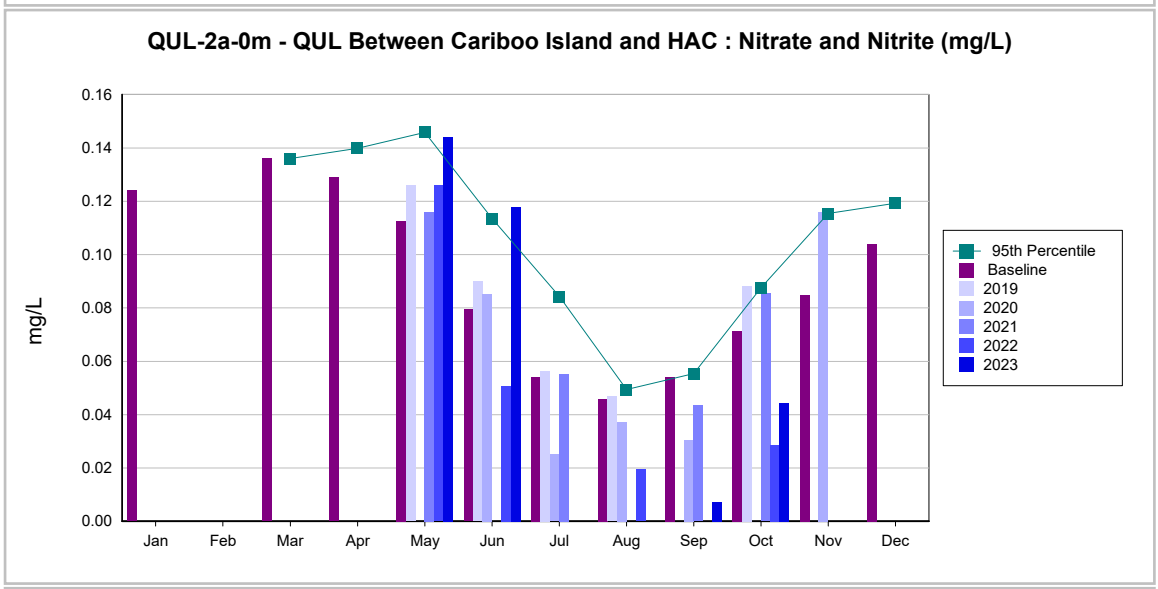

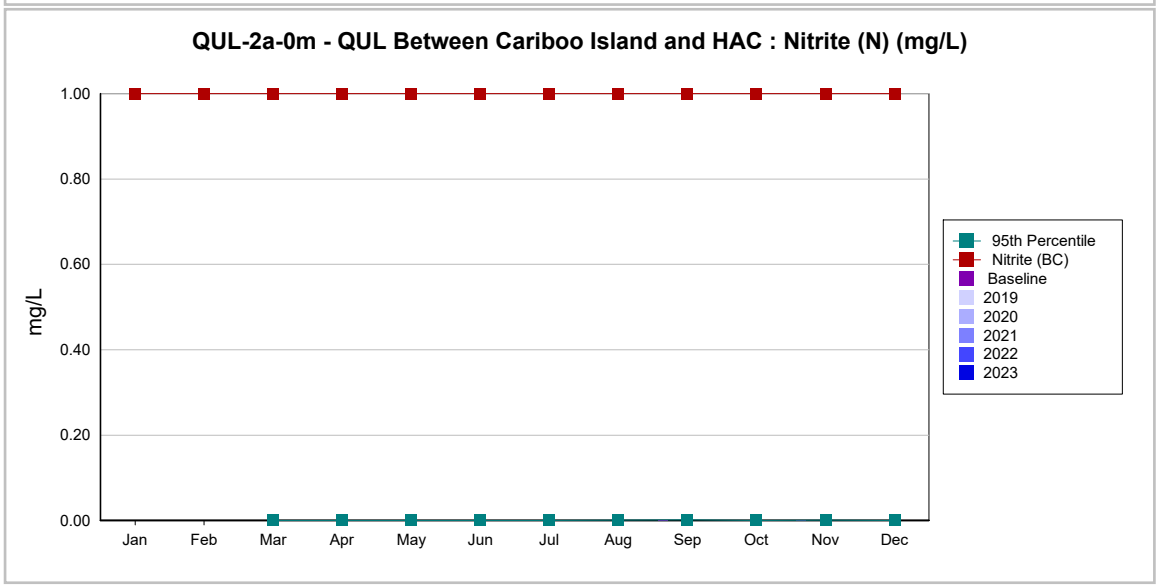

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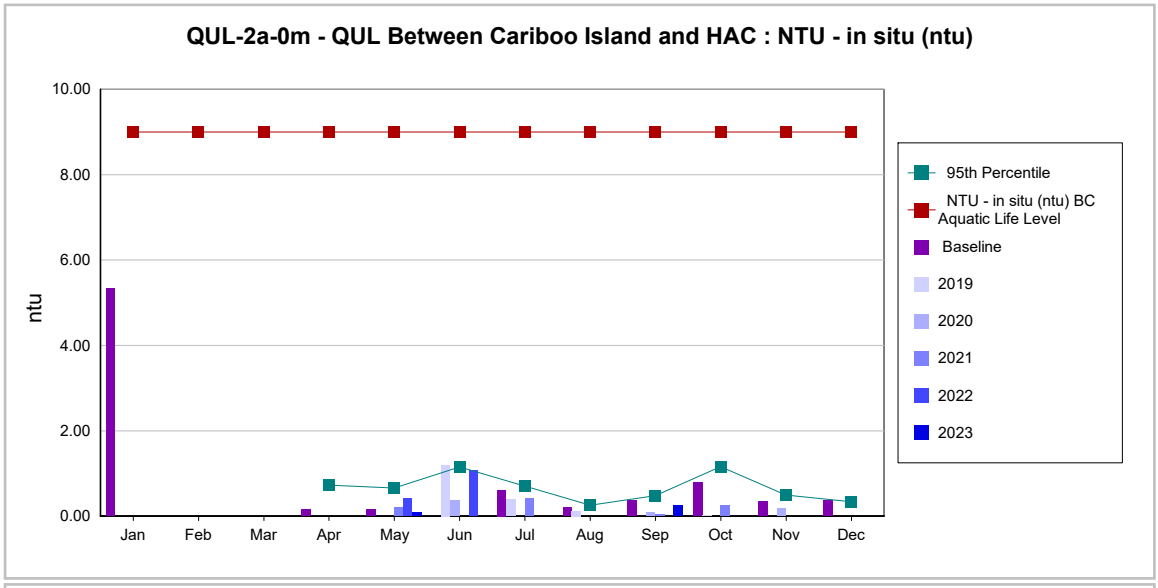

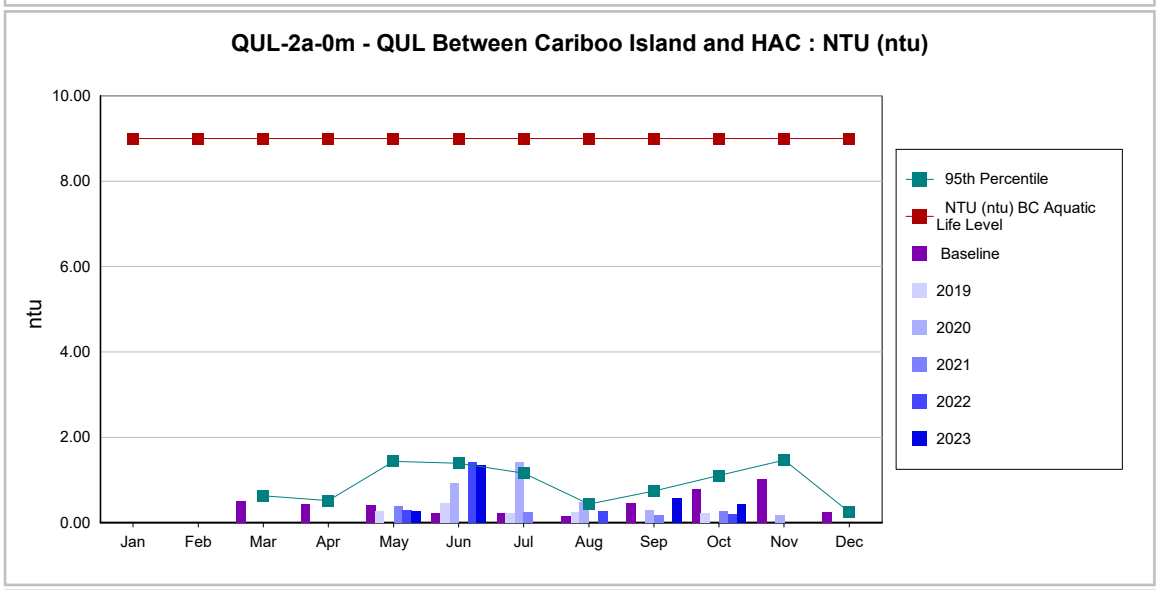

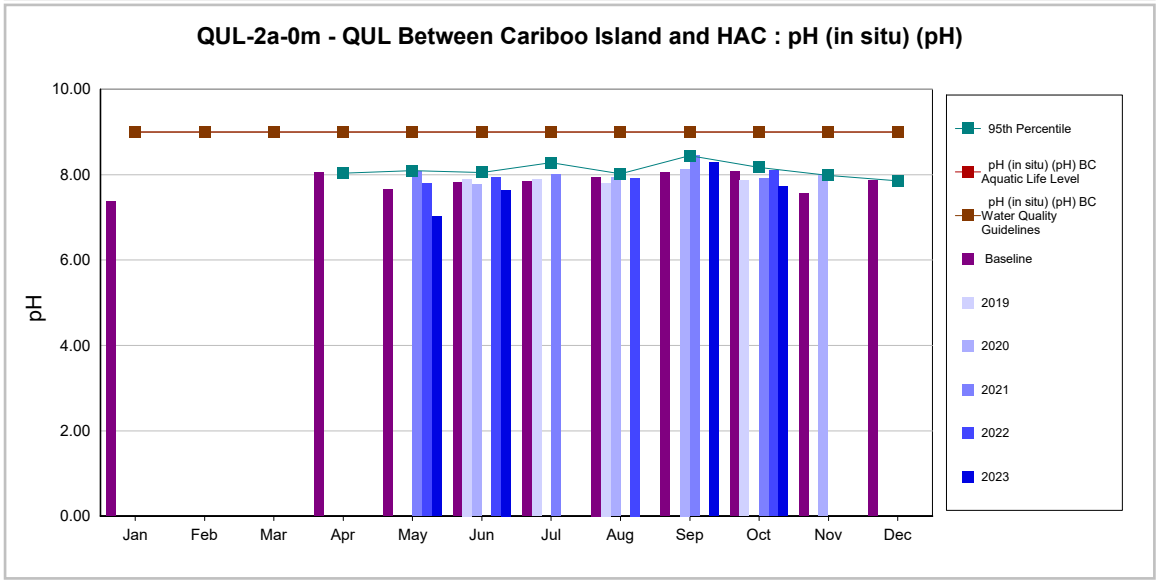

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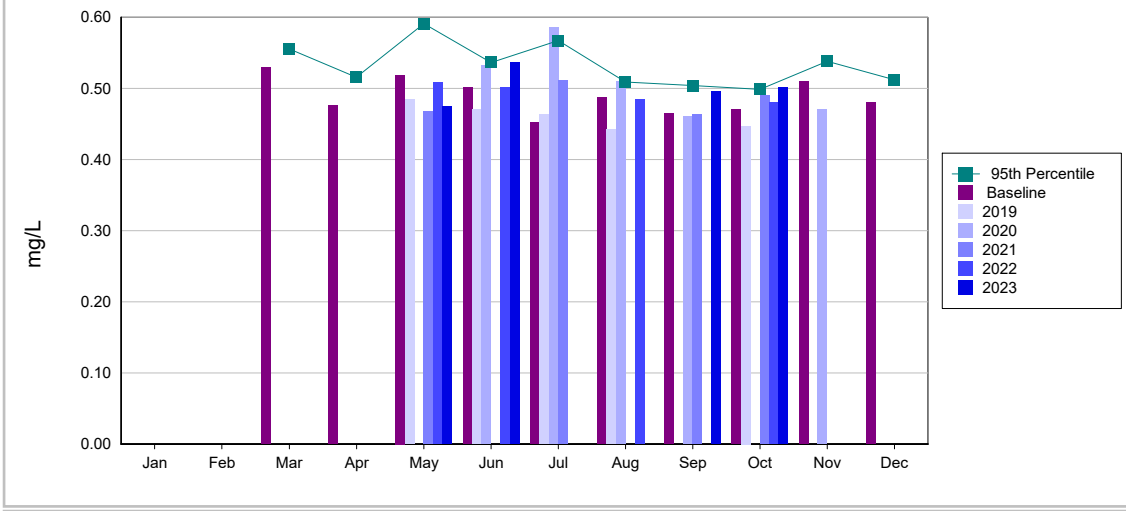

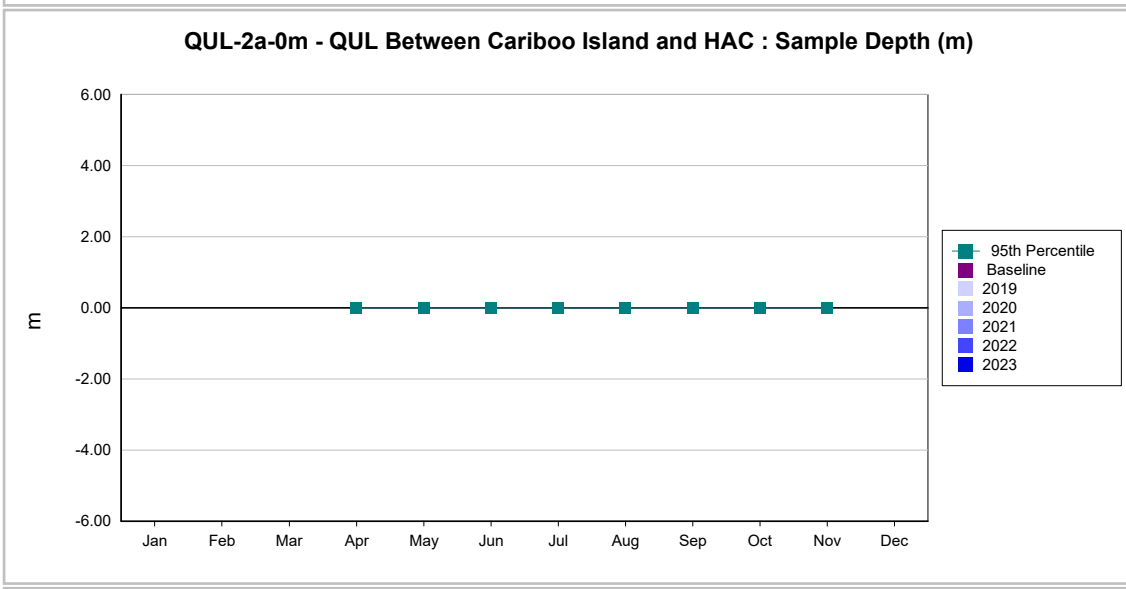

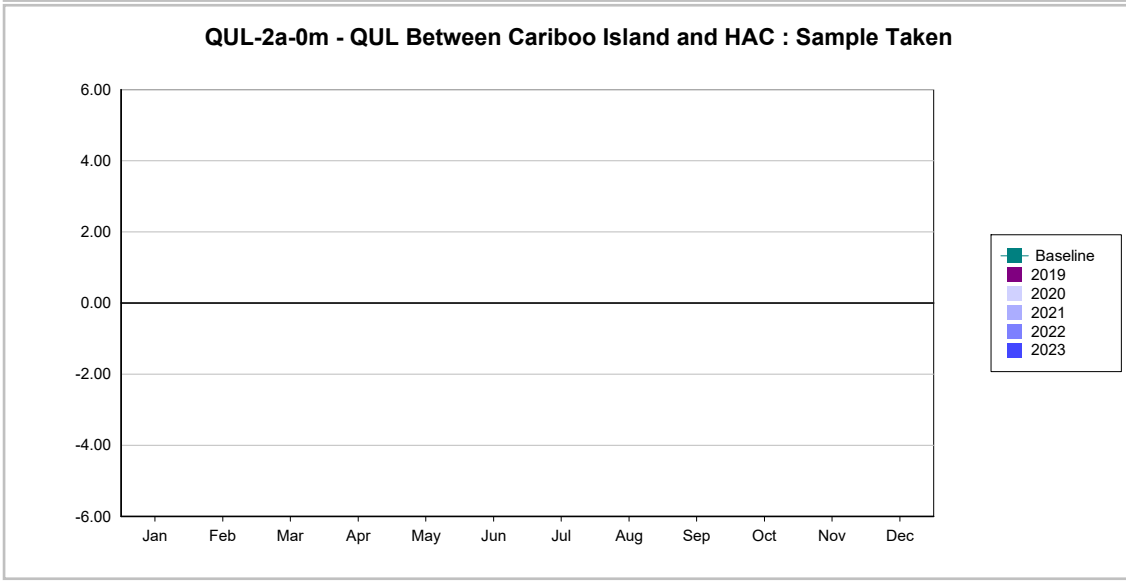

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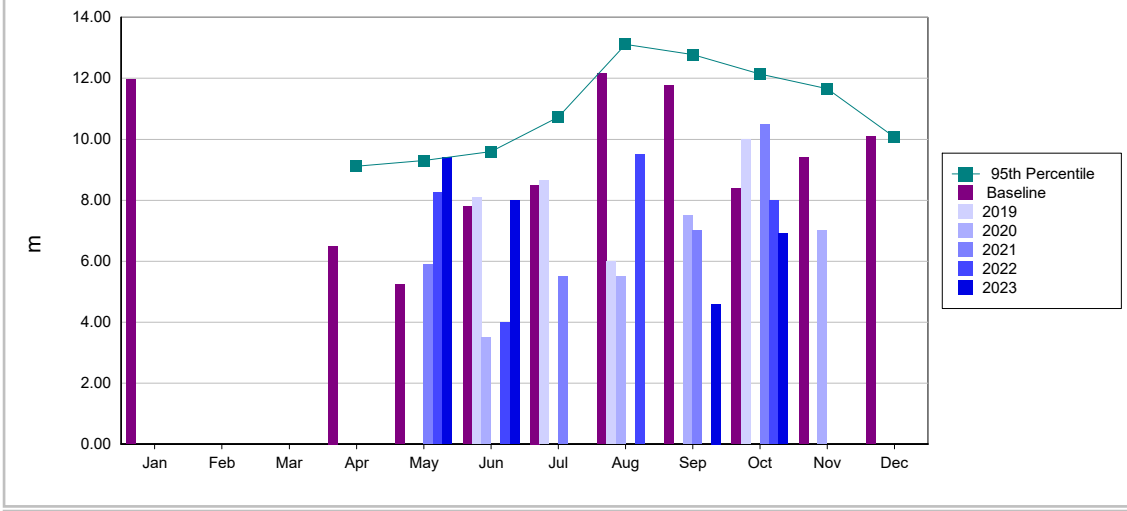

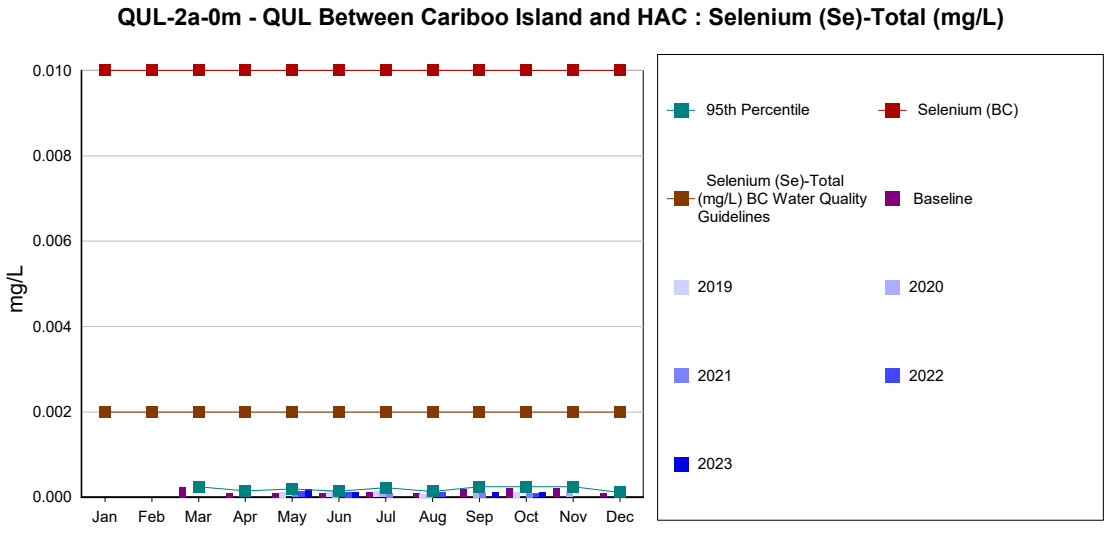

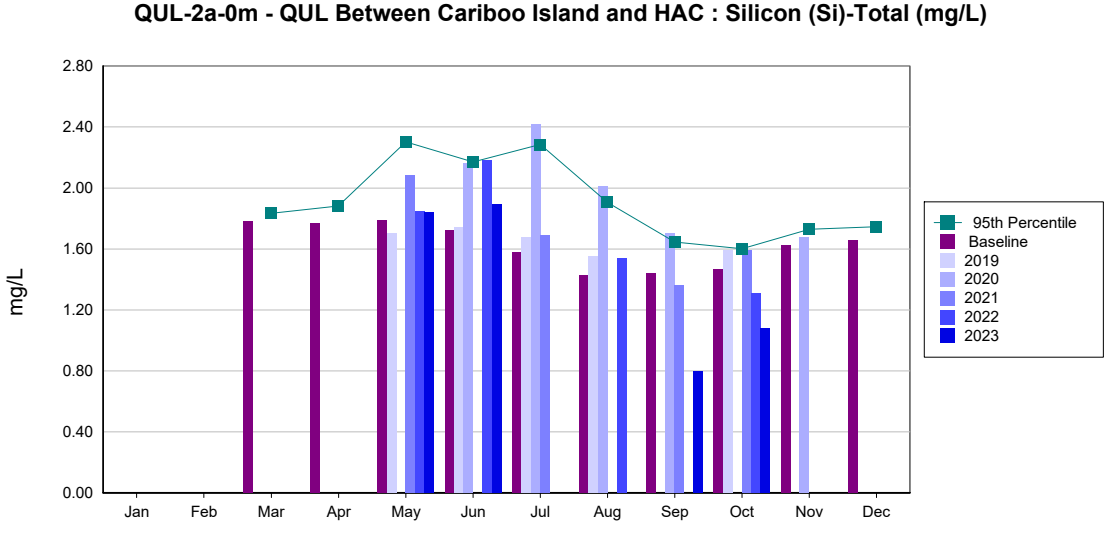

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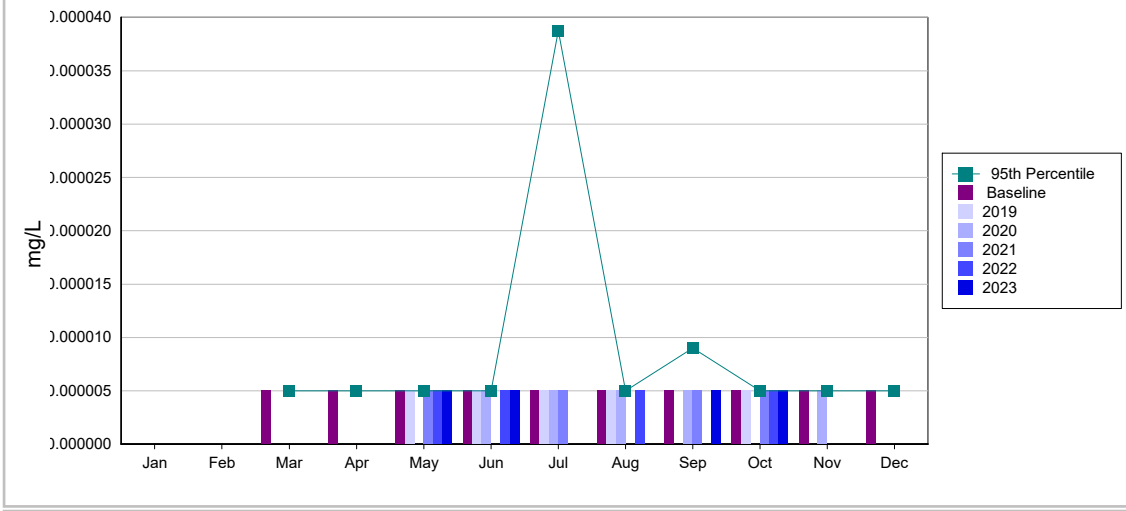

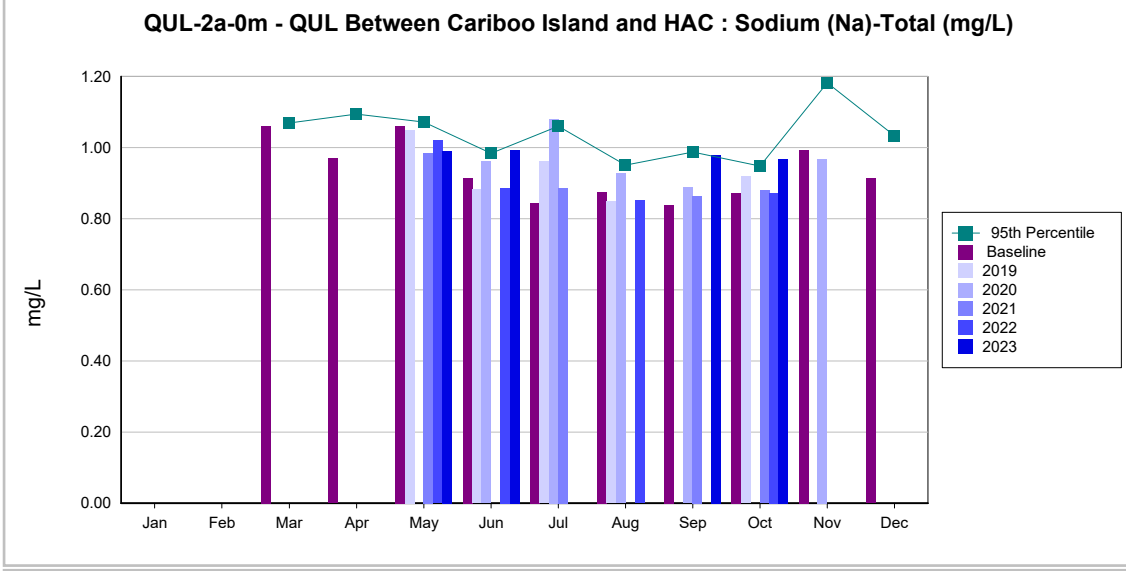

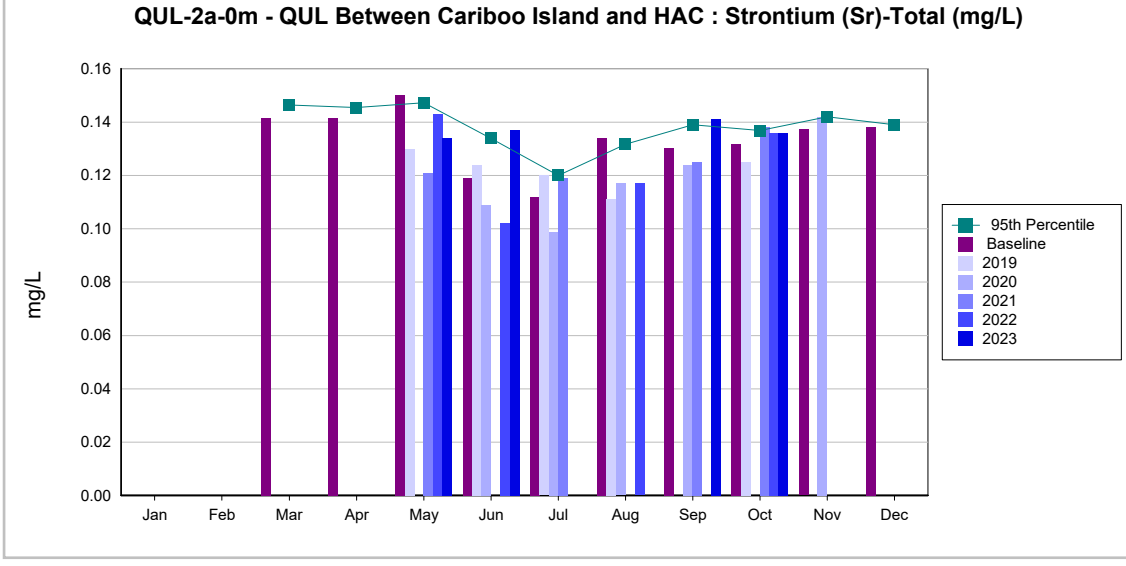

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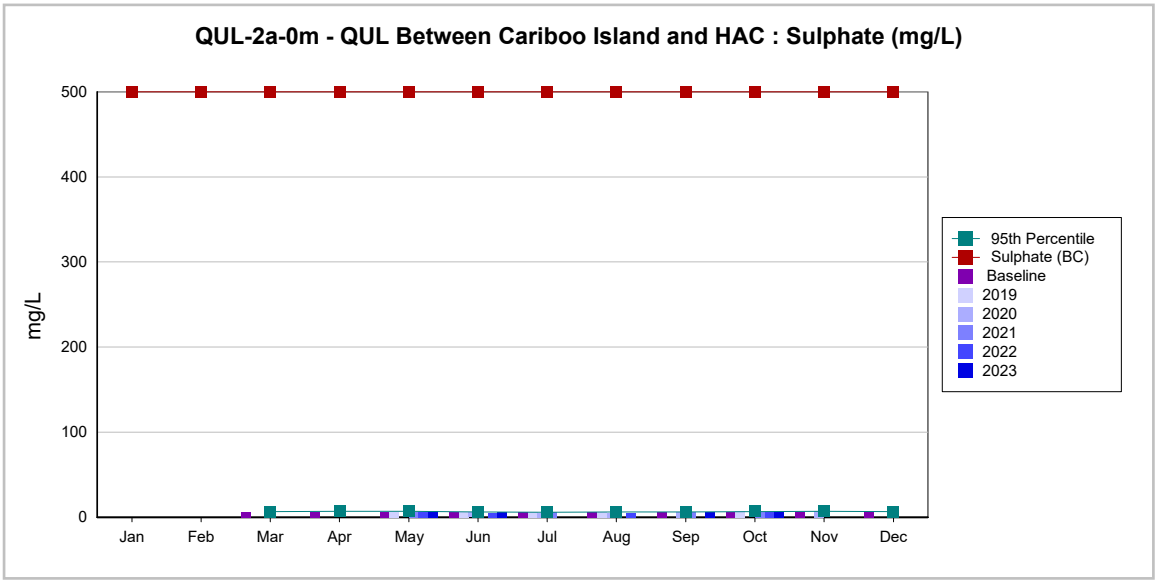

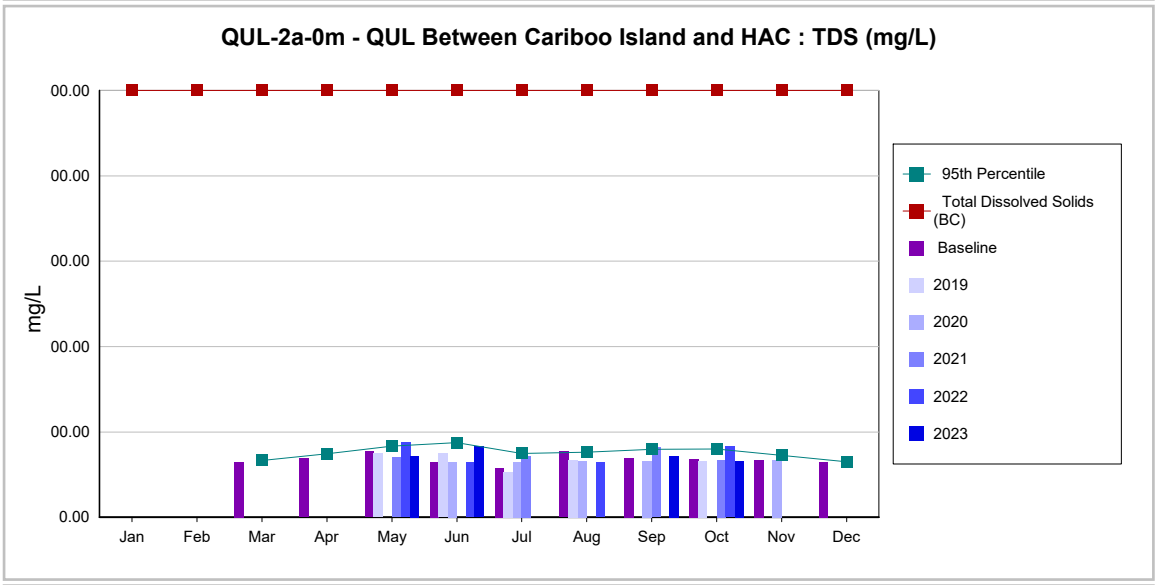

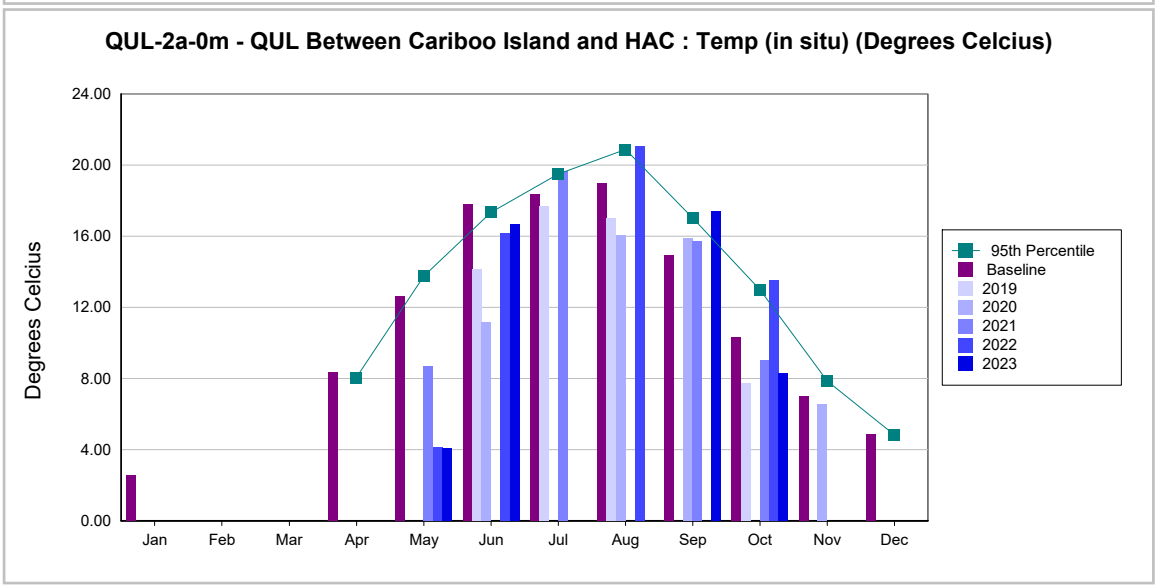

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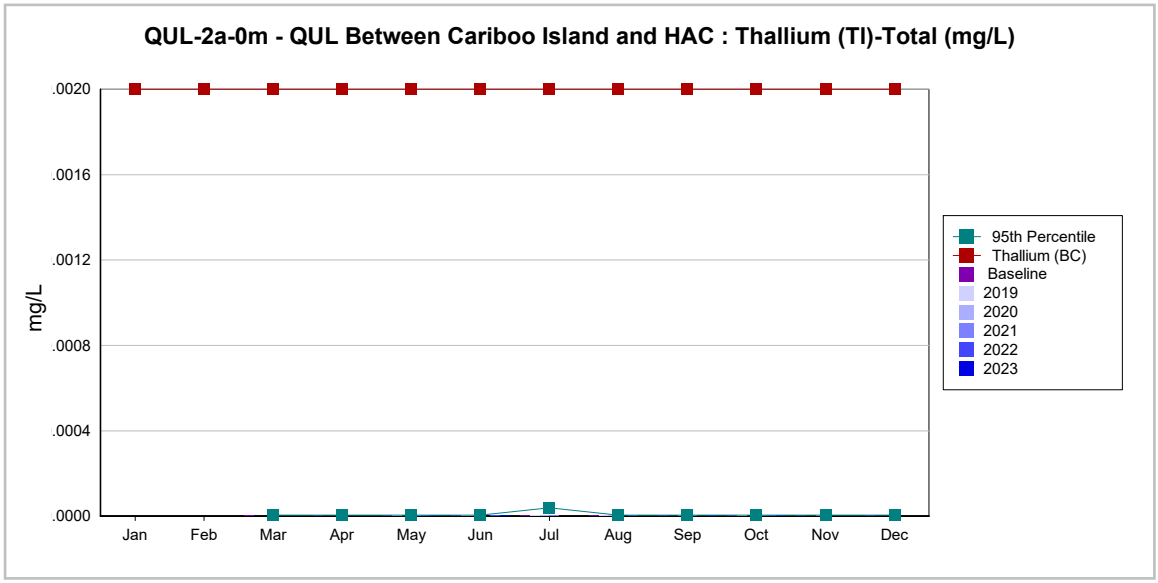

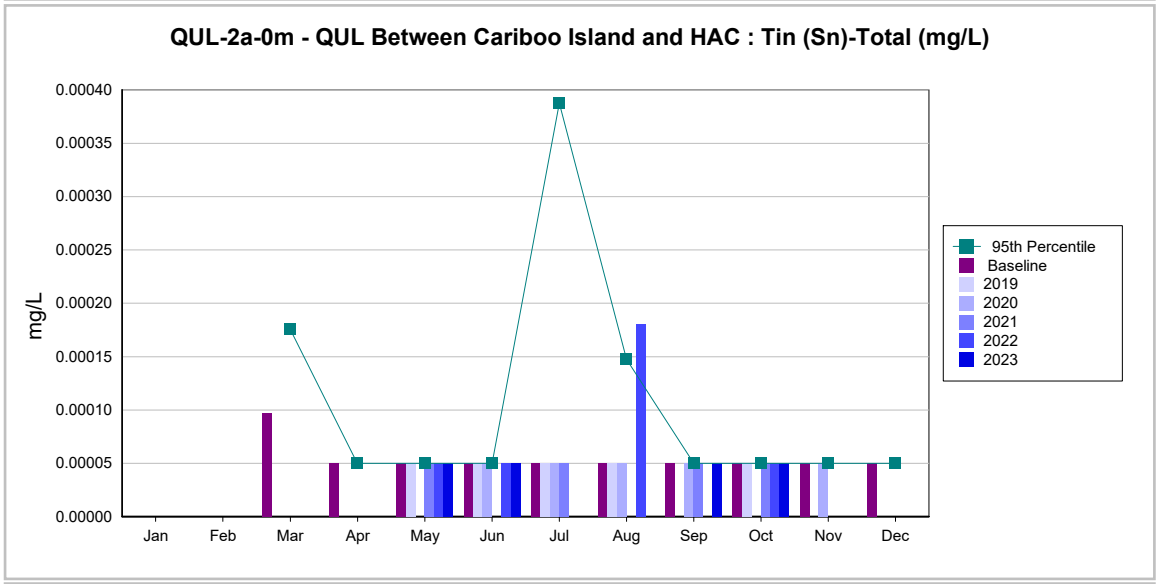

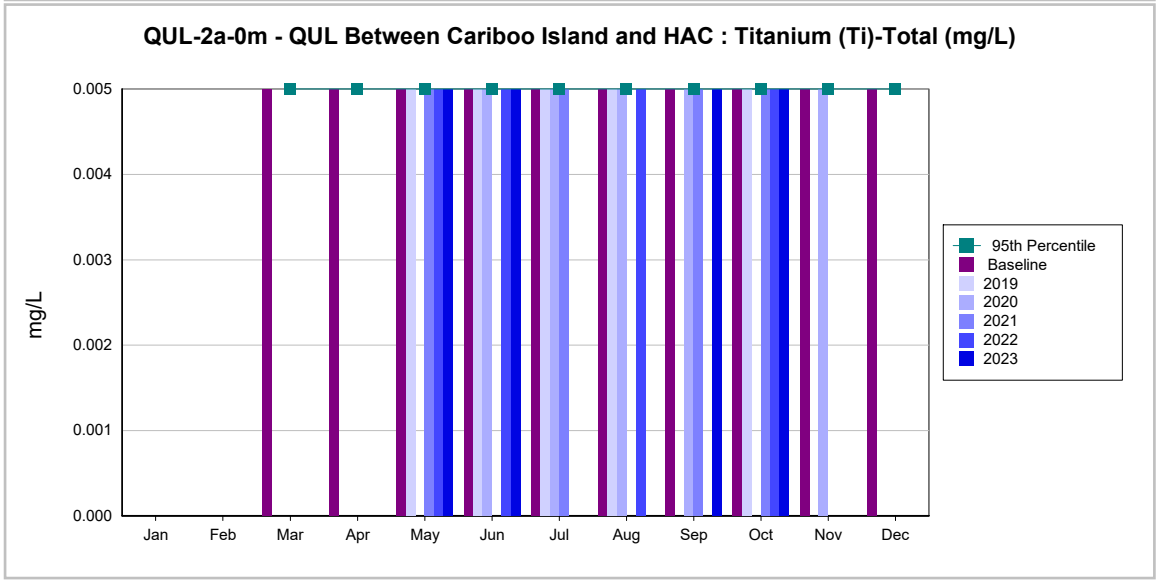

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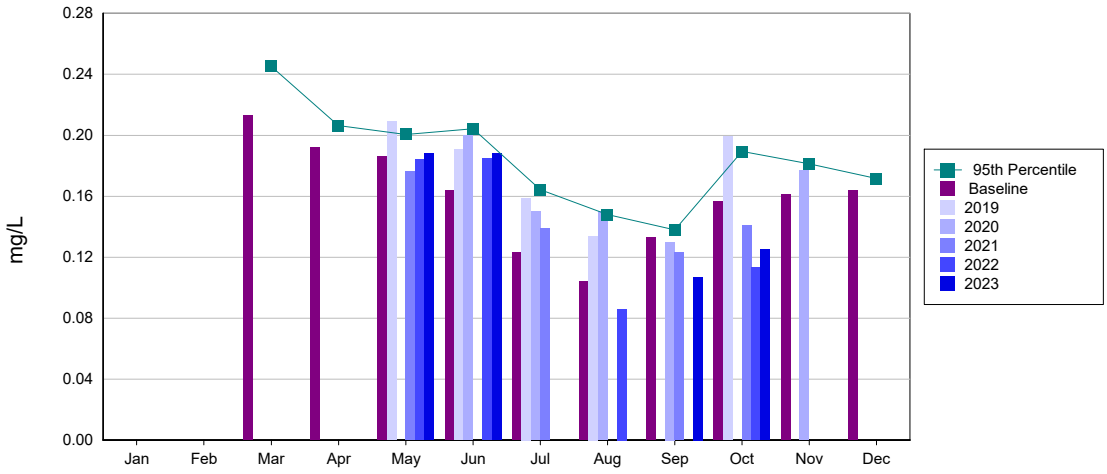
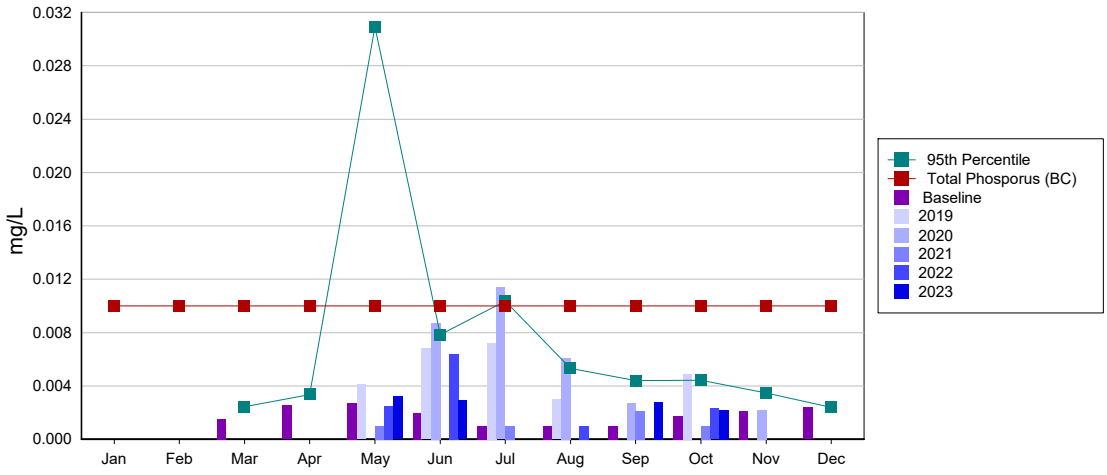
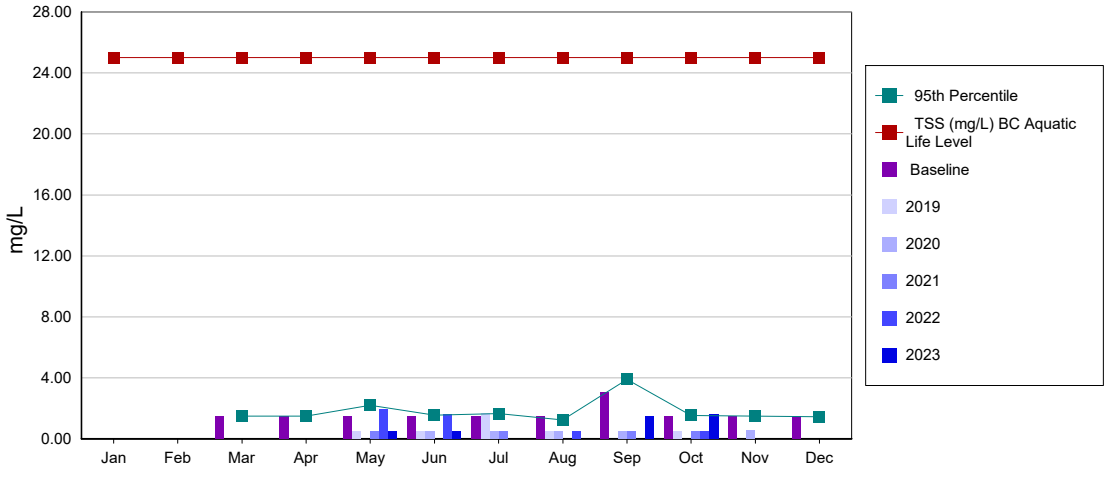
QUL-2a-0m - QUL Between Cariboo Island and HAC : Total Nitrogen (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Total Phosphorus (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : TSS (mg/L)



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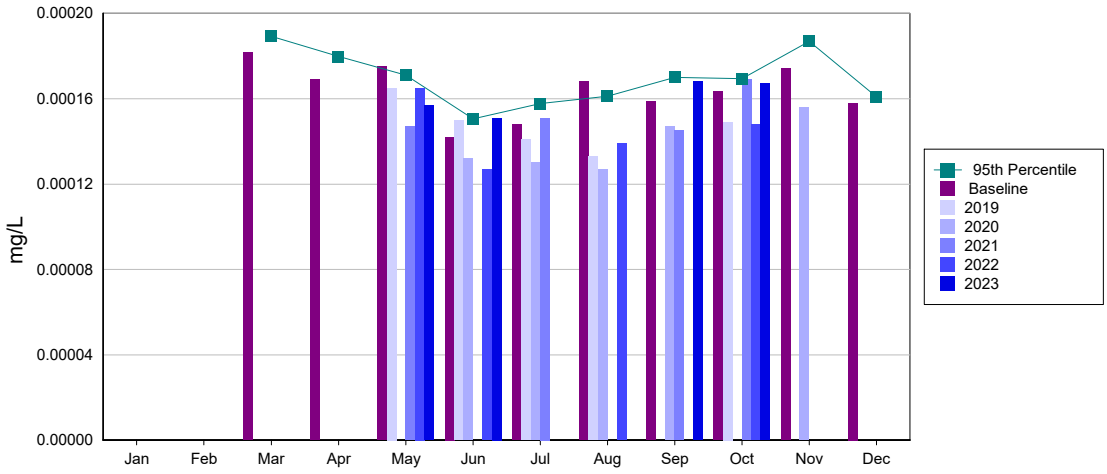
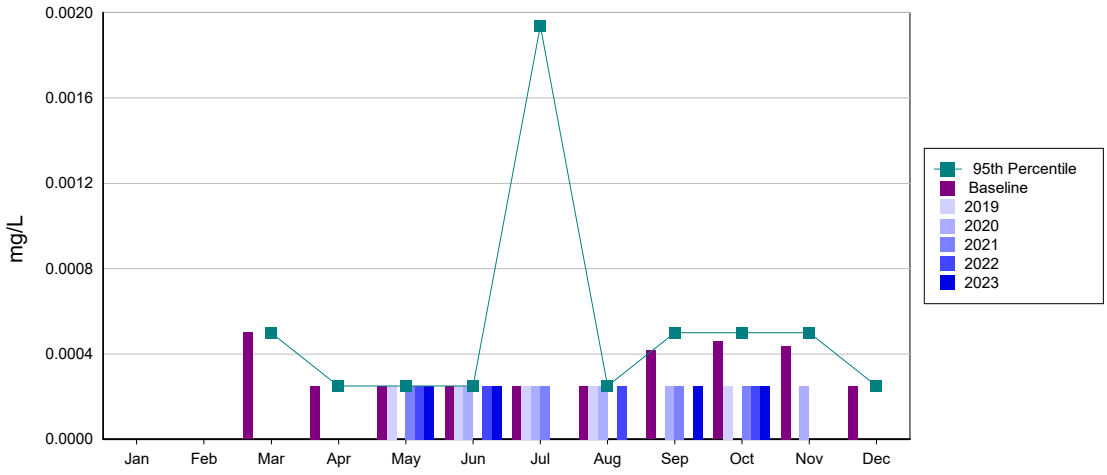
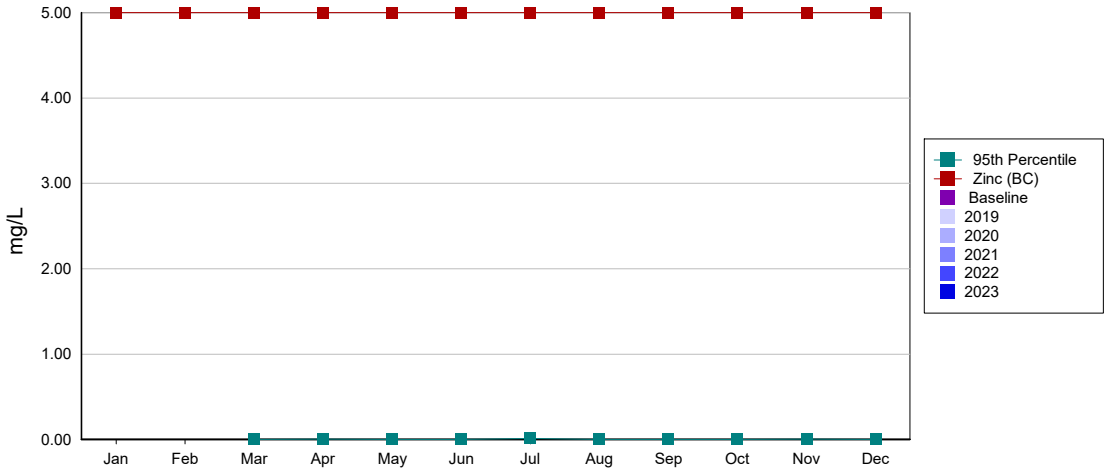
QUL-2a-0m - QUL Between Cariboo Island and HAC : Uranium (U)-Total (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Vanadium (V)-Total (mg/L)



QUL-2a-0m - QUL Between Cariboo Island and HAC : Zinc (Zn)-Total (mg/L)



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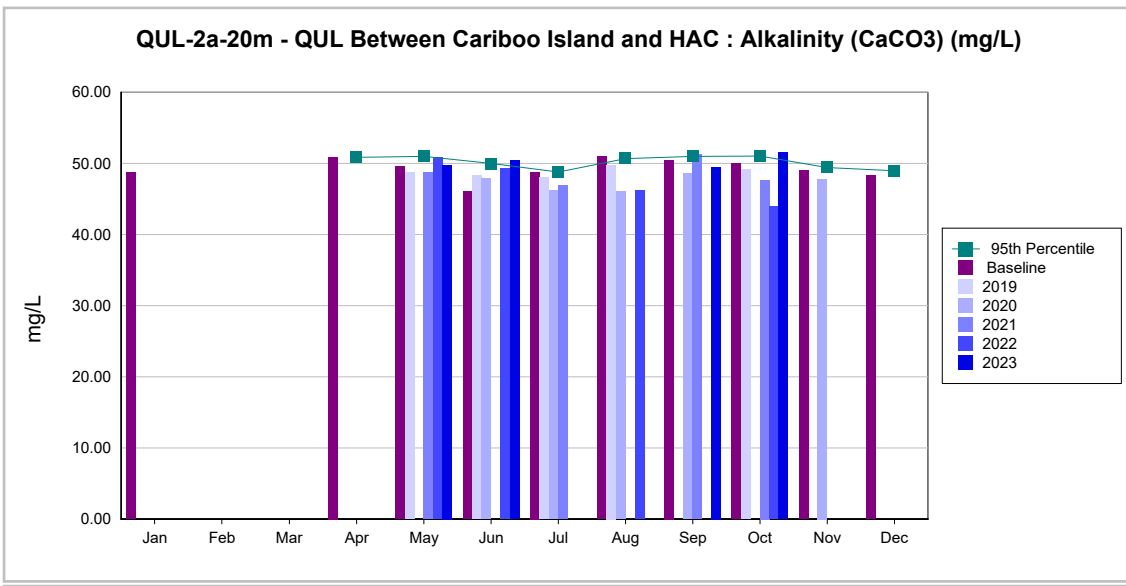

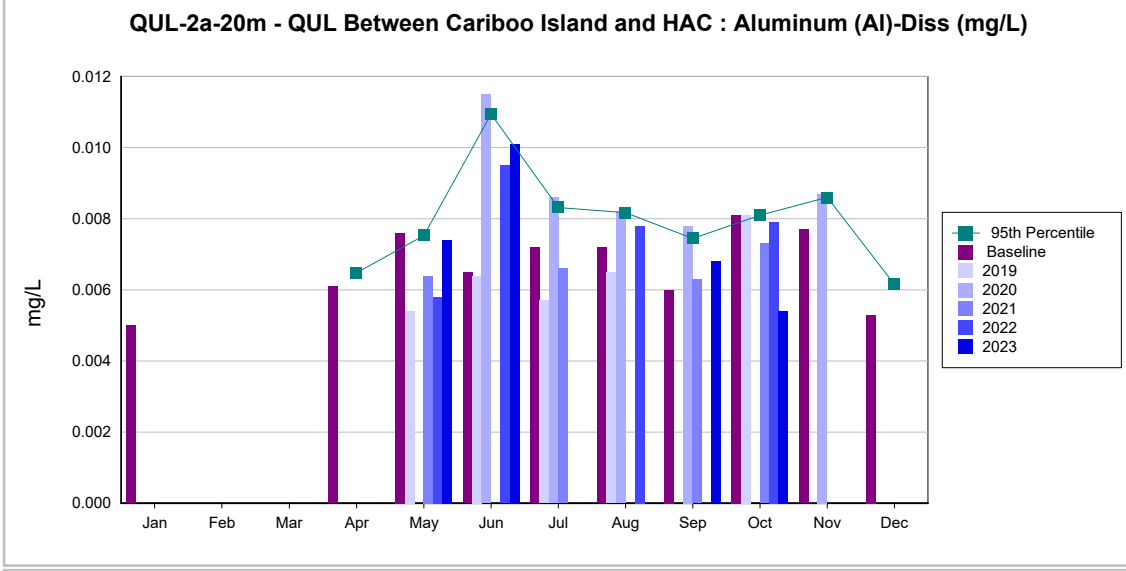

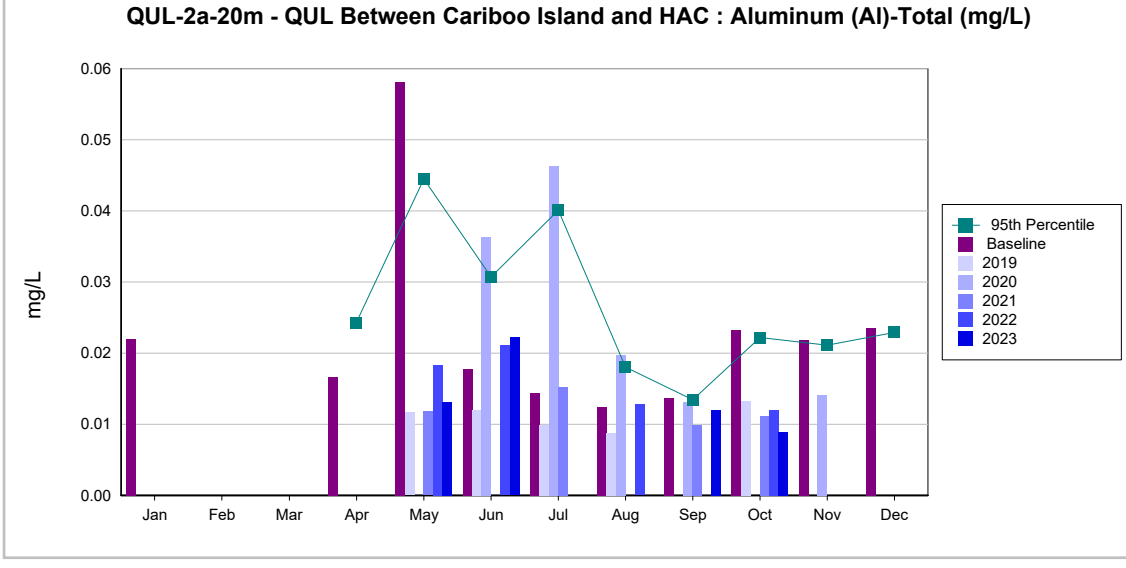

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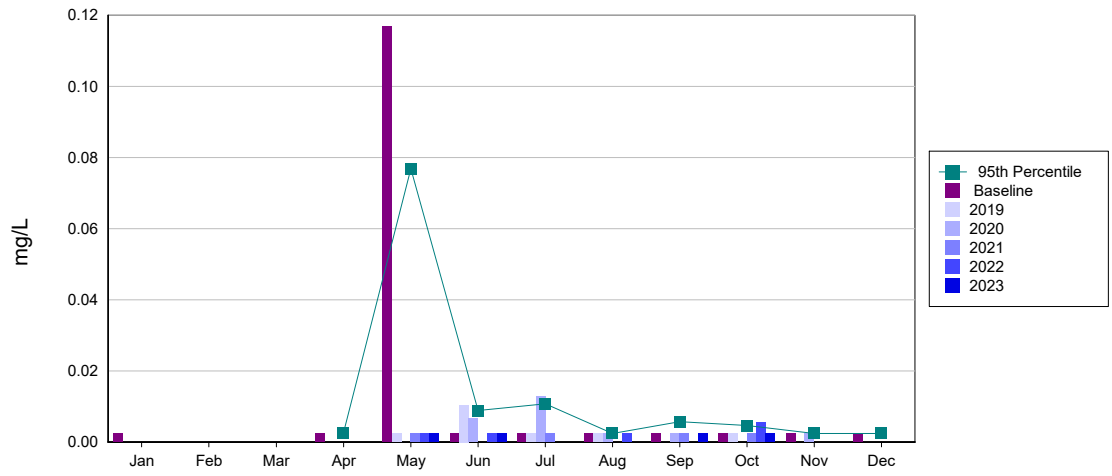
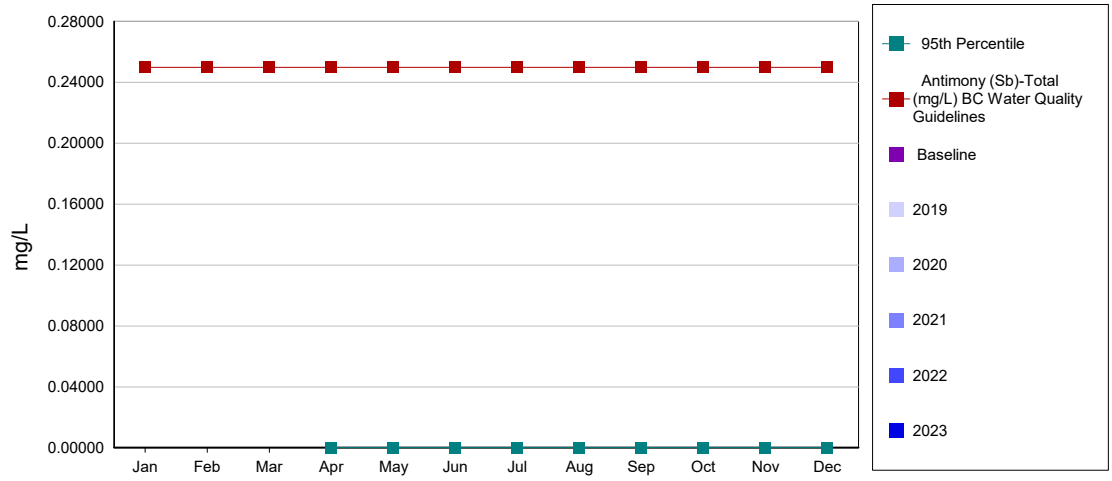
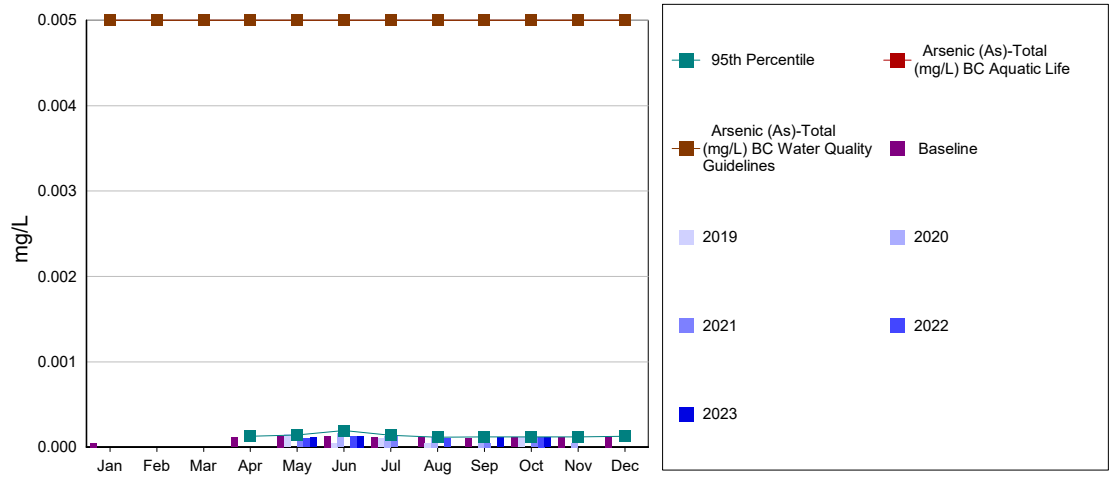
QUL-2a-20m - QUL Between Cariboo Island and HAC : Ammonia (as N) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Antimony (Sb)-Total (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Arsenic (As)-Total (mg/L)



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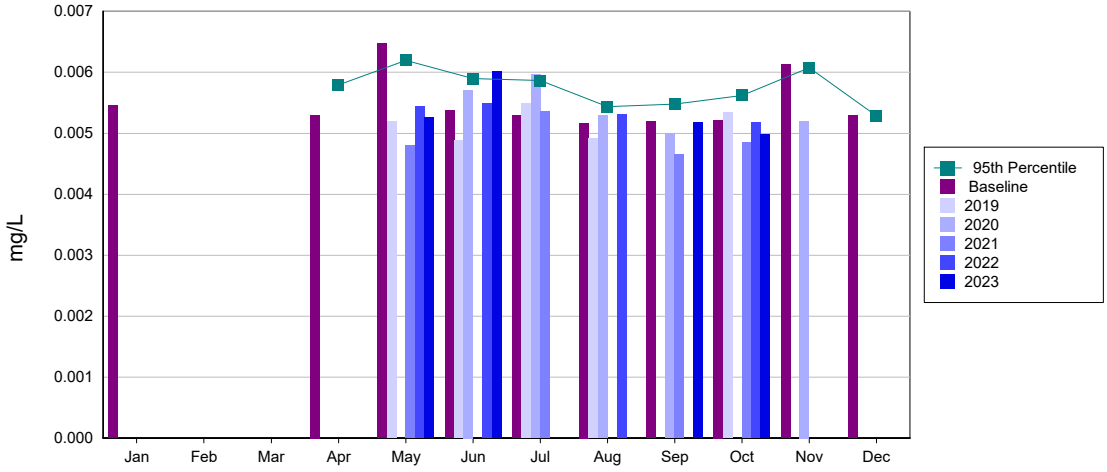

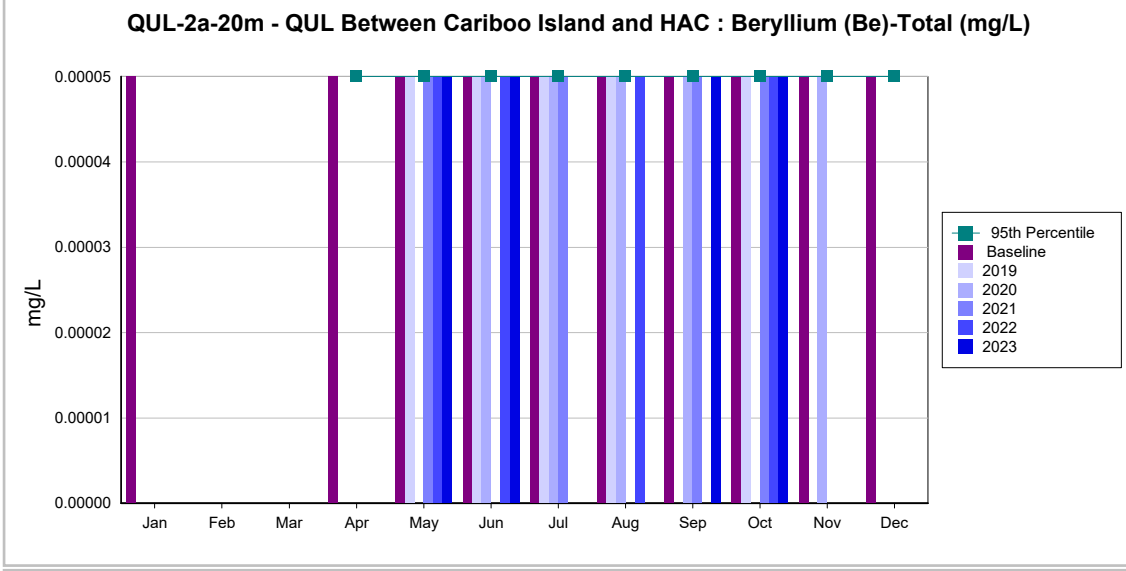

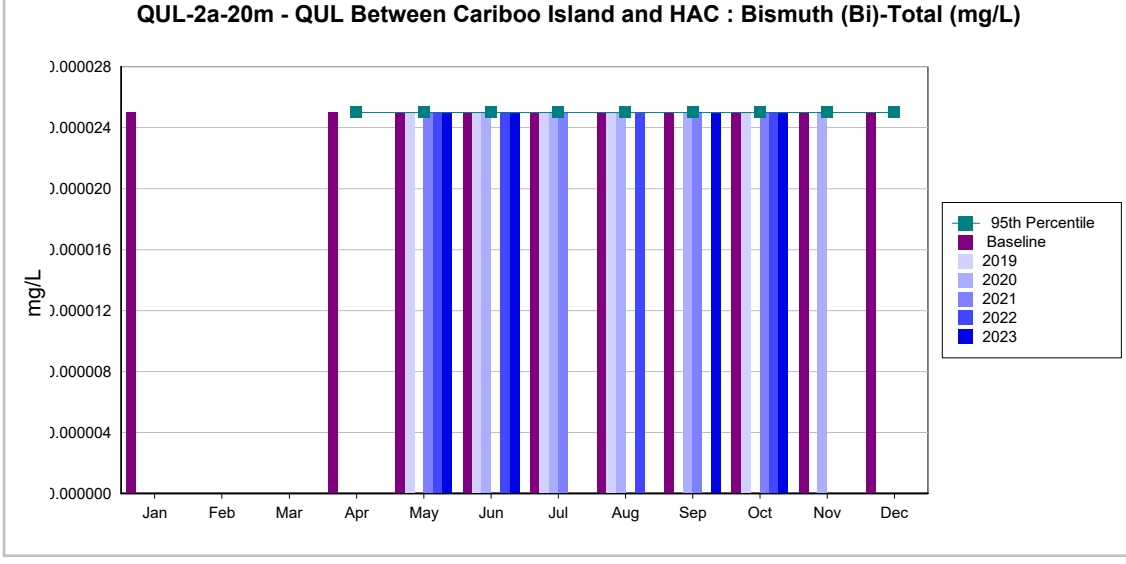

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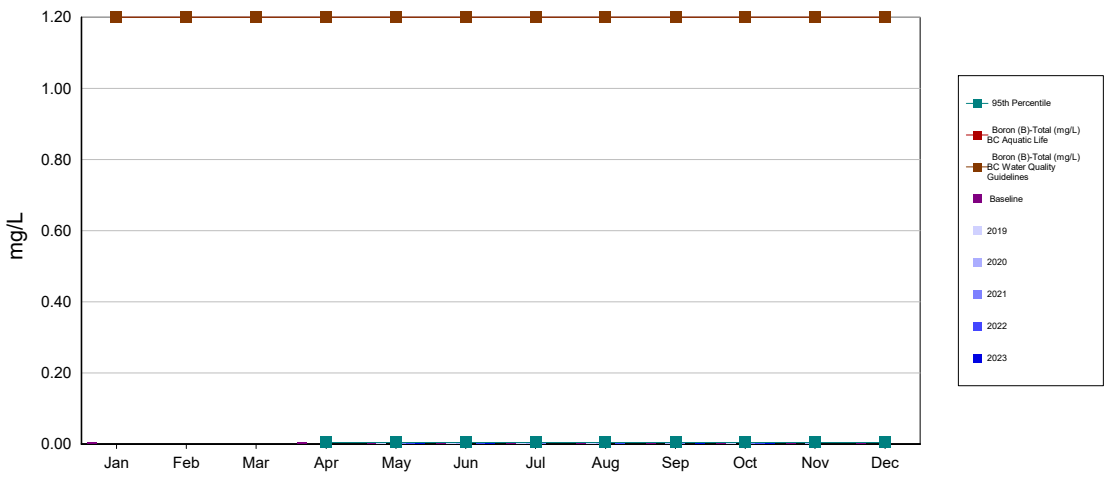

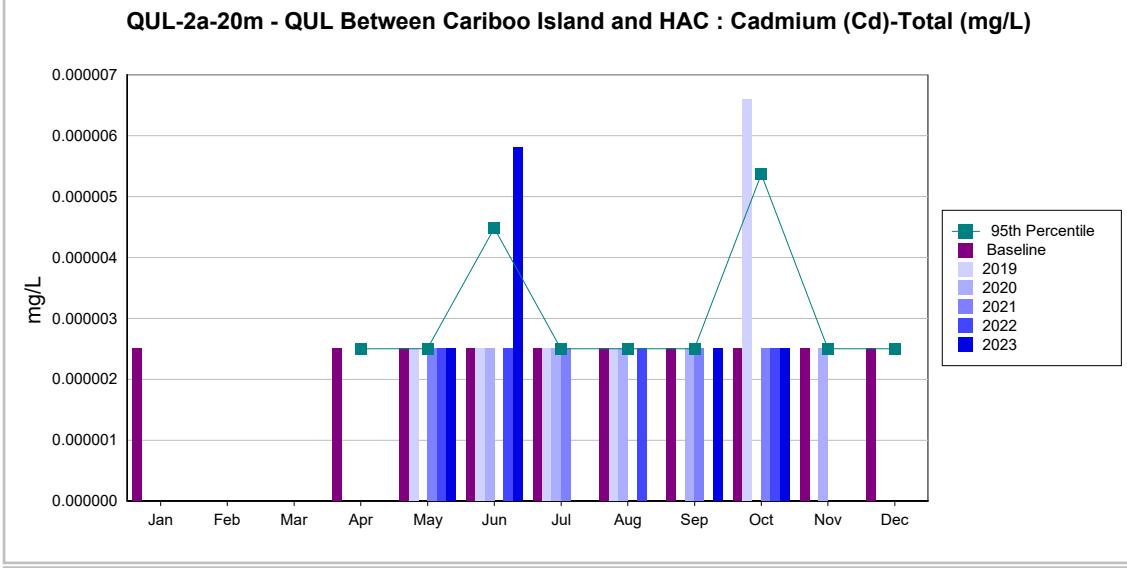

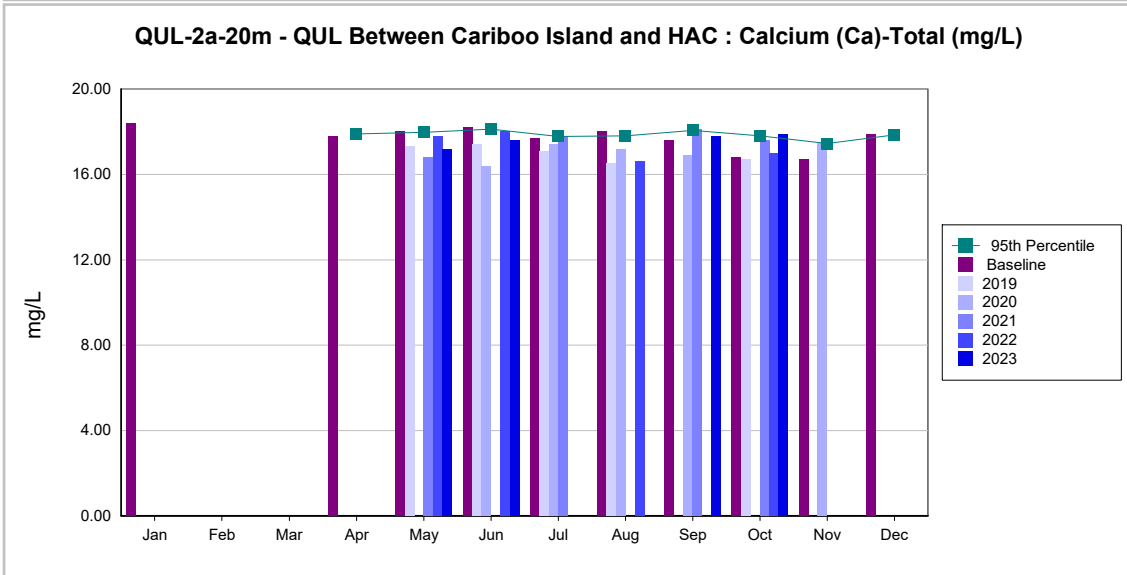

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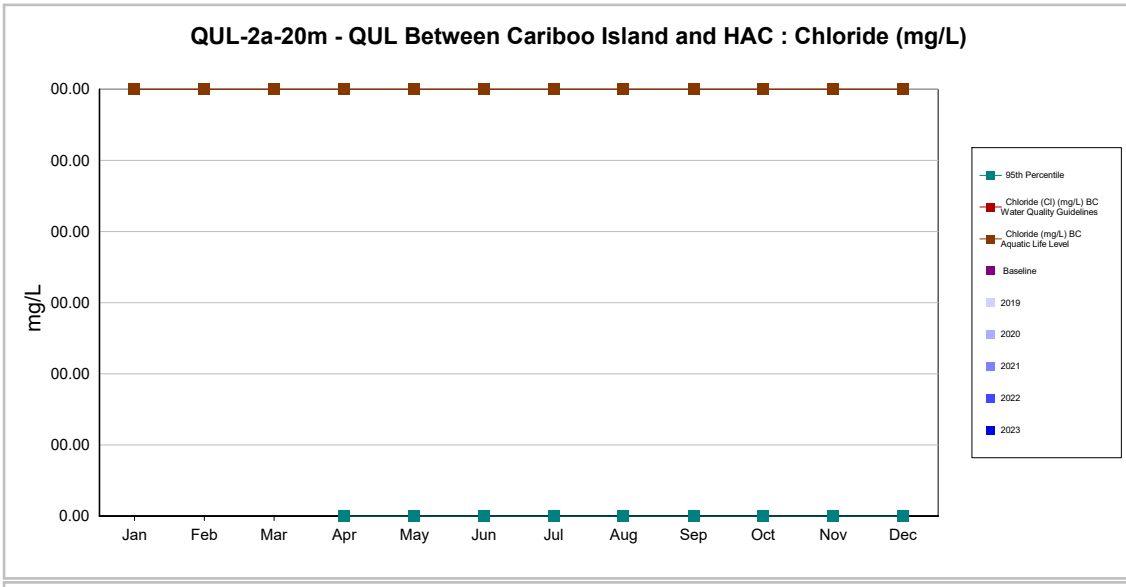

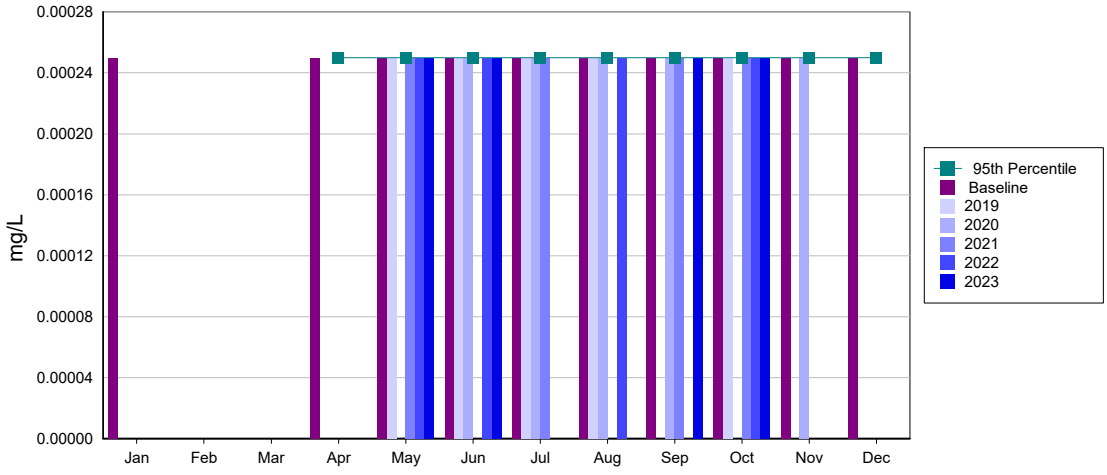

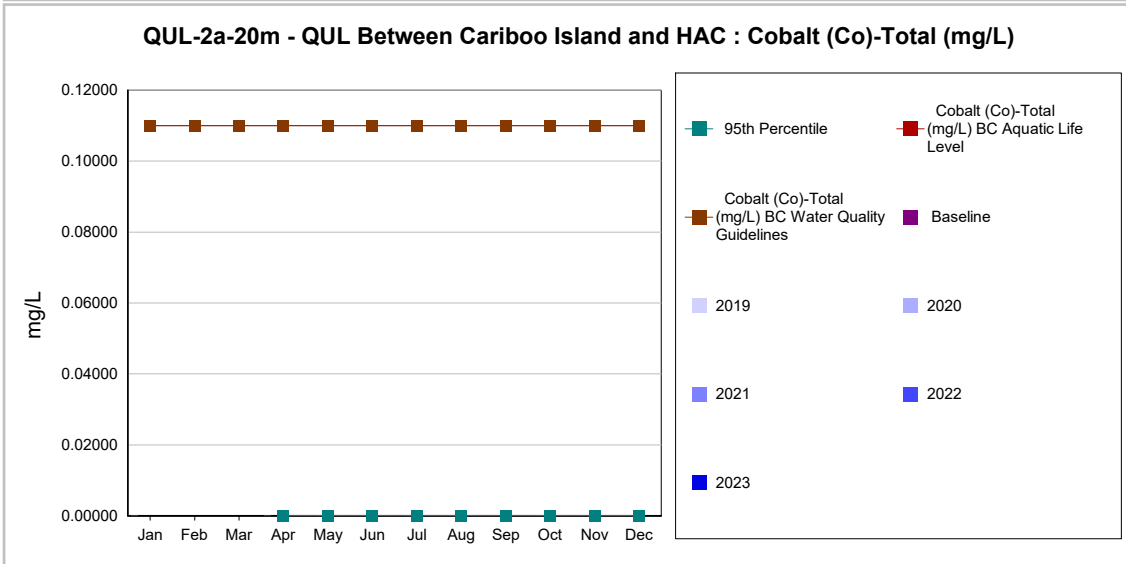

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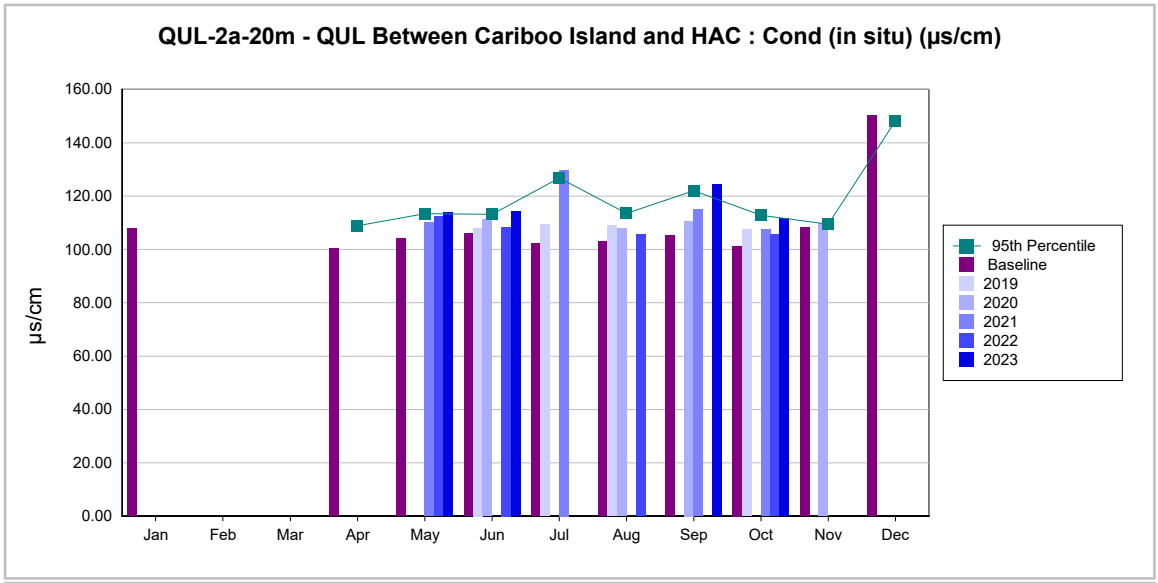

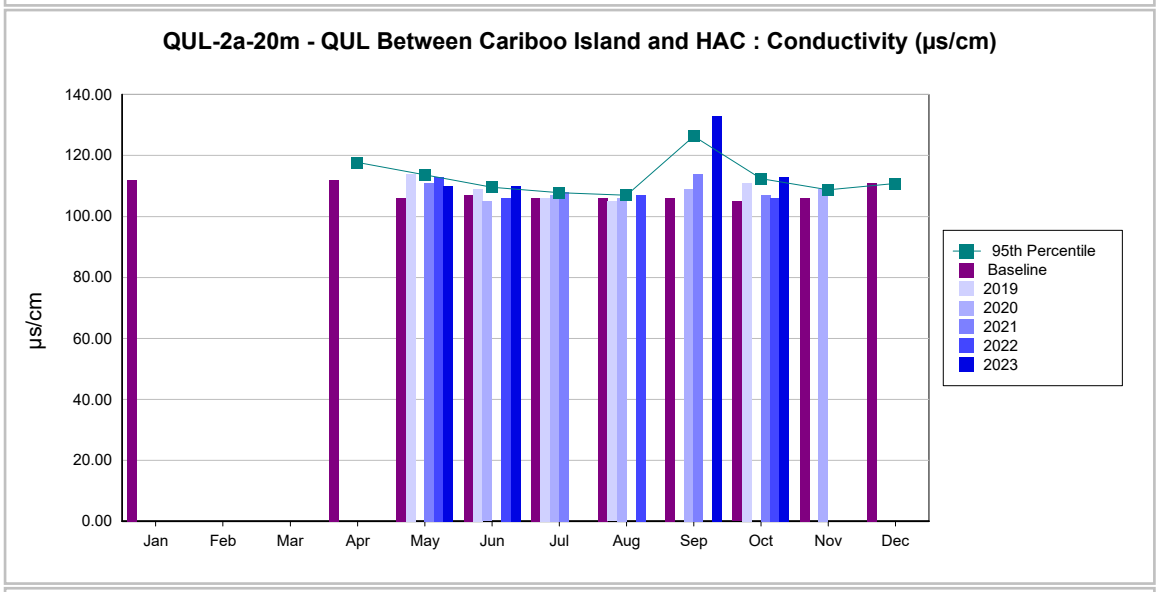

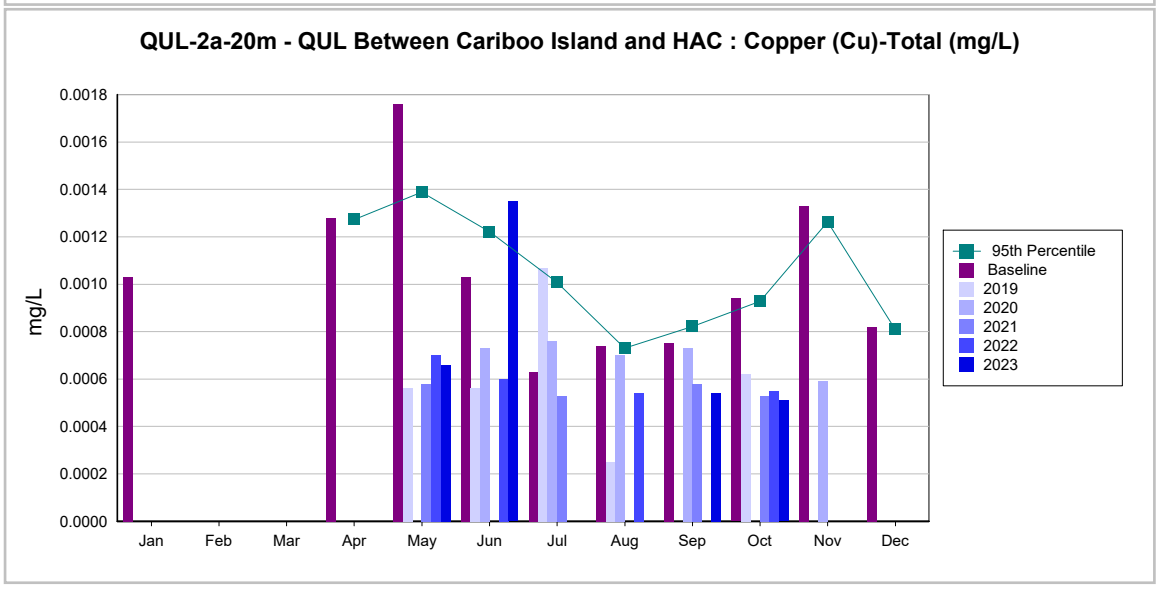

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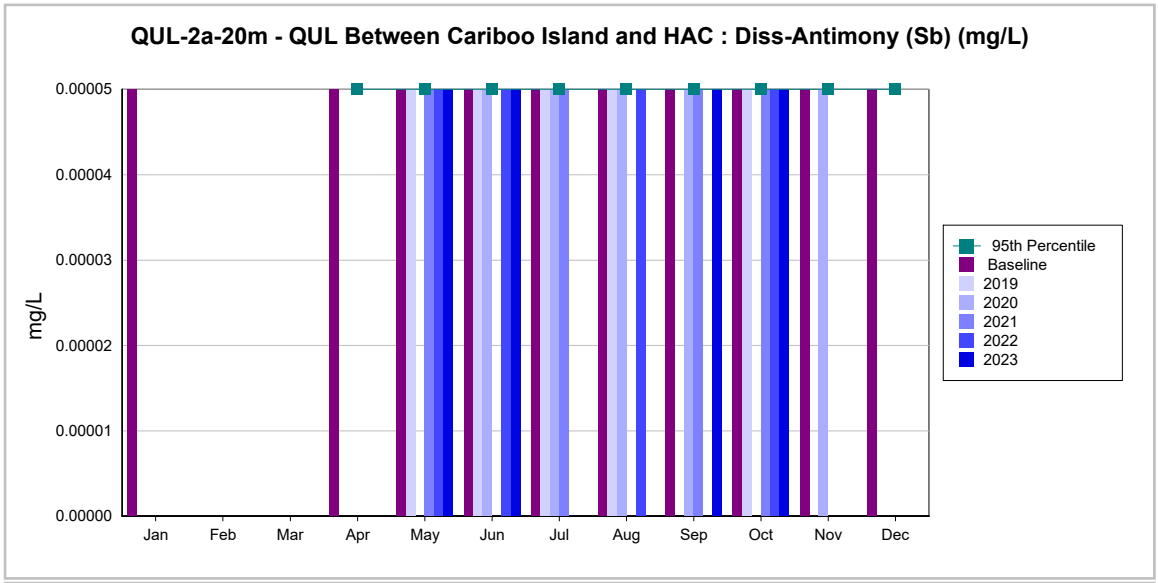

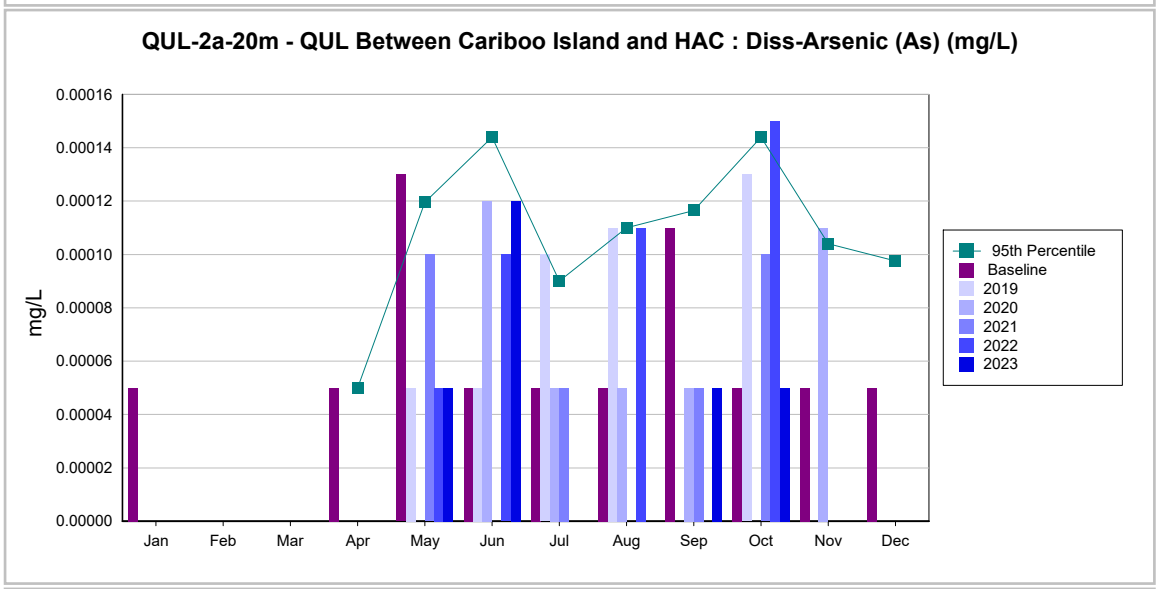

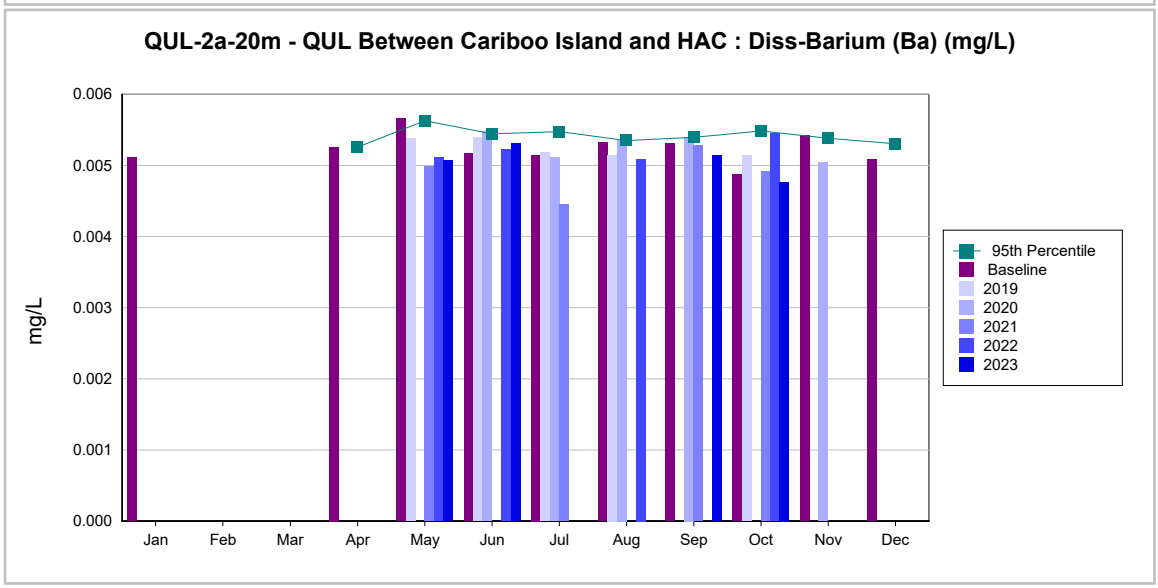

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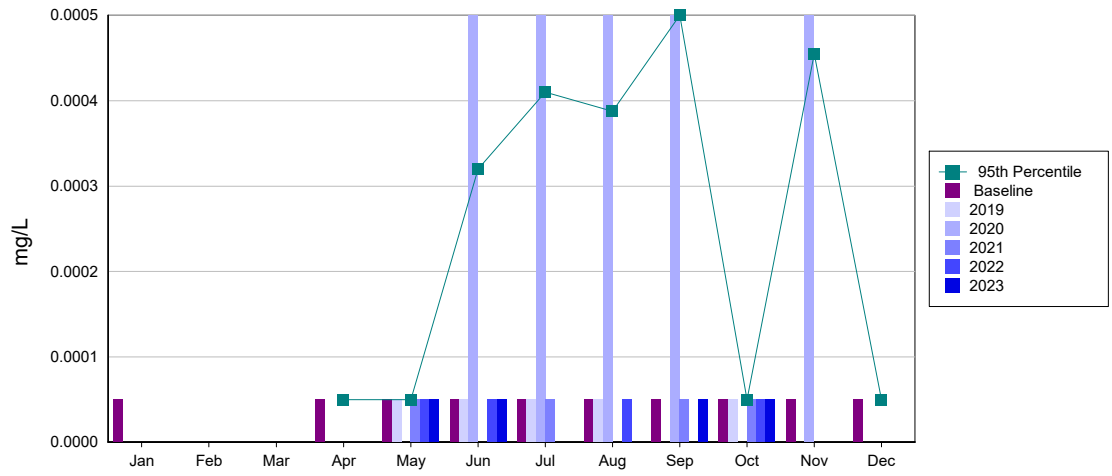
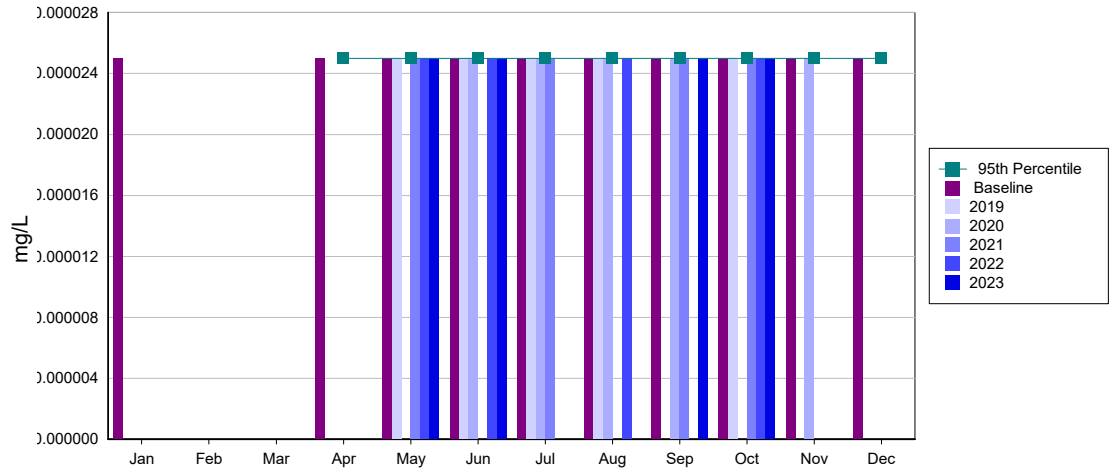
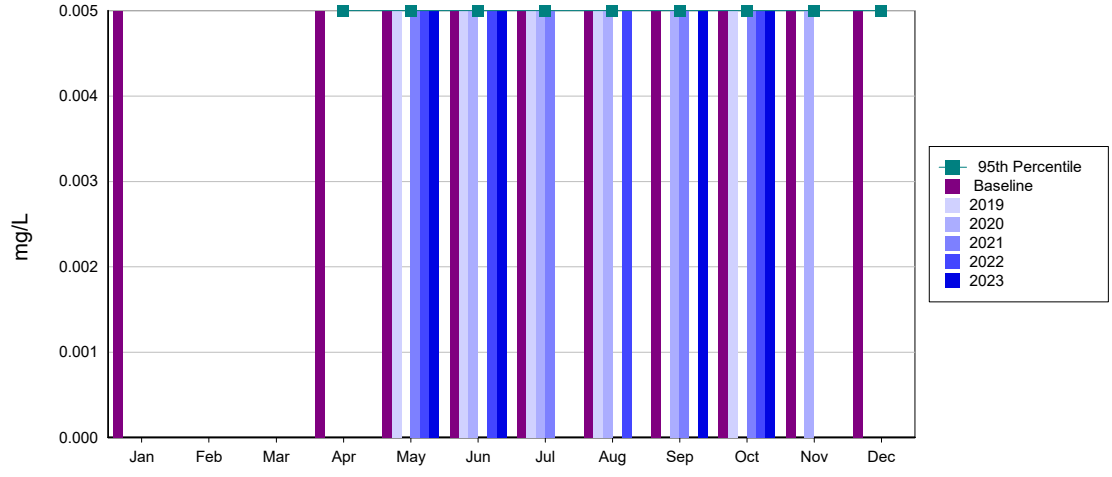
QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Beryllium (Be) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Bismuth (Bi) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Boron (B) (mg/L)



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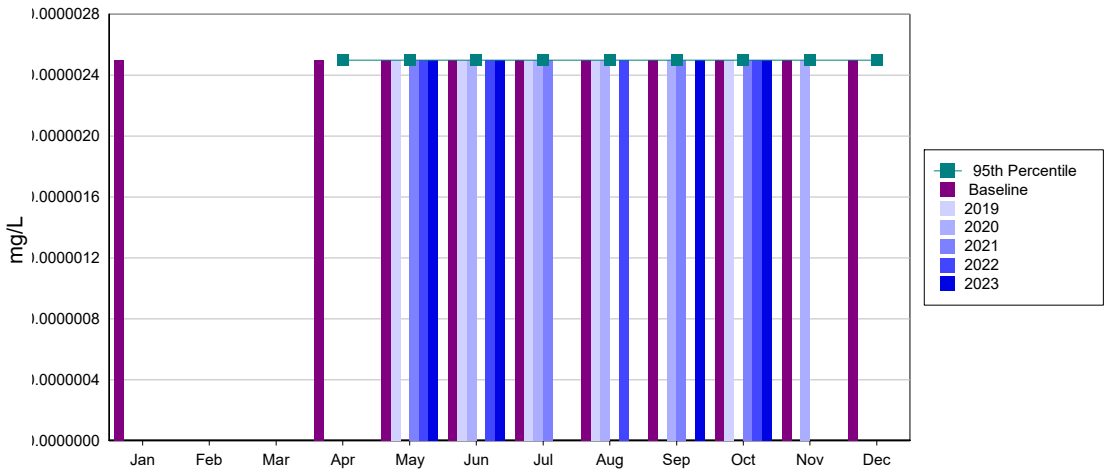
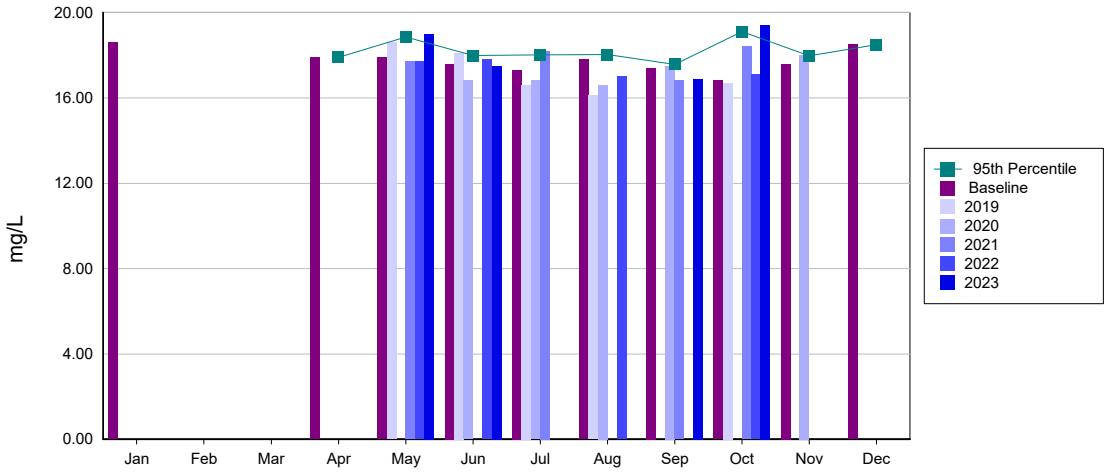
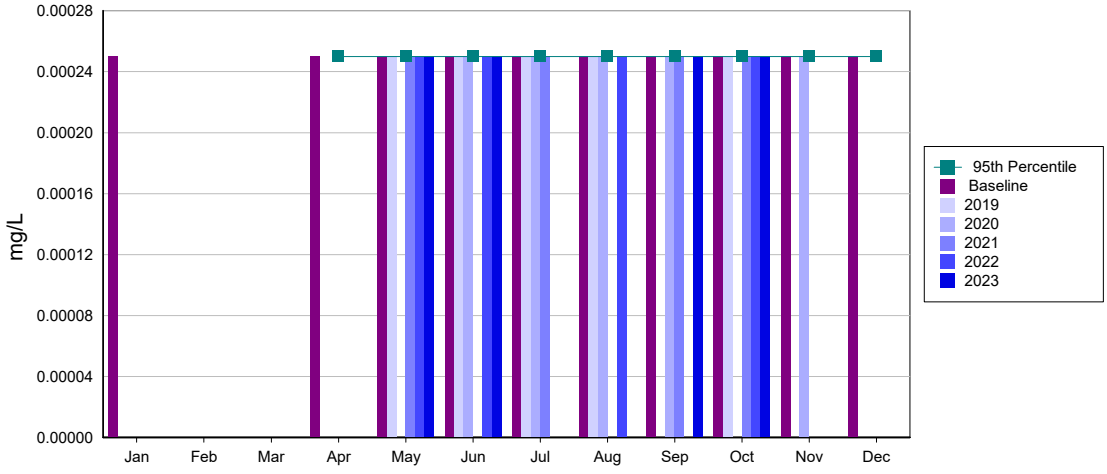
QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Cadmium (Cd) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Calcium (Ca) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Chromium (Cr) (mg/L)



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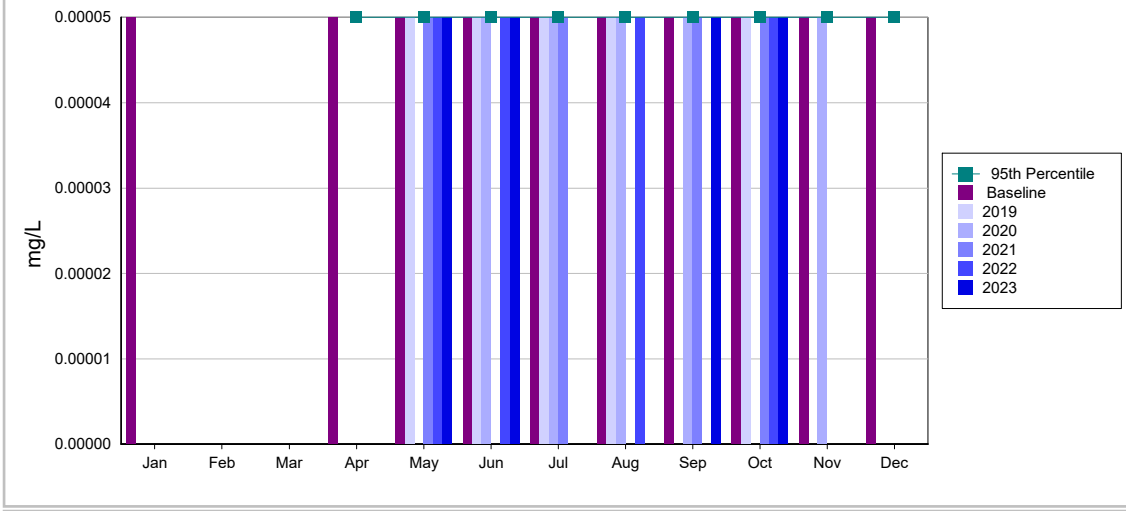

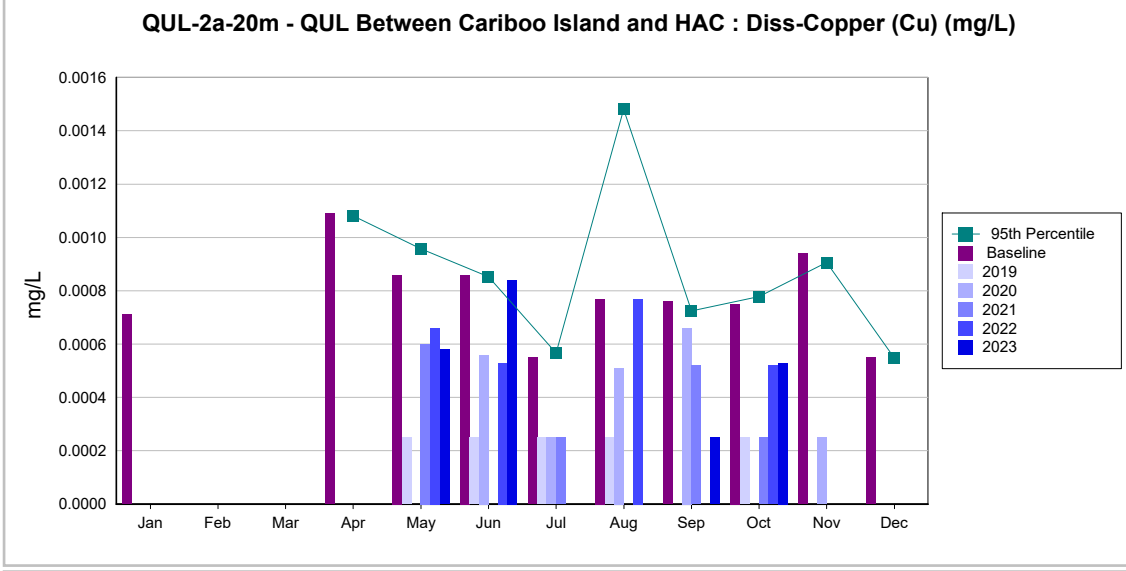

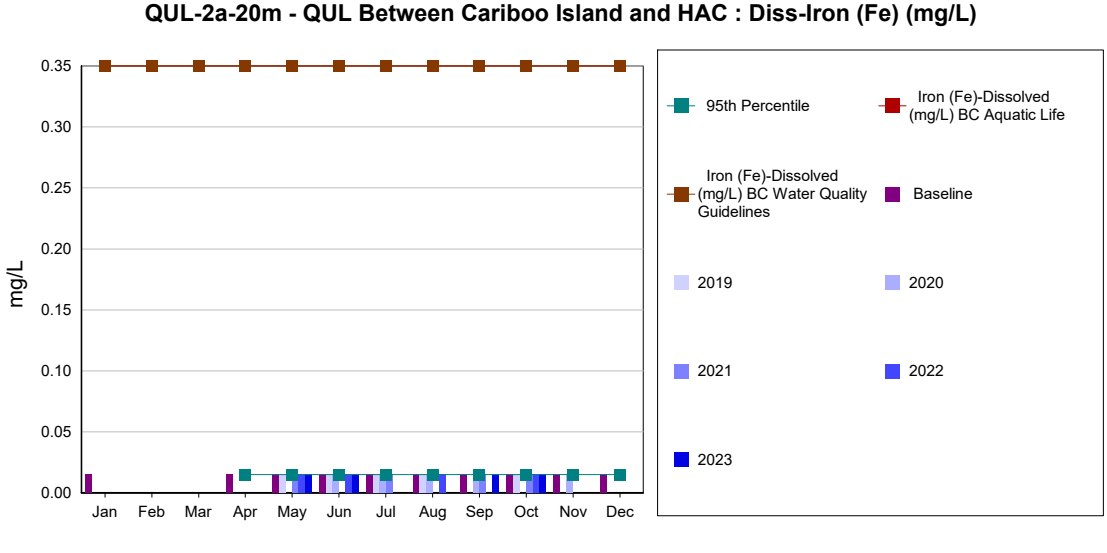

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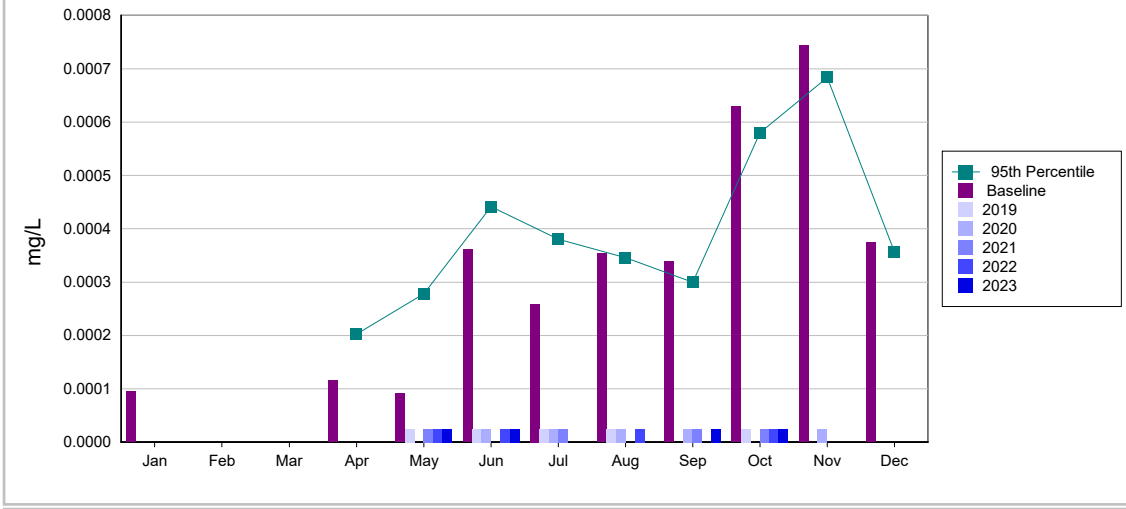

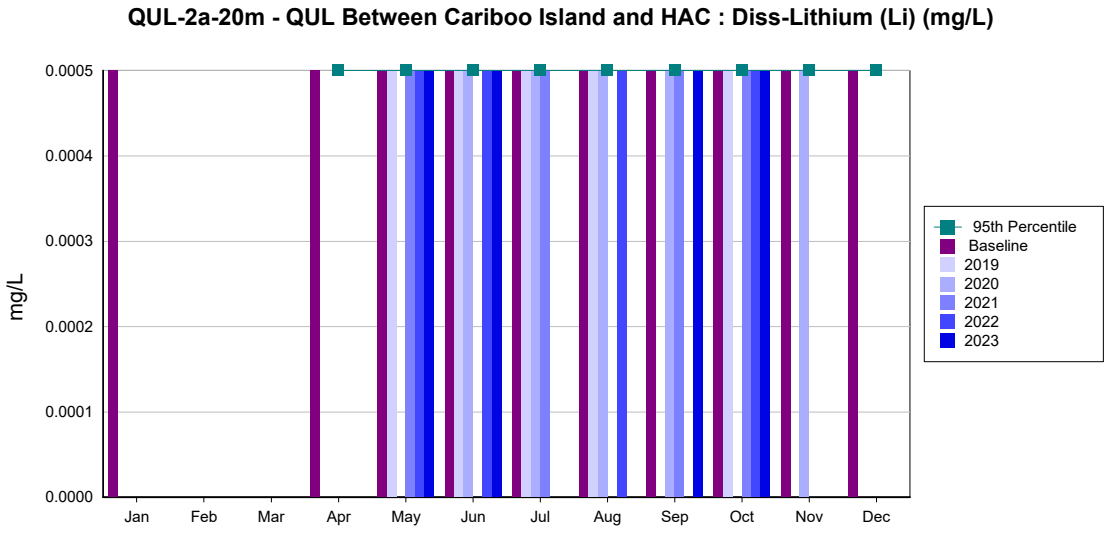

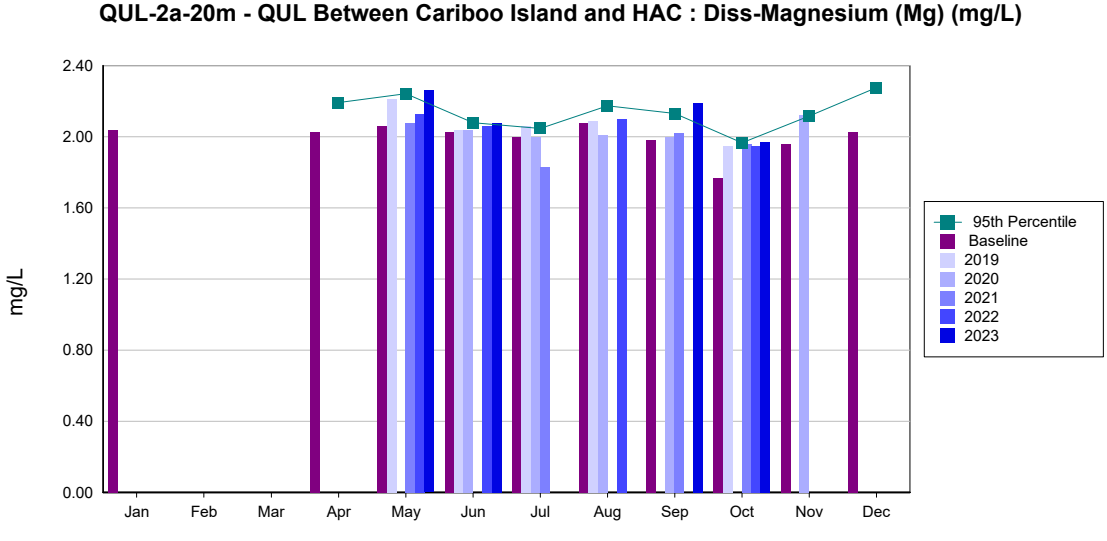

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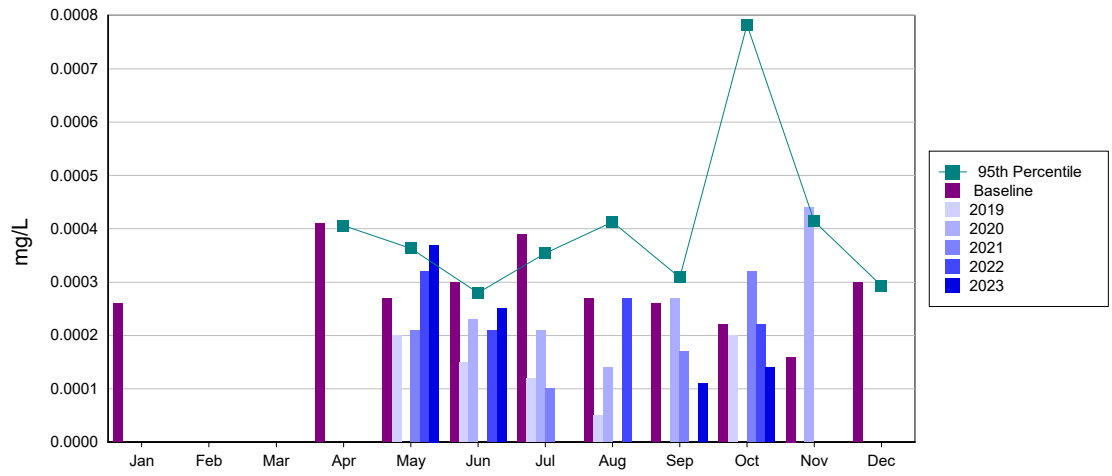
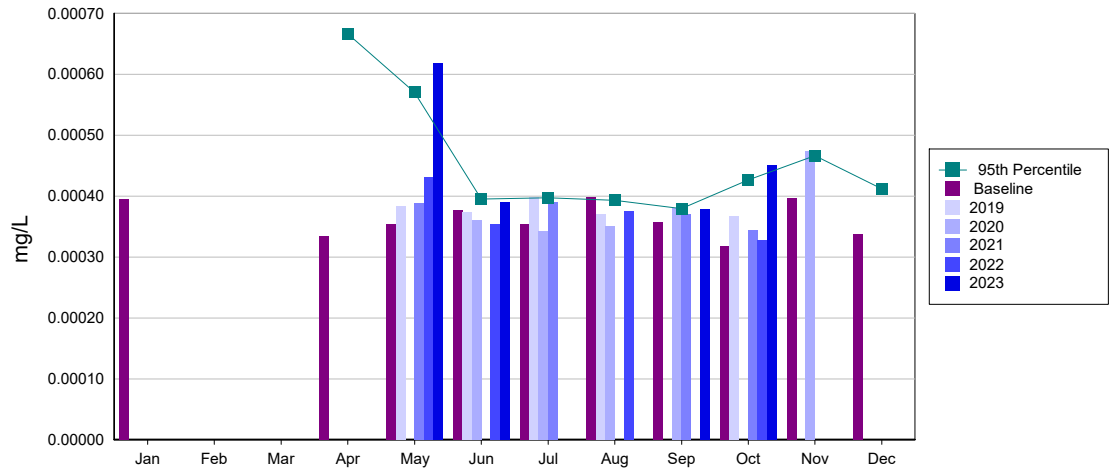
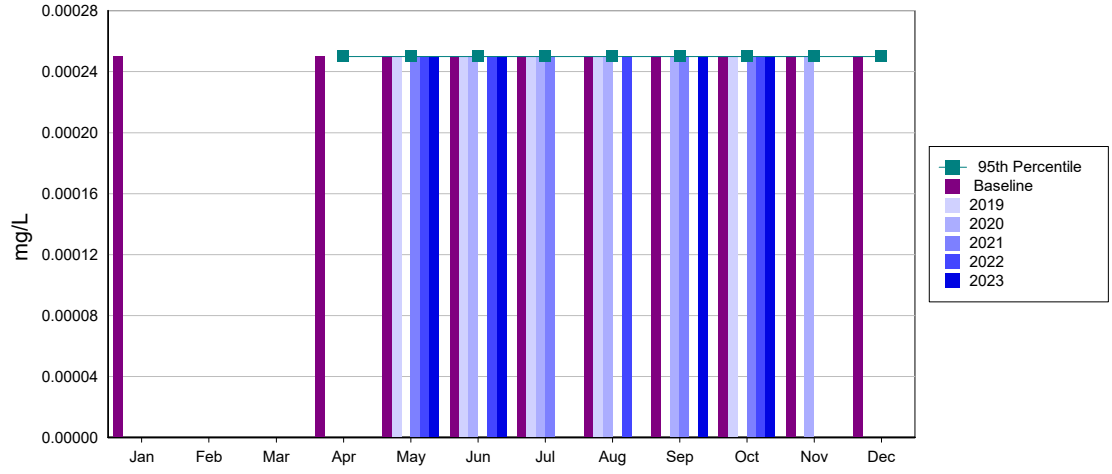
QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Manganese (Mn) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Molybdenum (Mo) (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Nickel (Ni) (mg/L)



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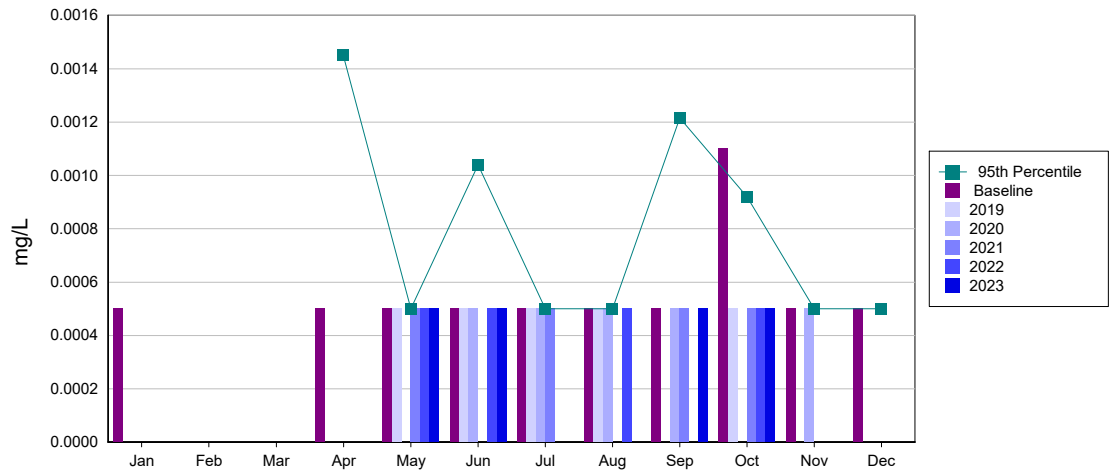
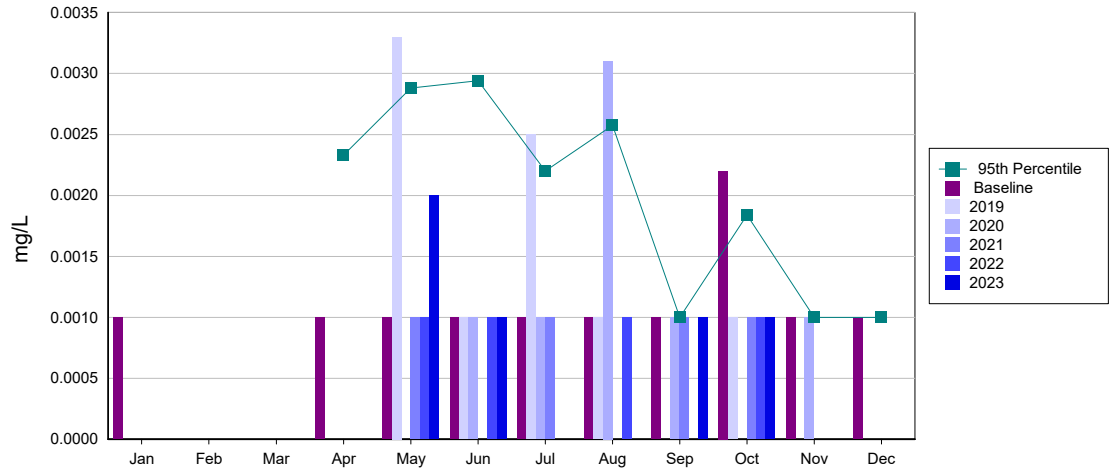
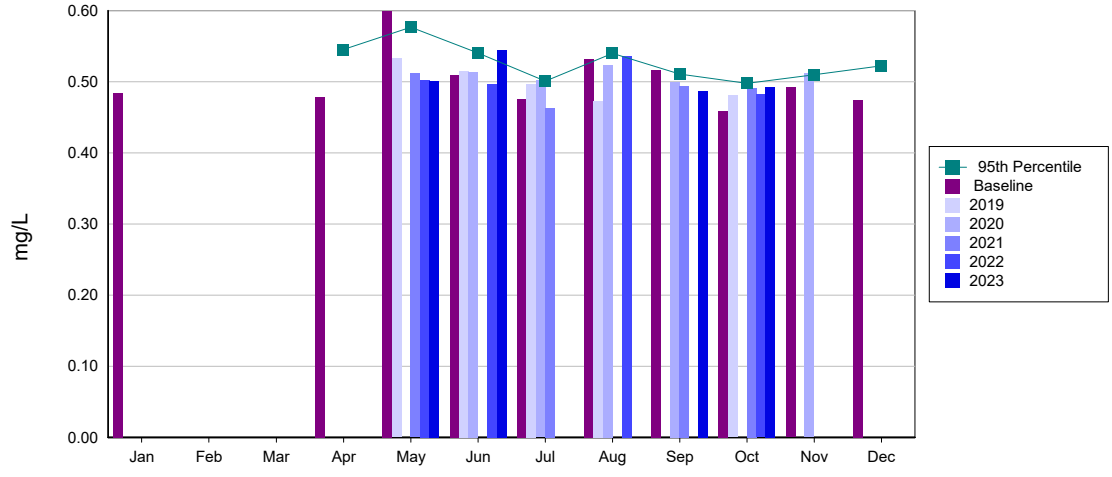
QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Orthophosphate (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Phosphorus (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Diss-Potassium (K) (mg/L)



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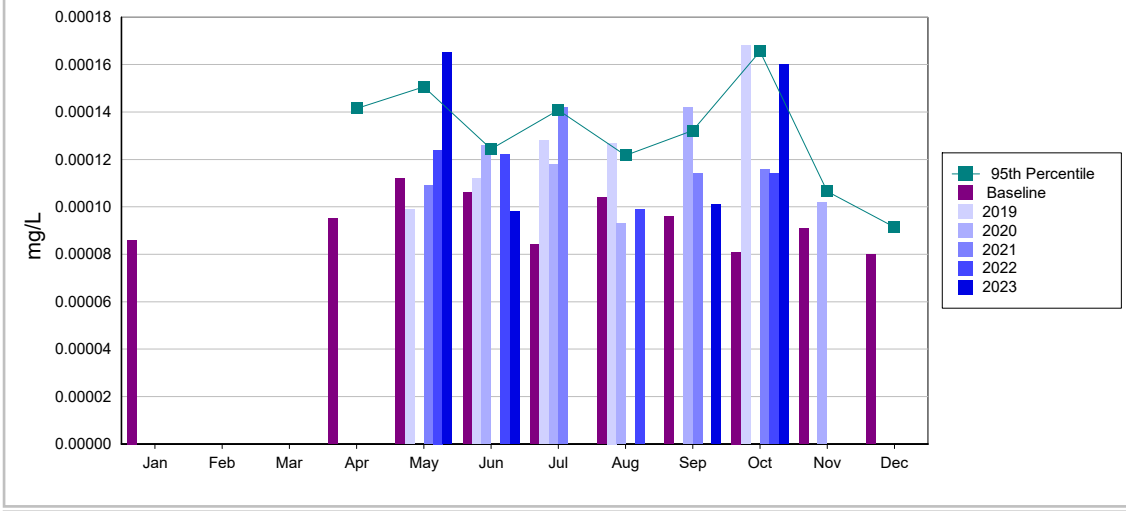

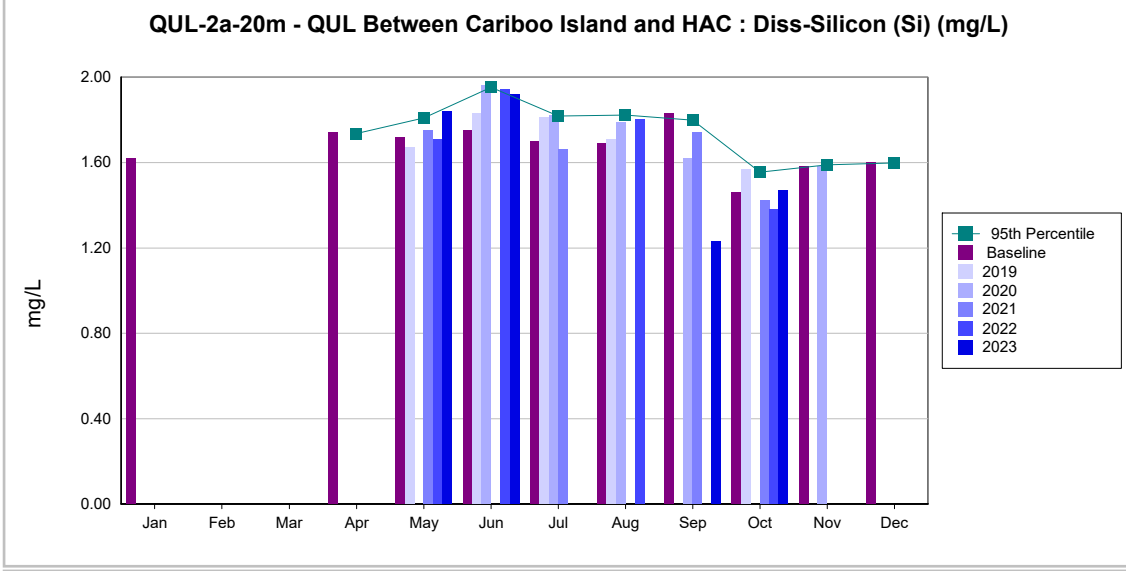

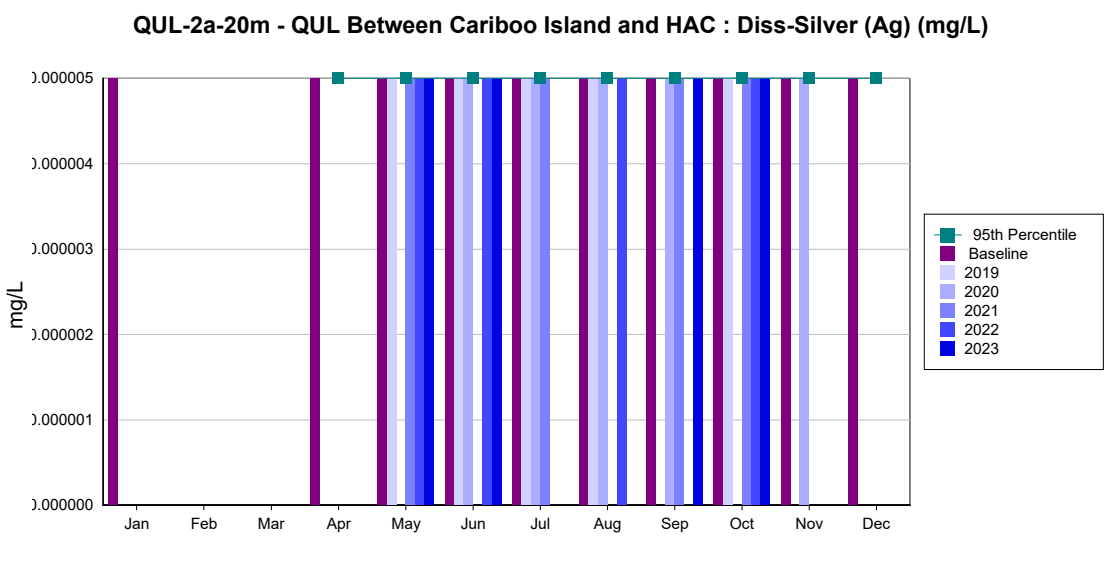

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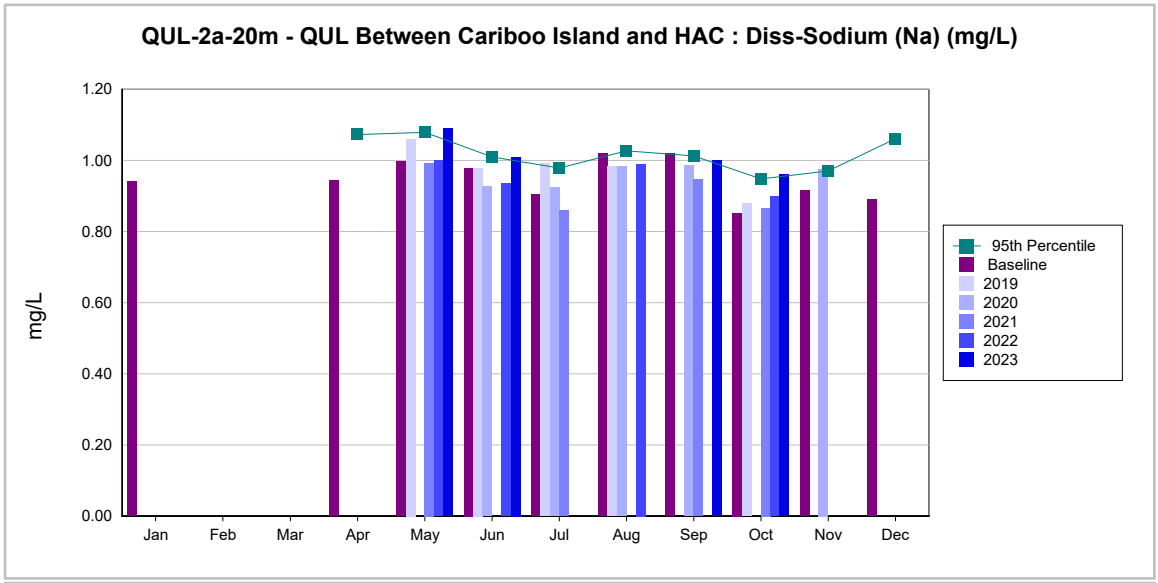

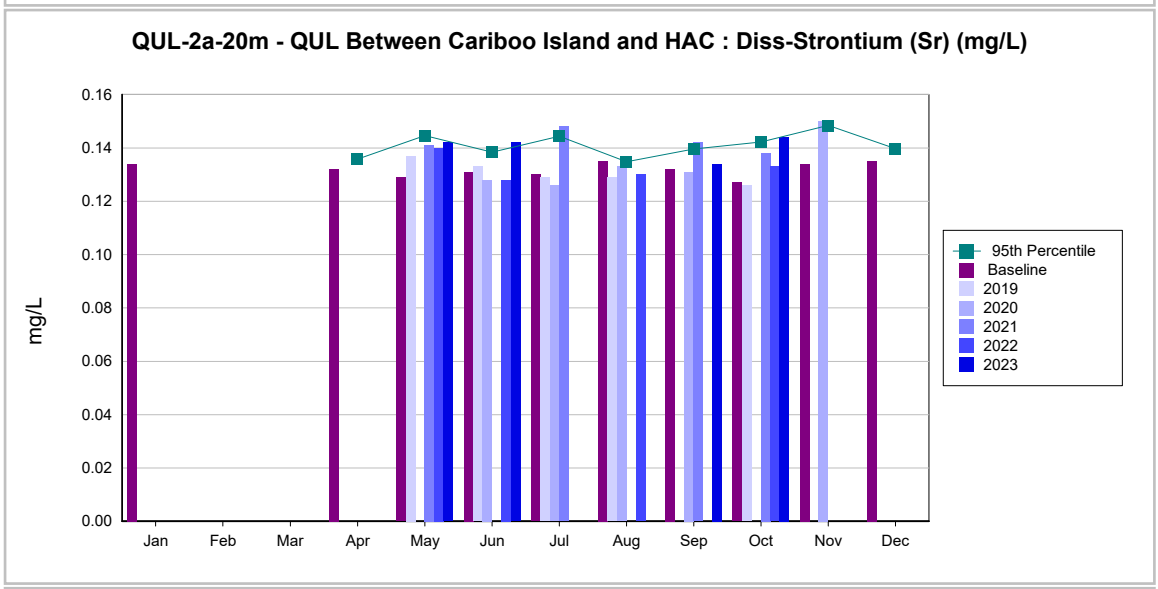

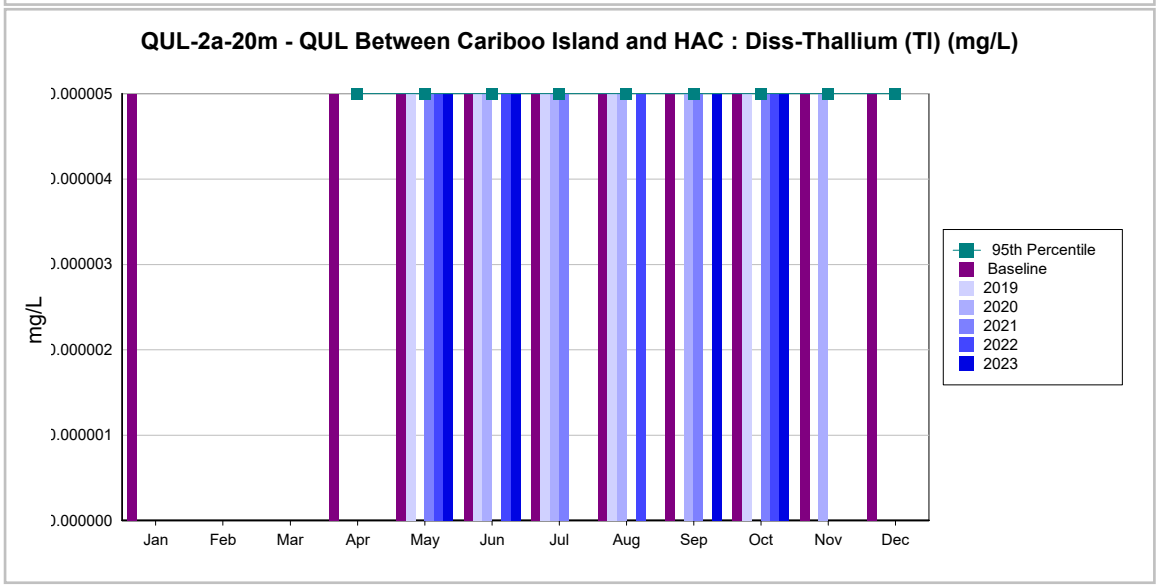

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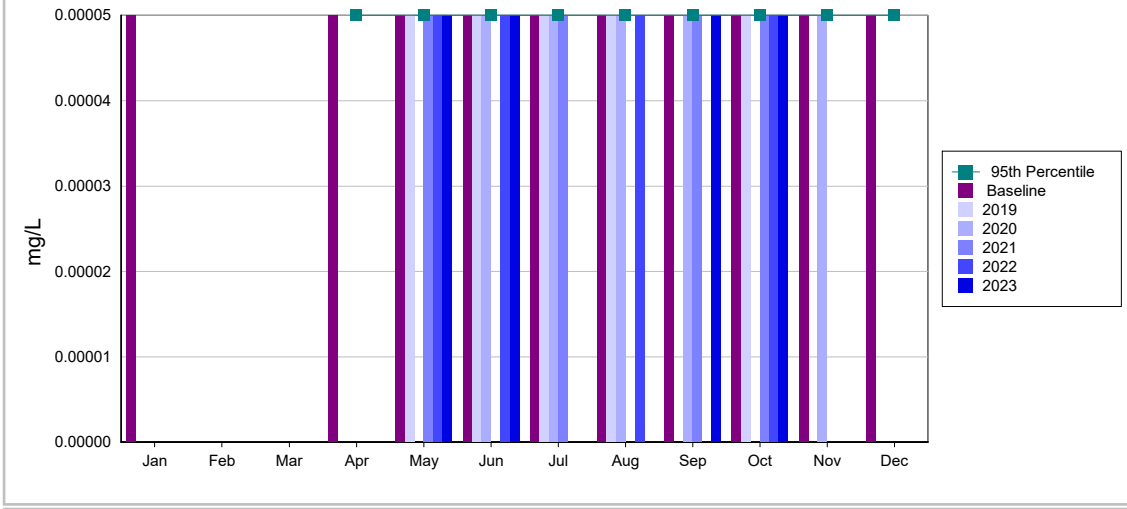

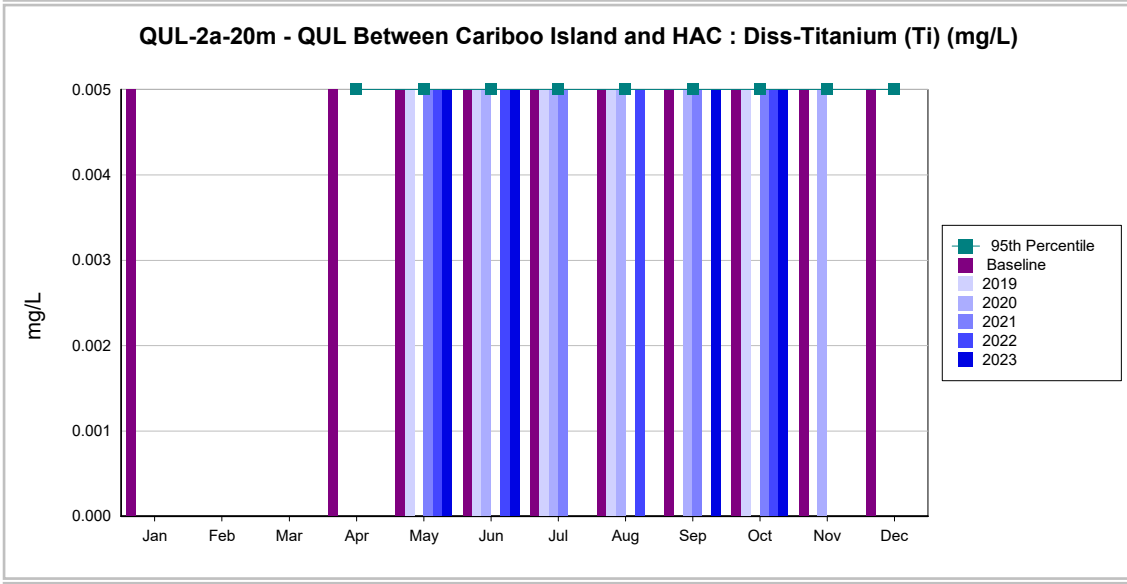

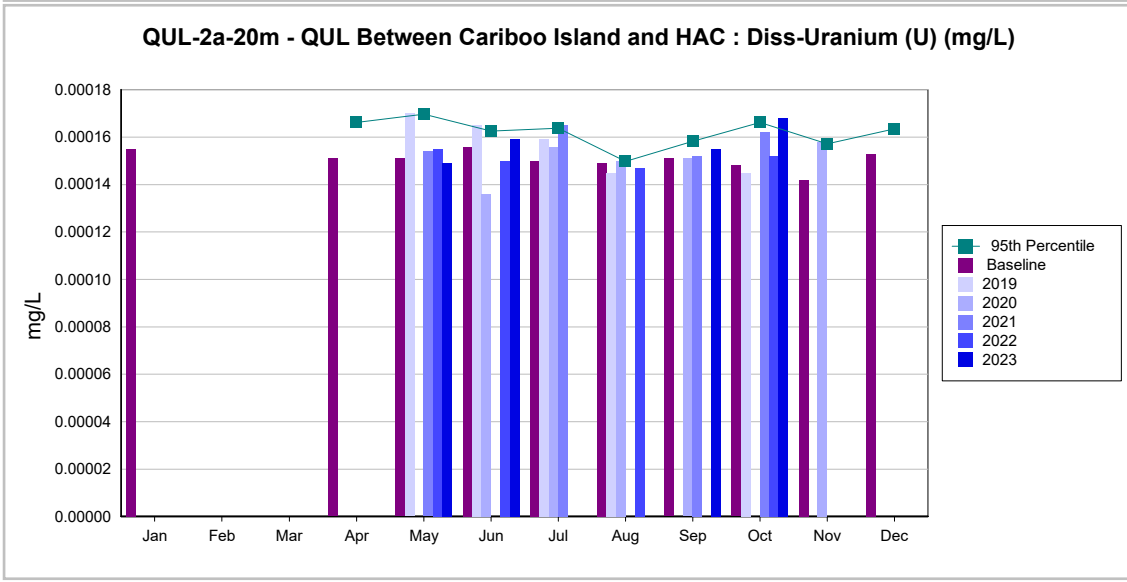

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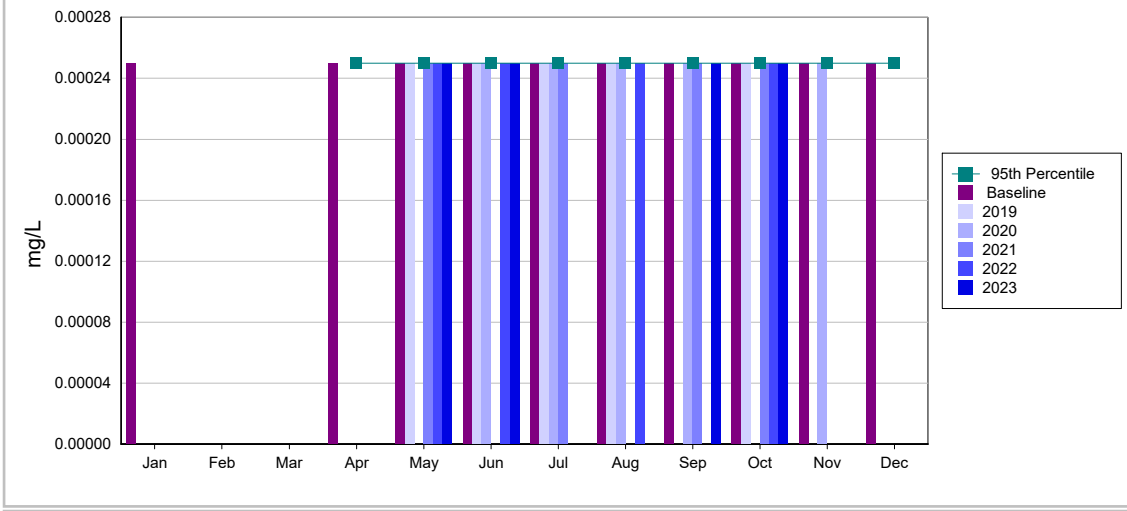

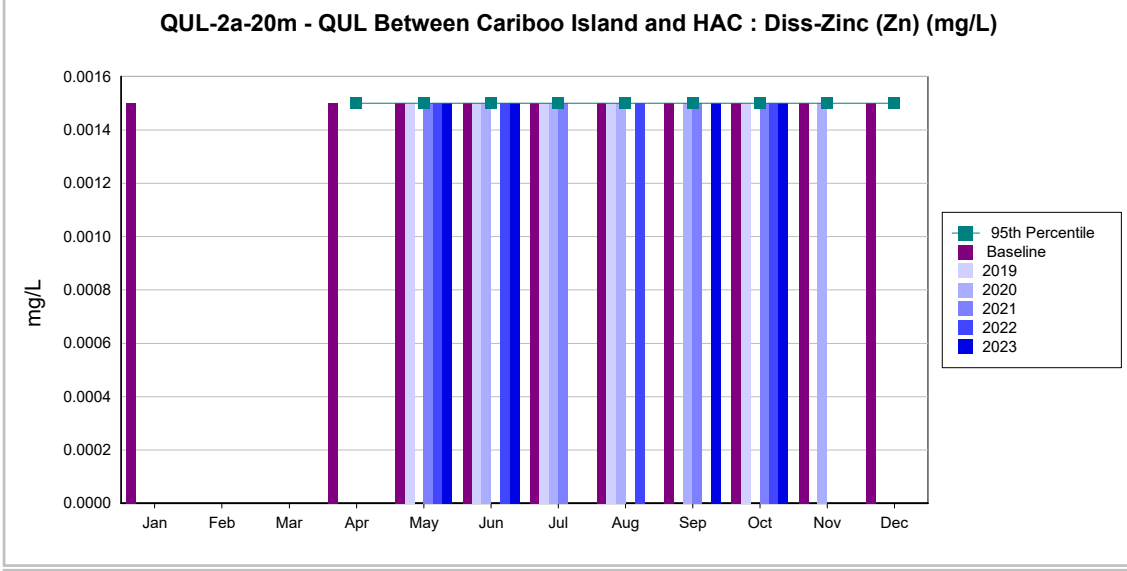

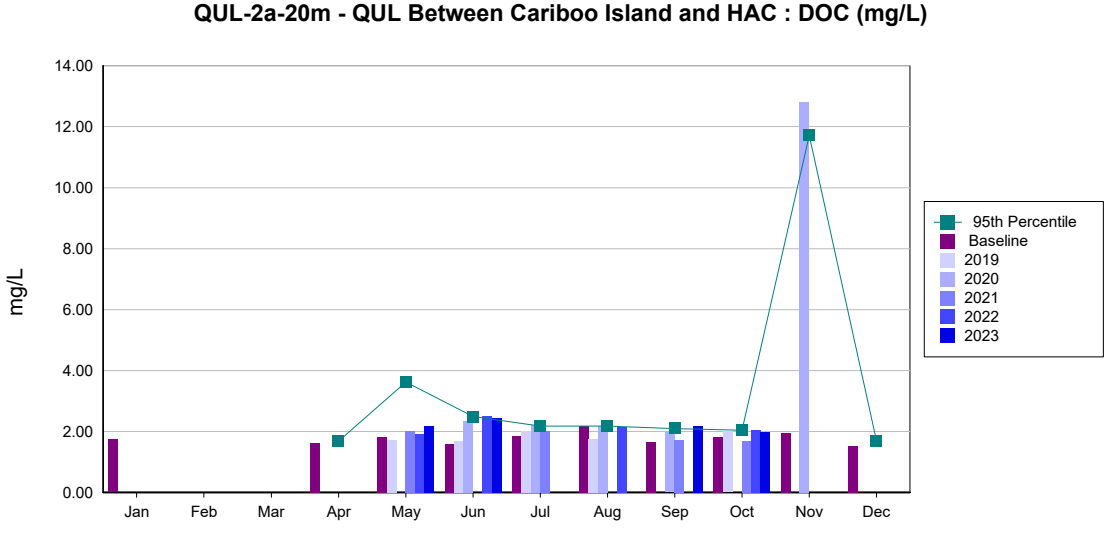

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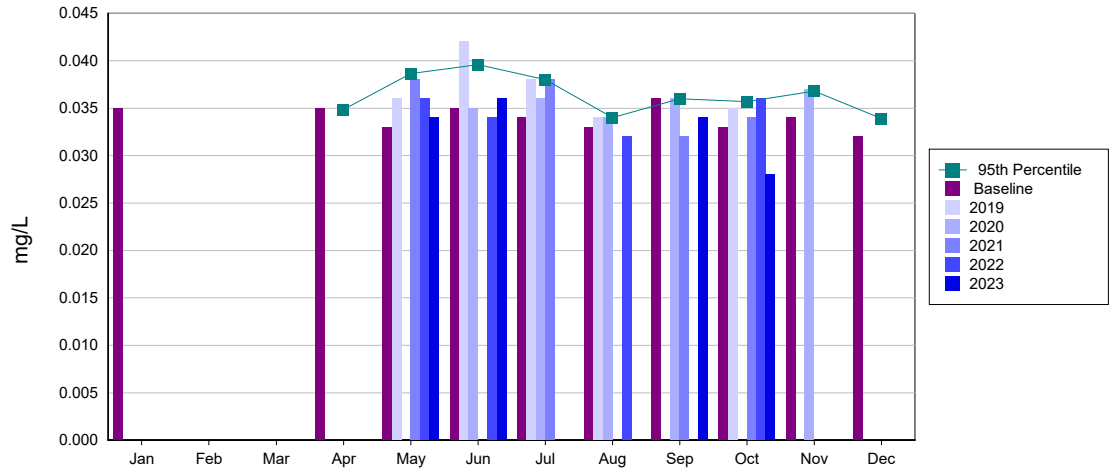
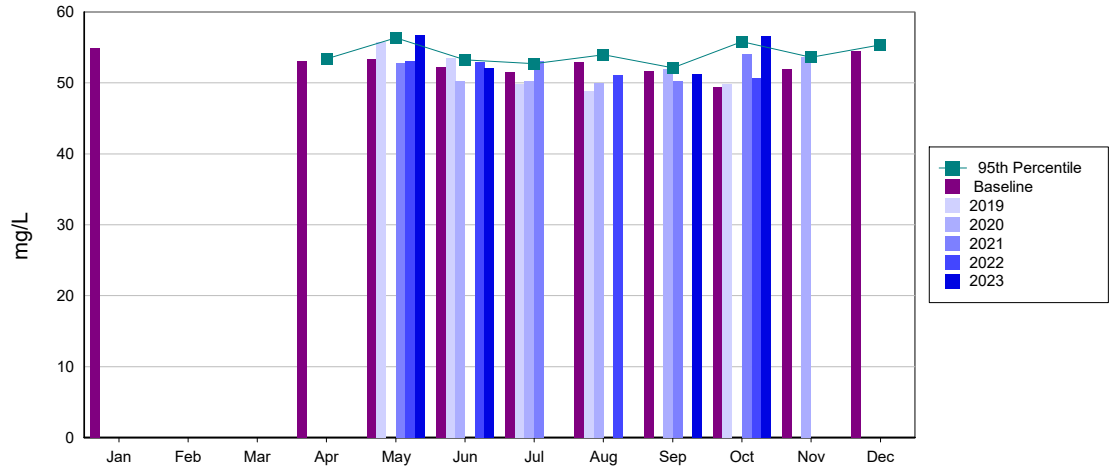
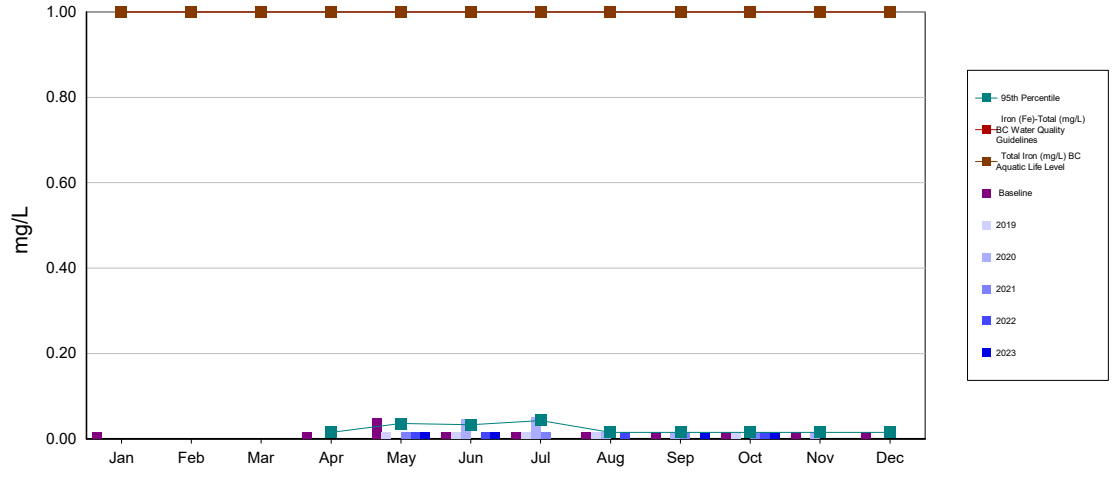
QUL-2a-20m - QUL Between Cariboo Island and HAC : Floride (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Hardness (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Iron (Fe)-Total (mg/L)



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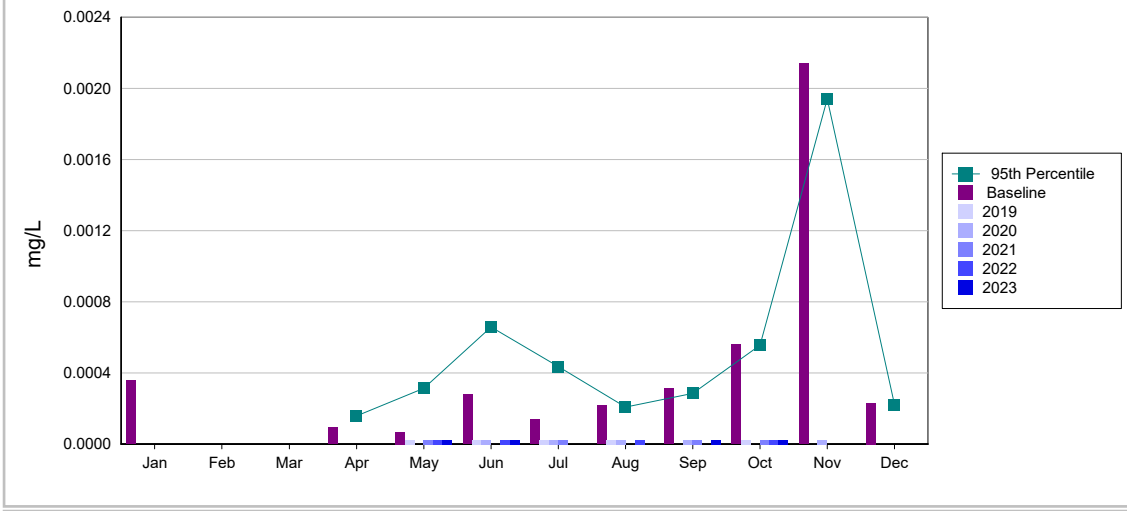

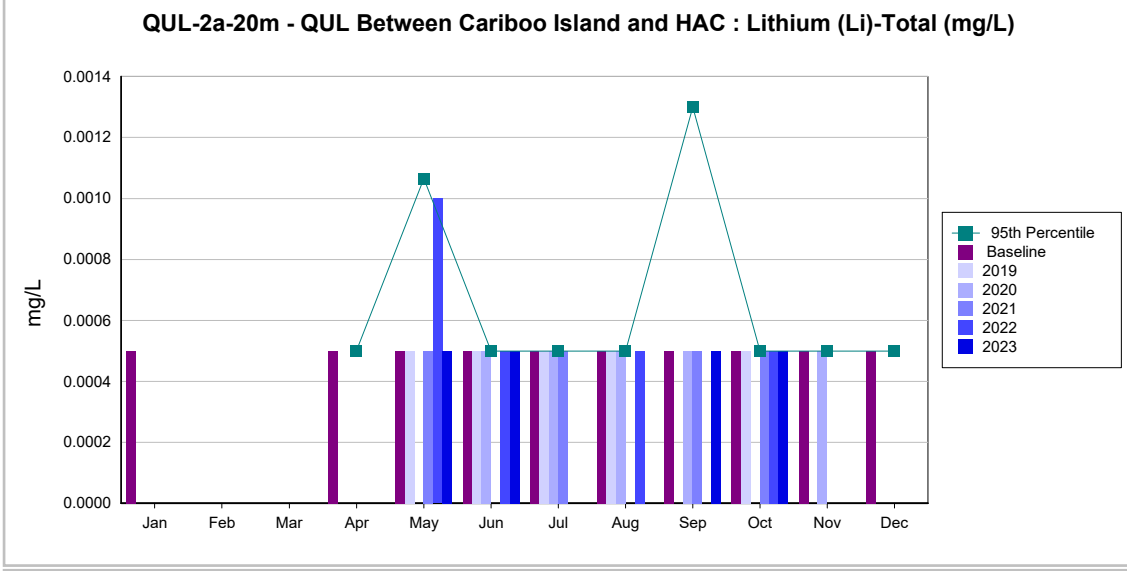

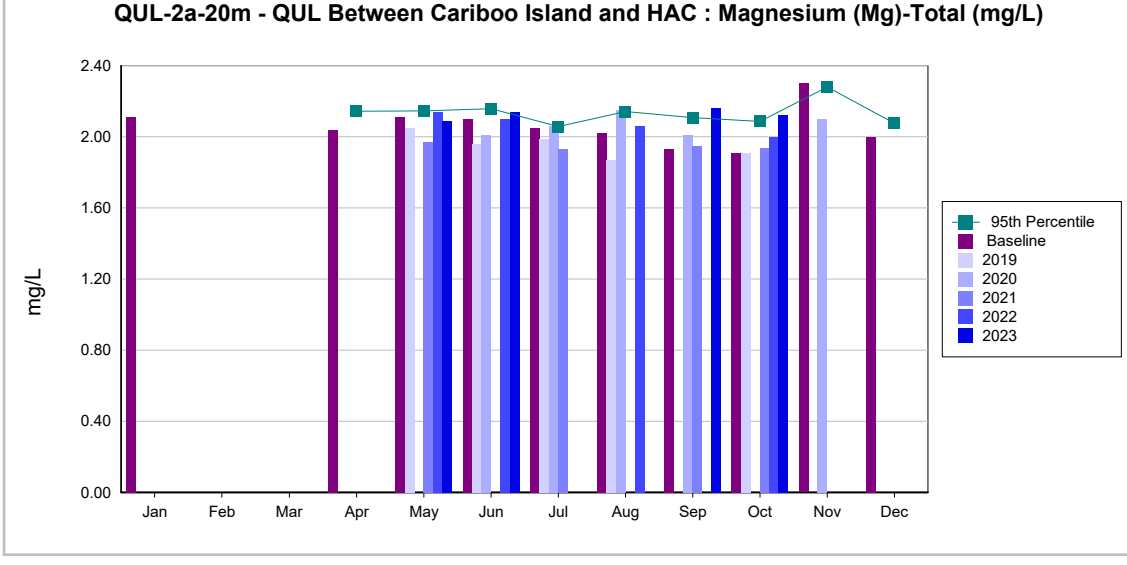

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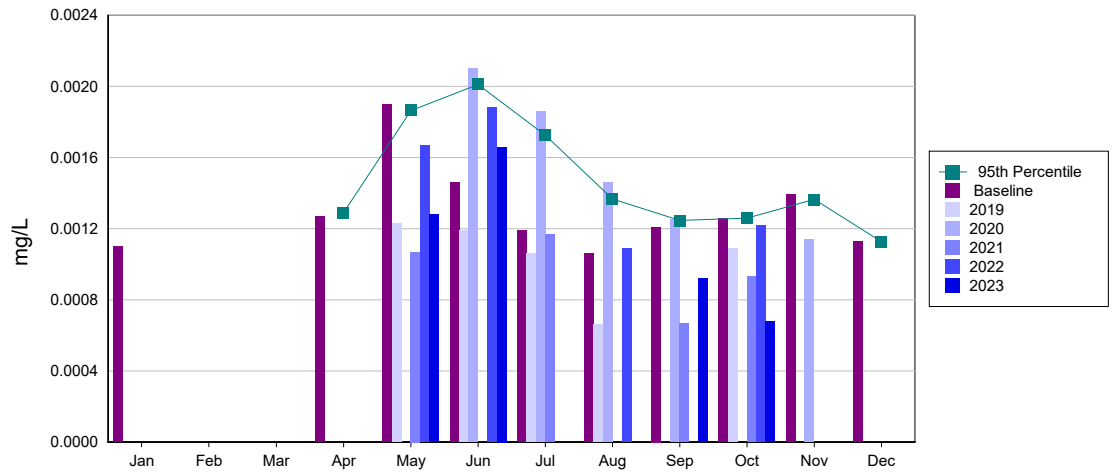
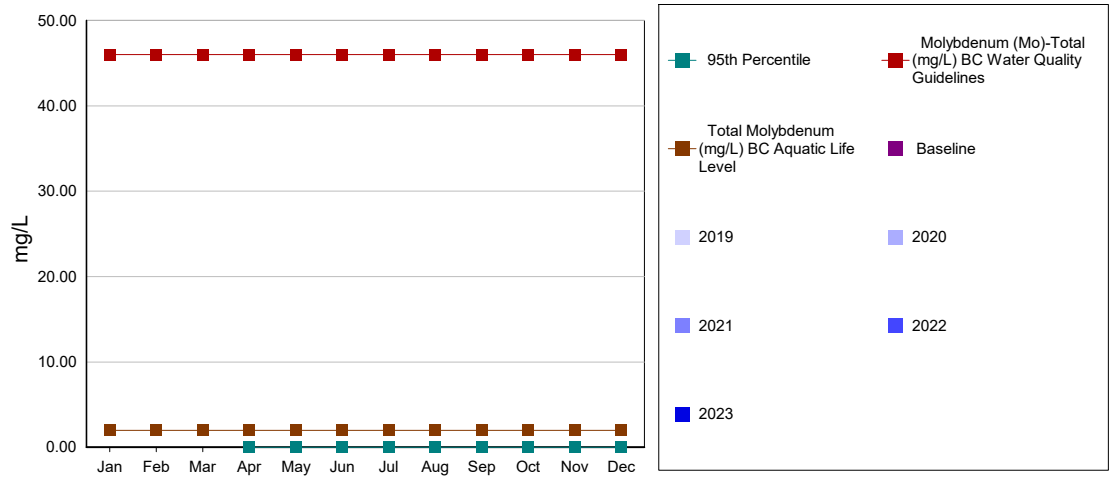
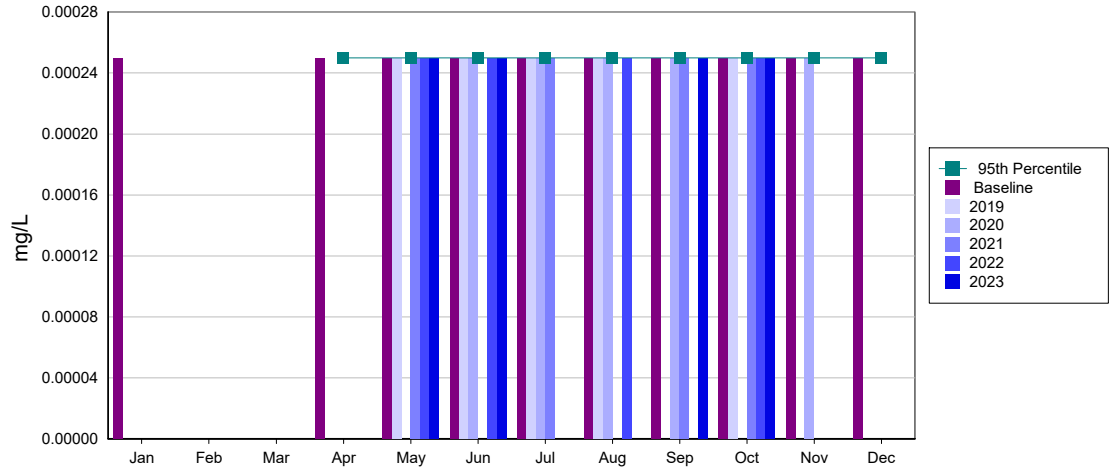
QUL-2a-20m - QUL Between Cariboo Island and HAC : Manganese (Mn)-Total (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Molybdenum (Mo)-Tota (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Nickel (Ni)-Total (mg/L)



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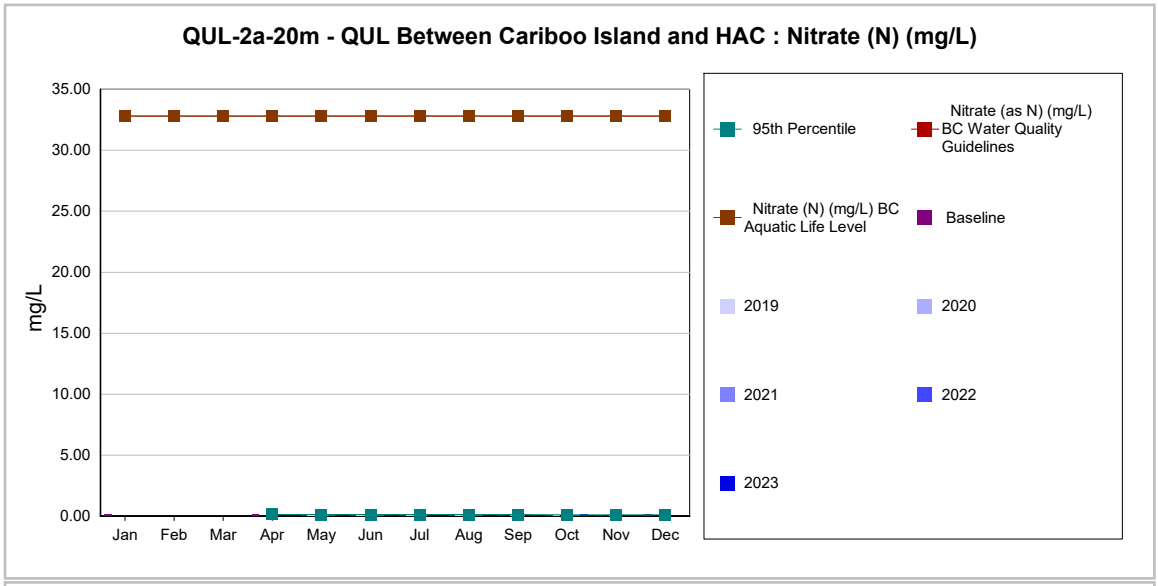

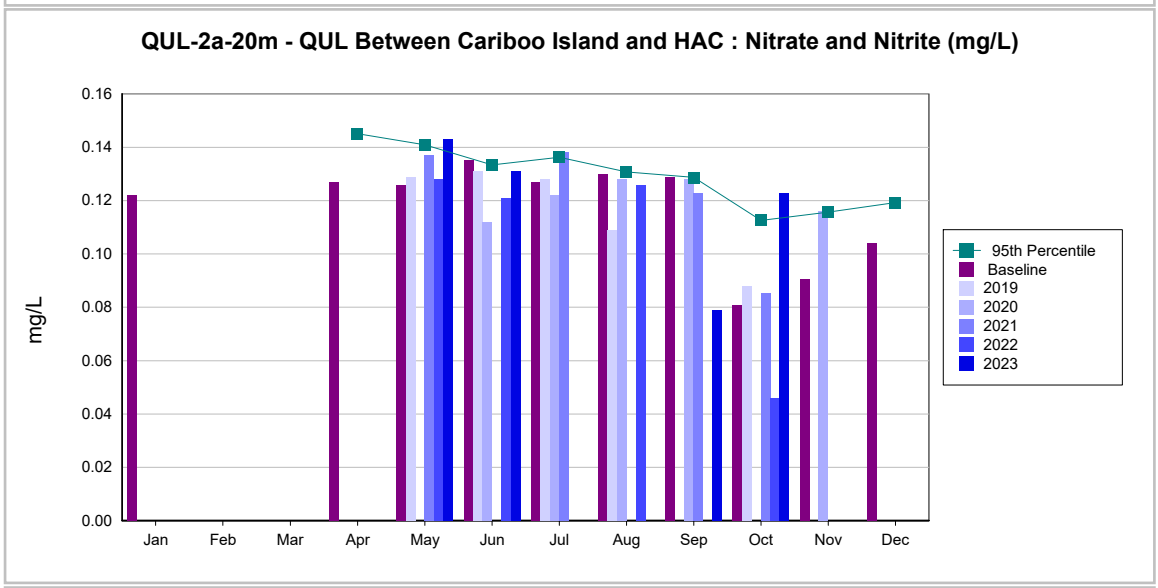

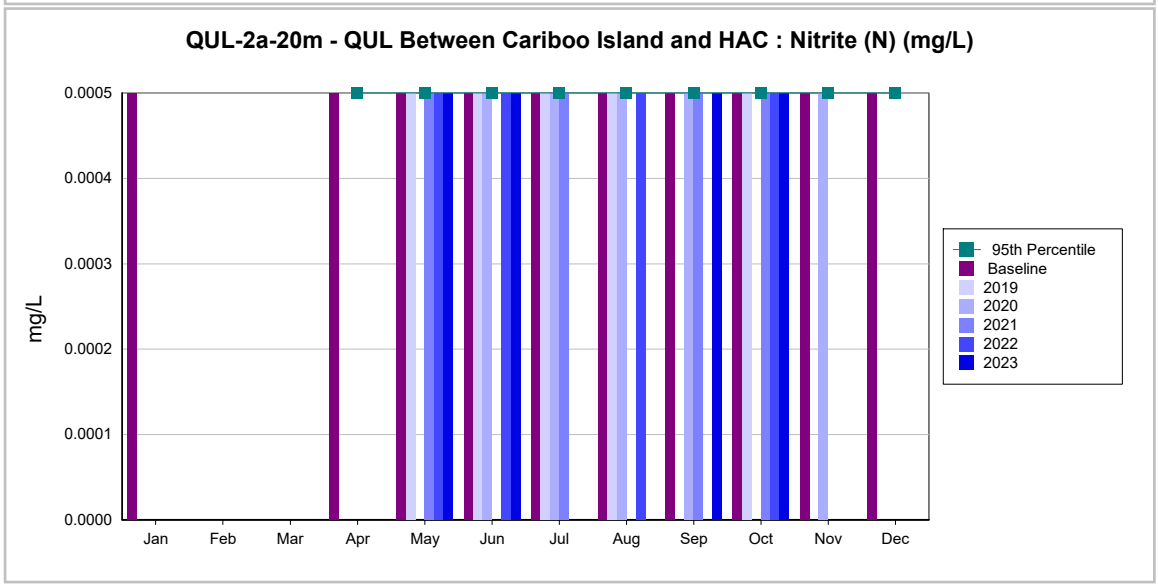

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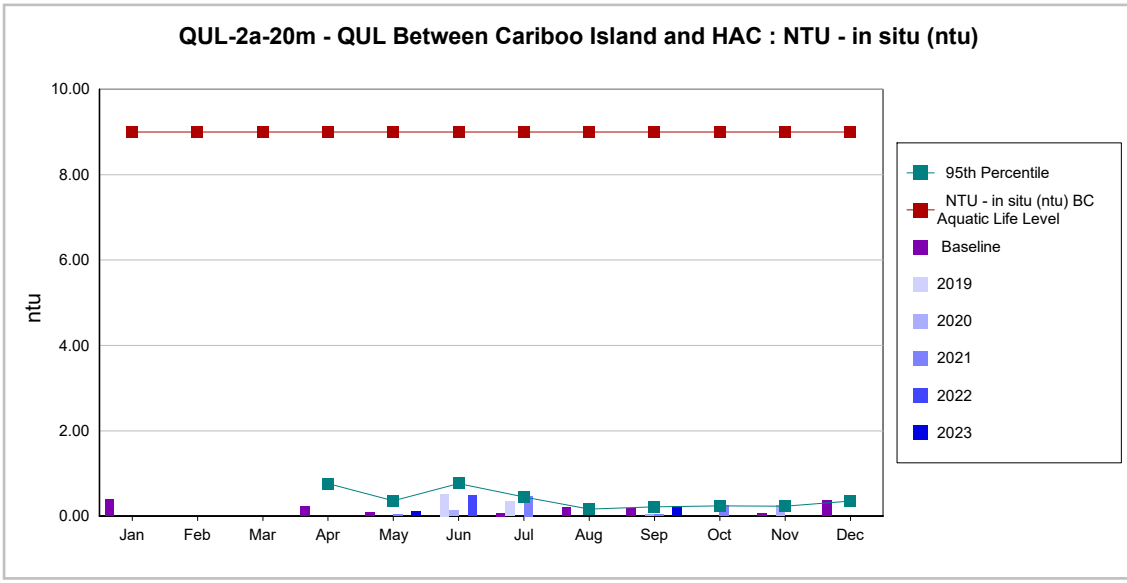

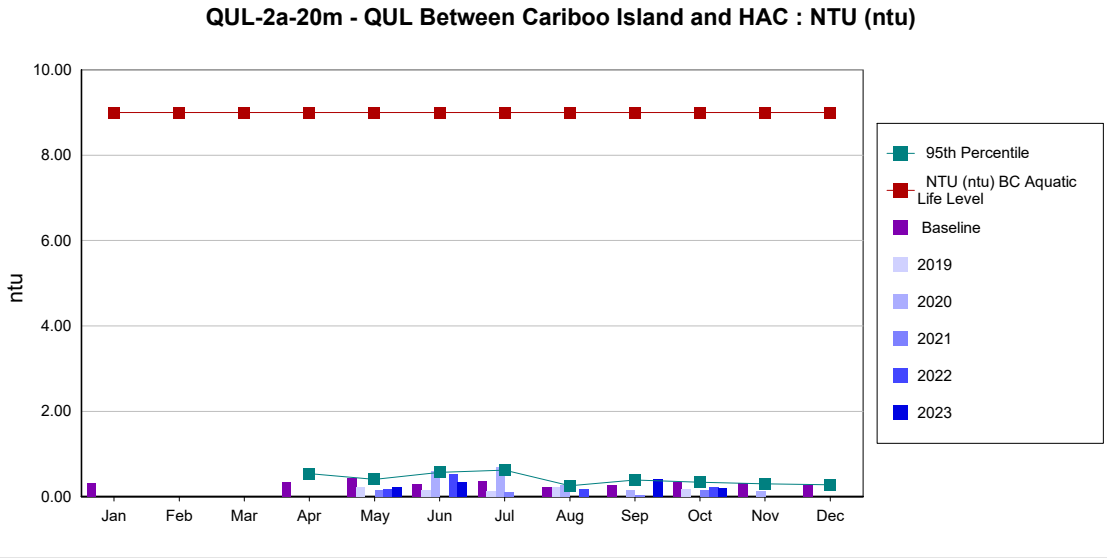

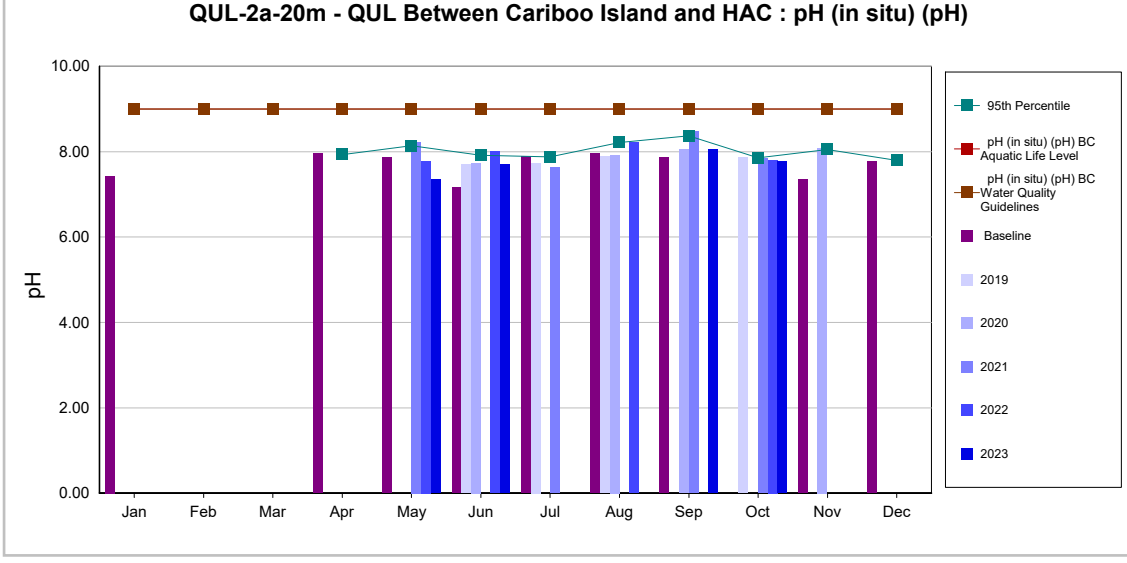

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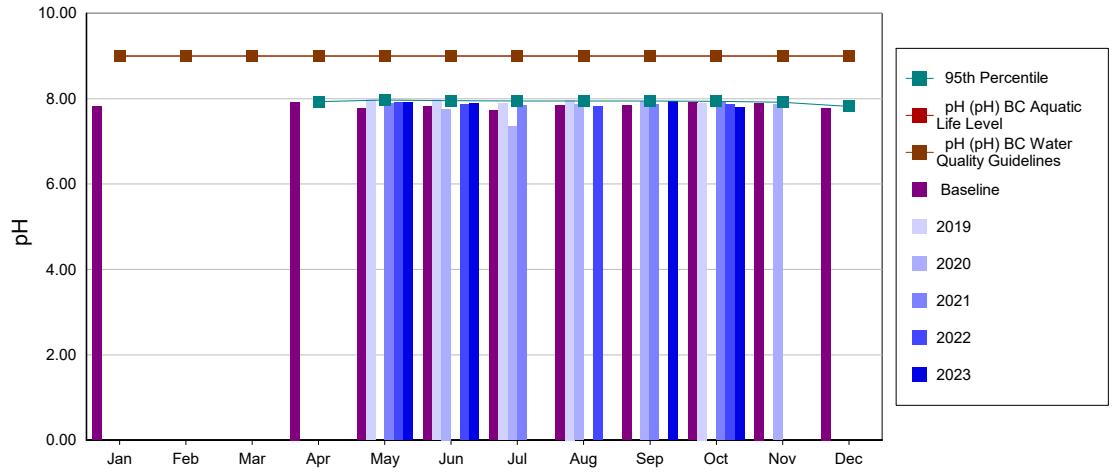
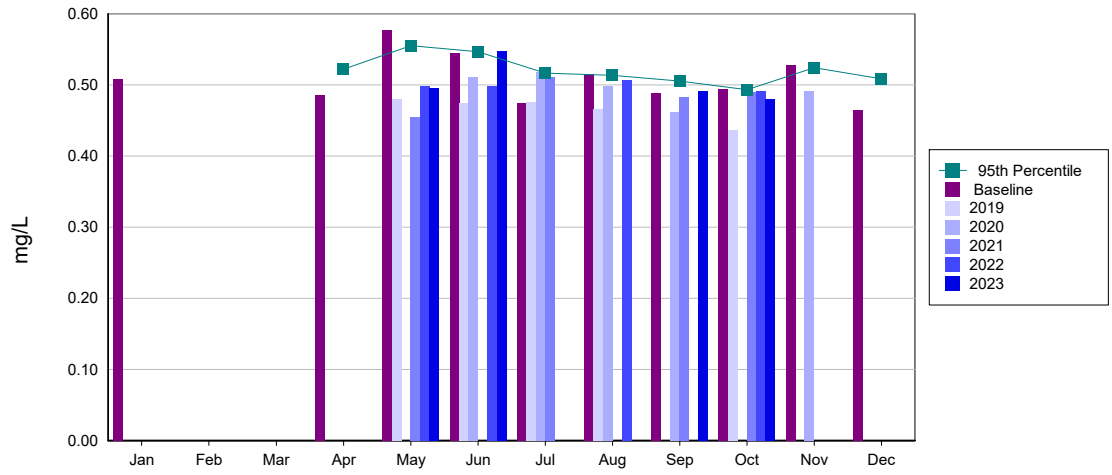
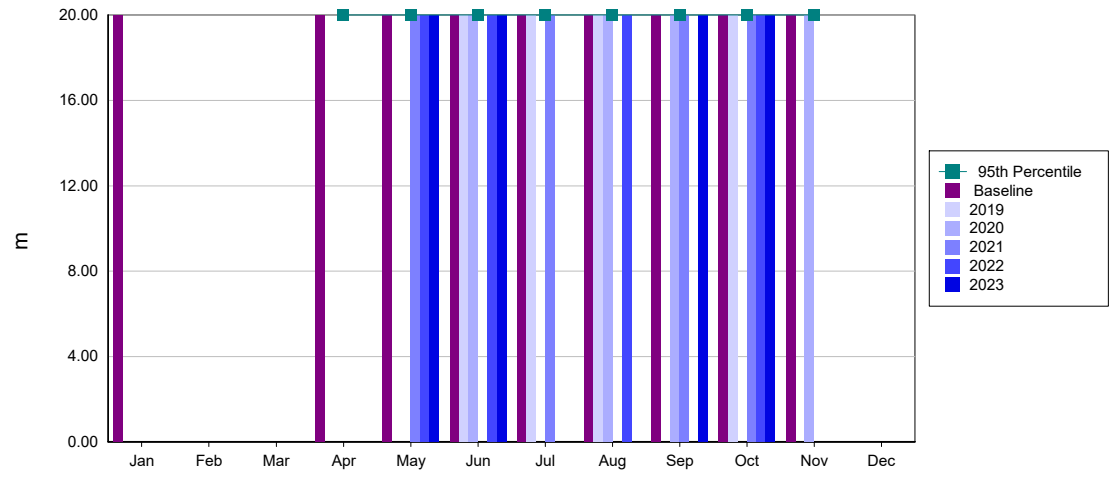
QUL-2a-20m - QUL Between Cariboo Island and HAC : pH (pH)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Potassium (K)-Total (mg/L)



QUL-2a-20m - QUL Between Cariboo Island and HAC : Sample Depth (m)



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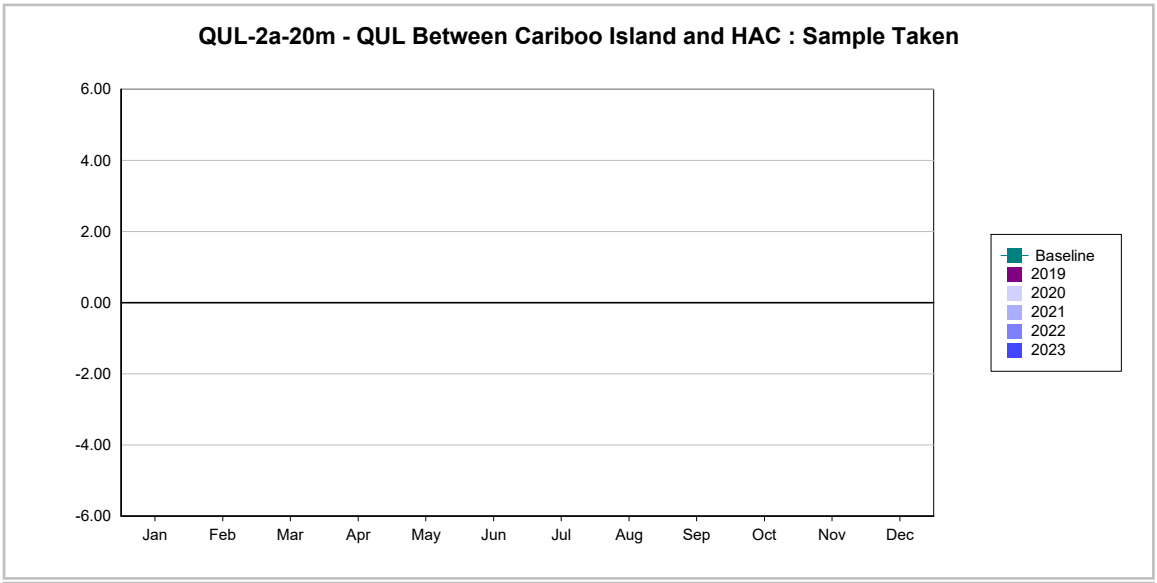

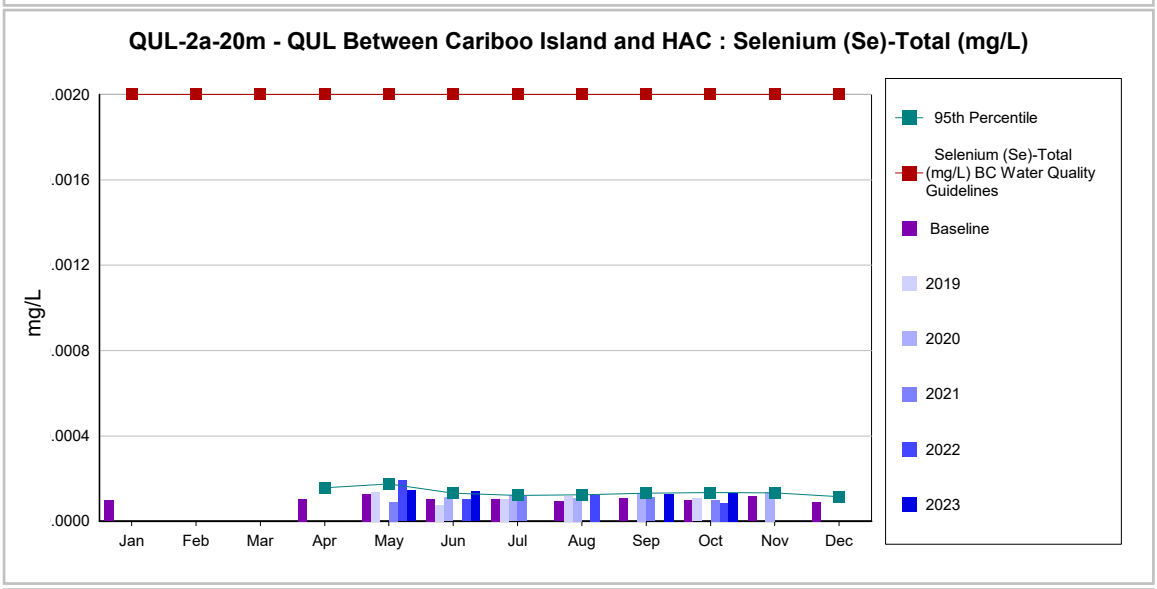

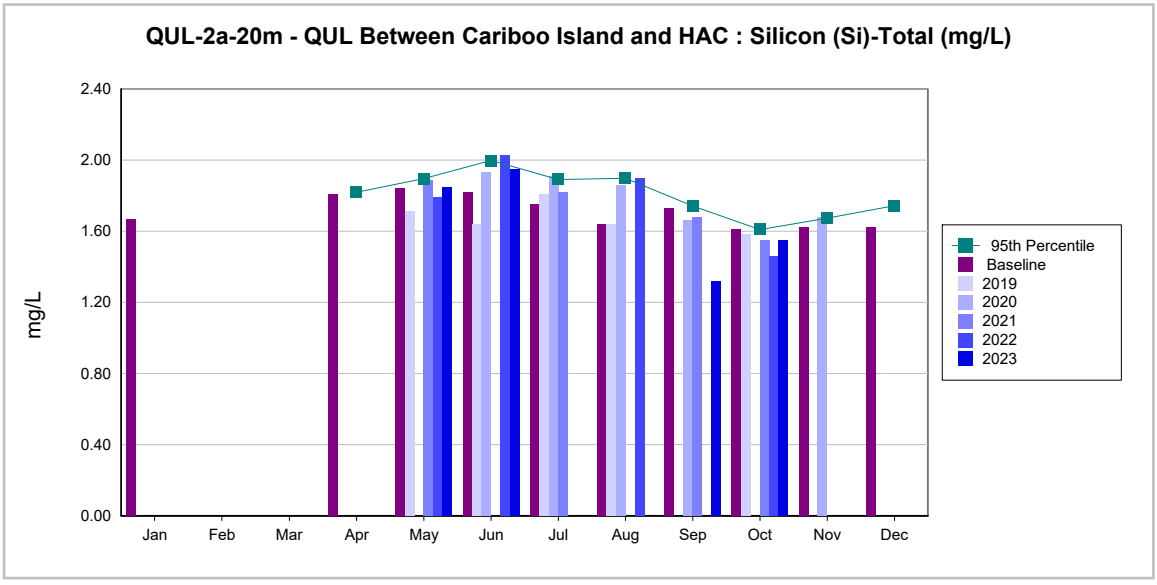

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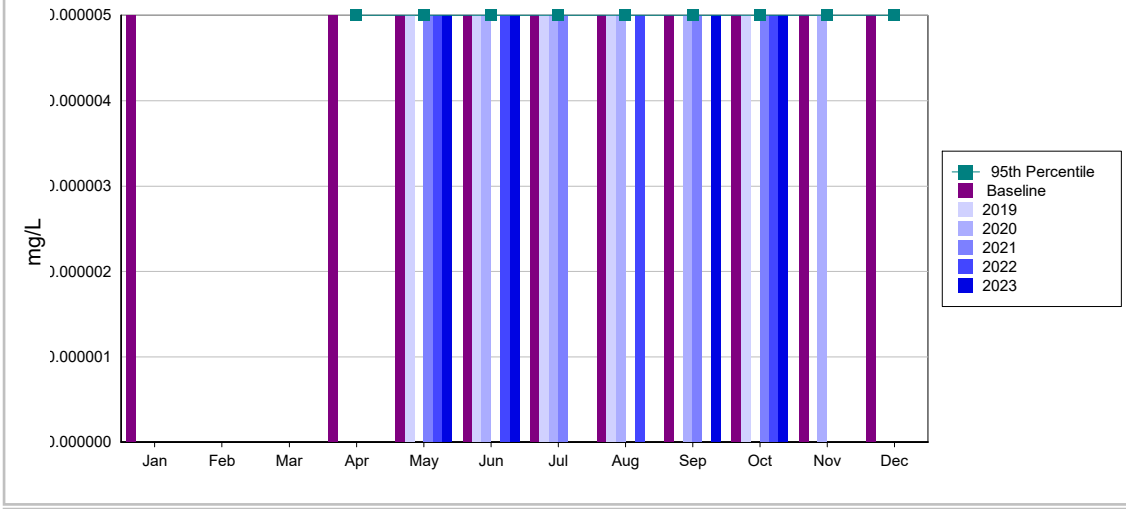

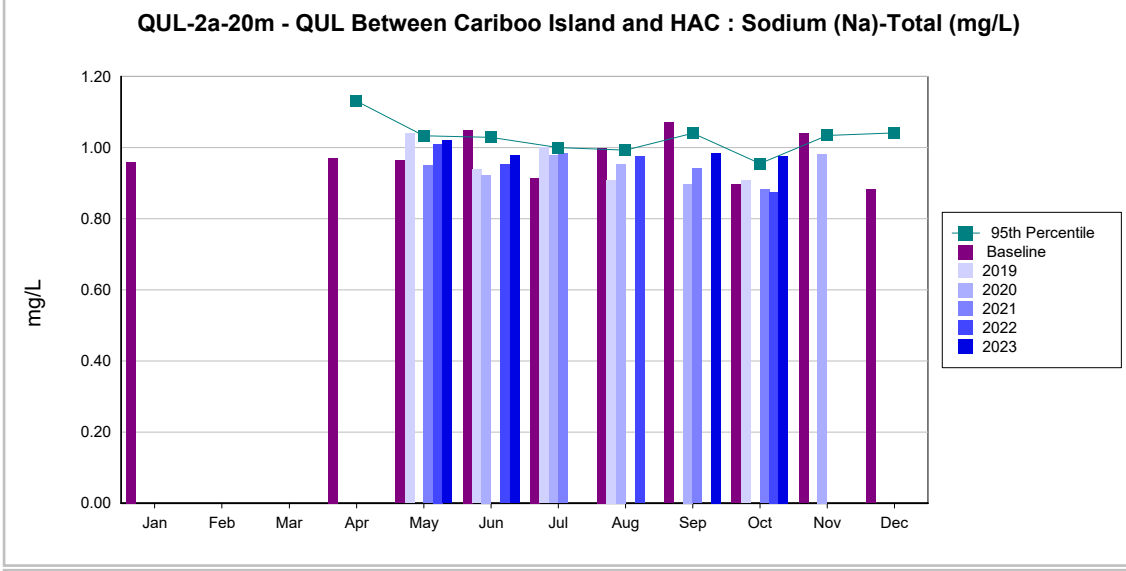

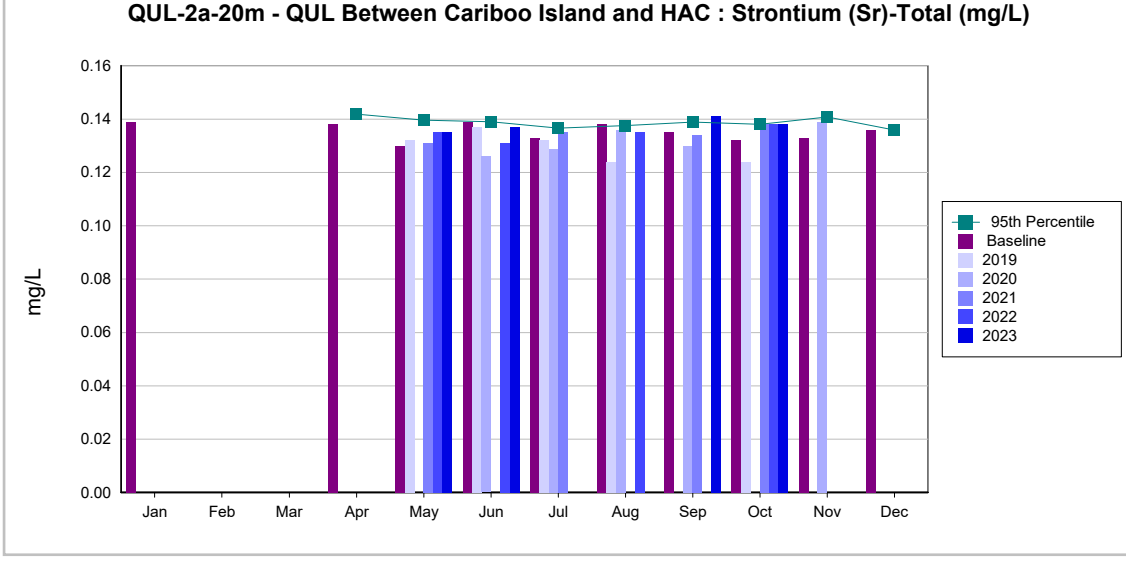

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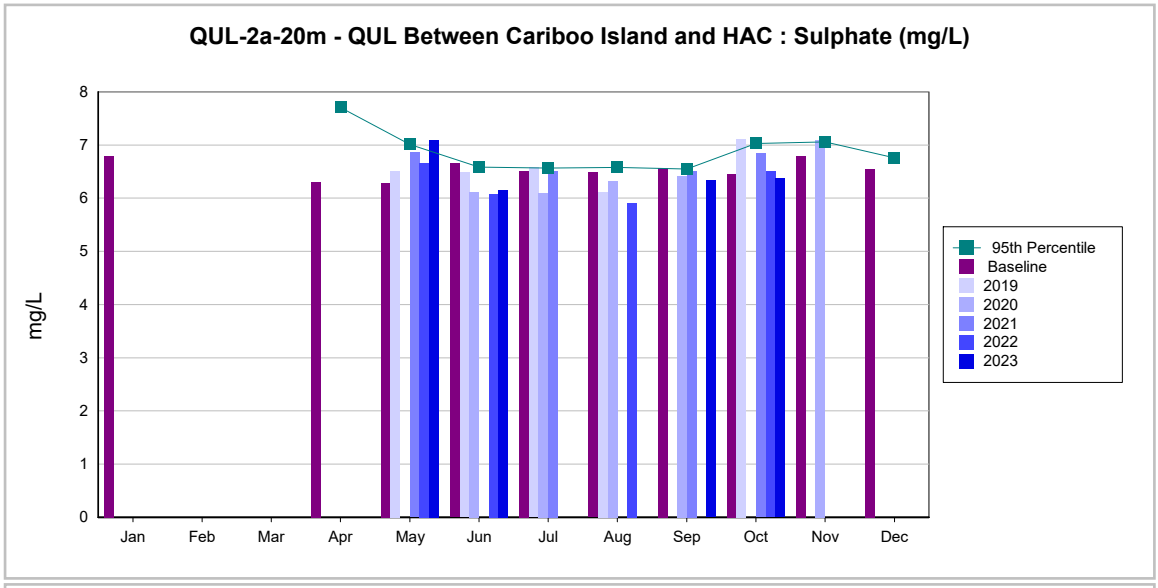

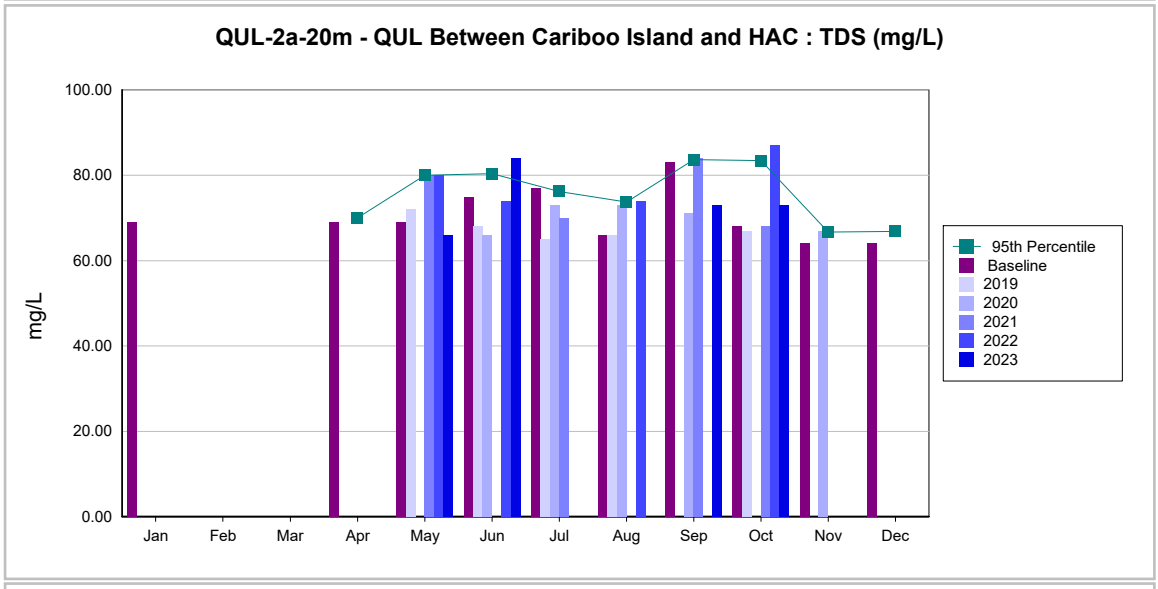

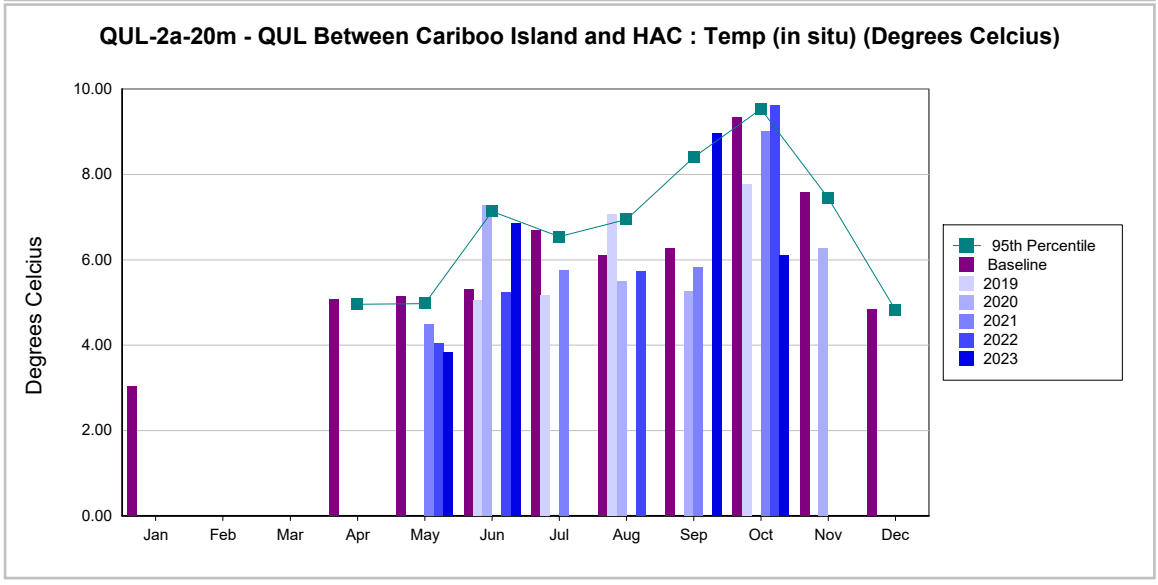

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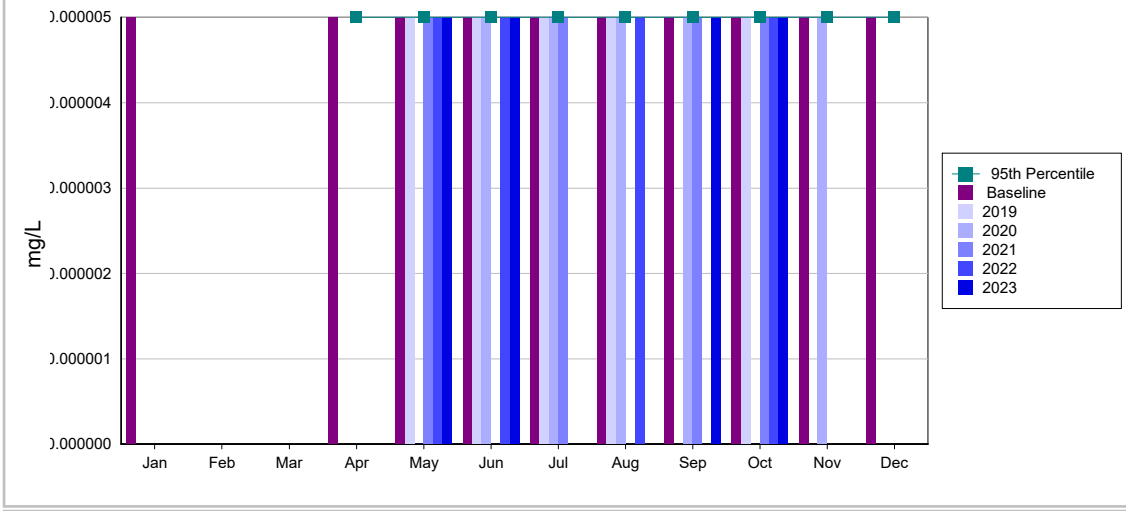

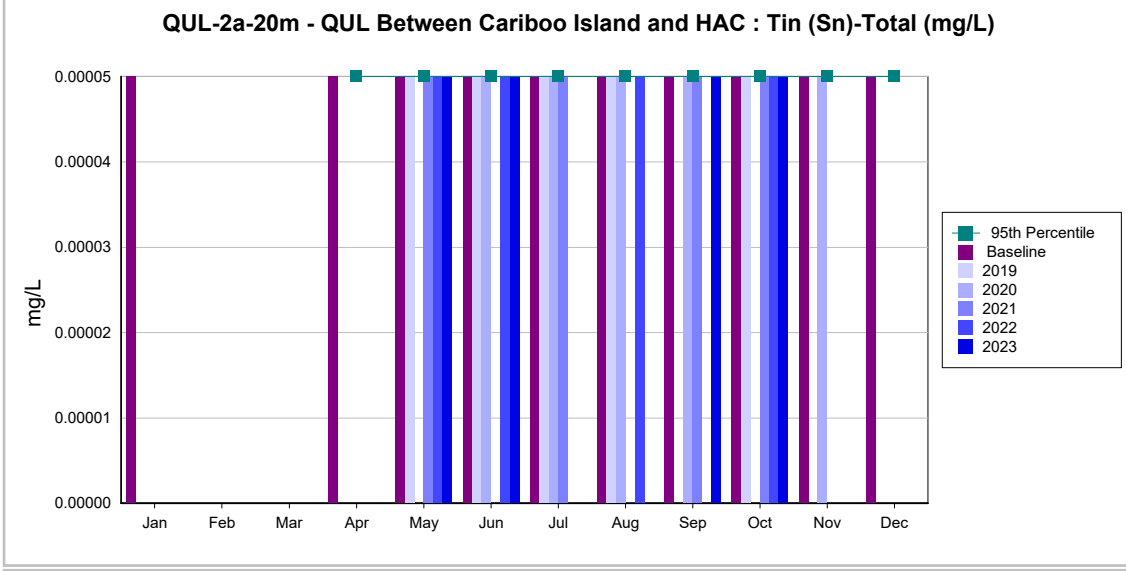

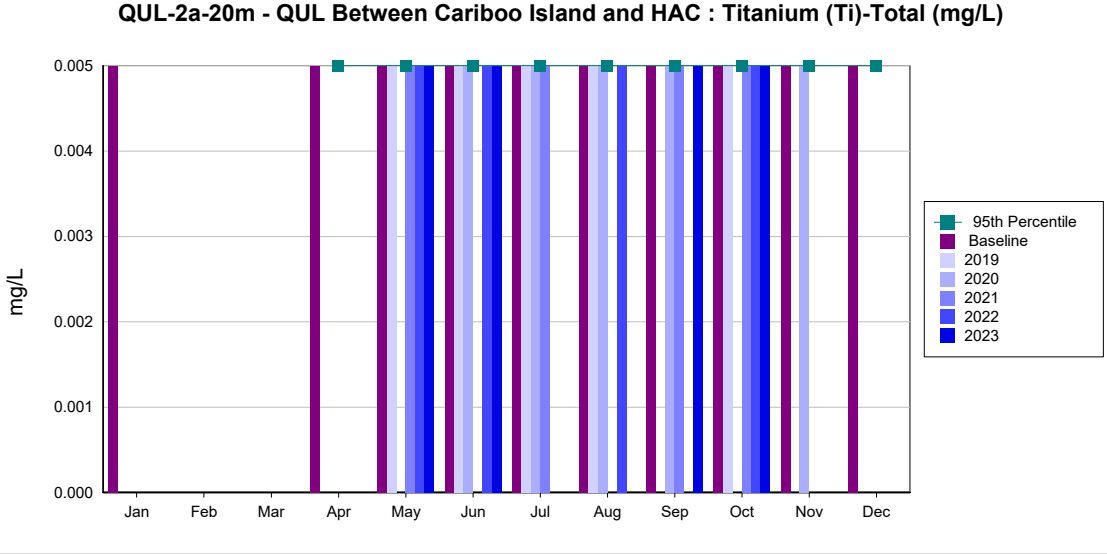

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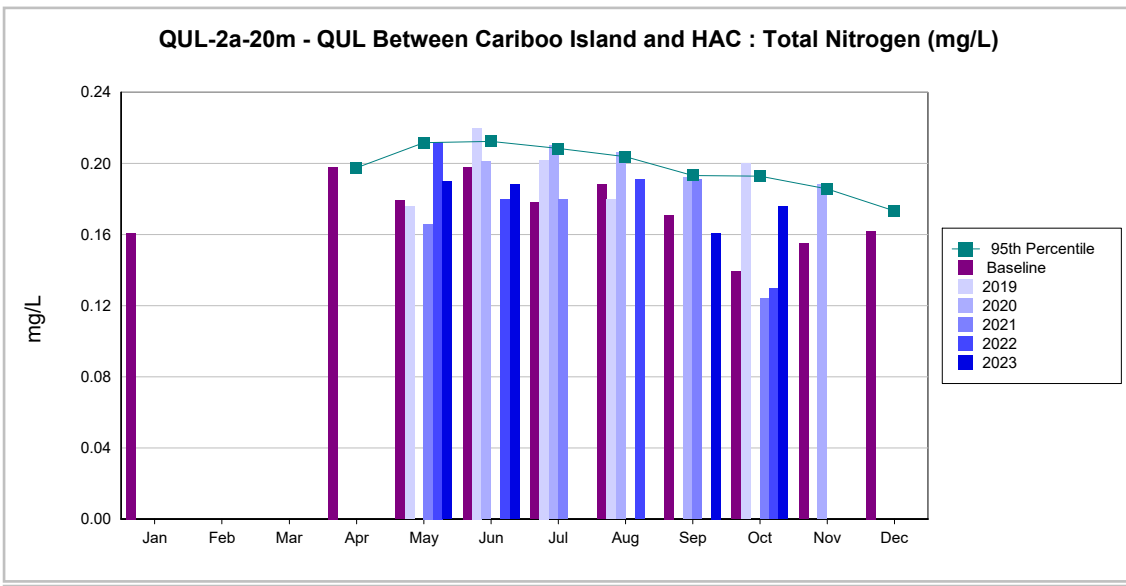

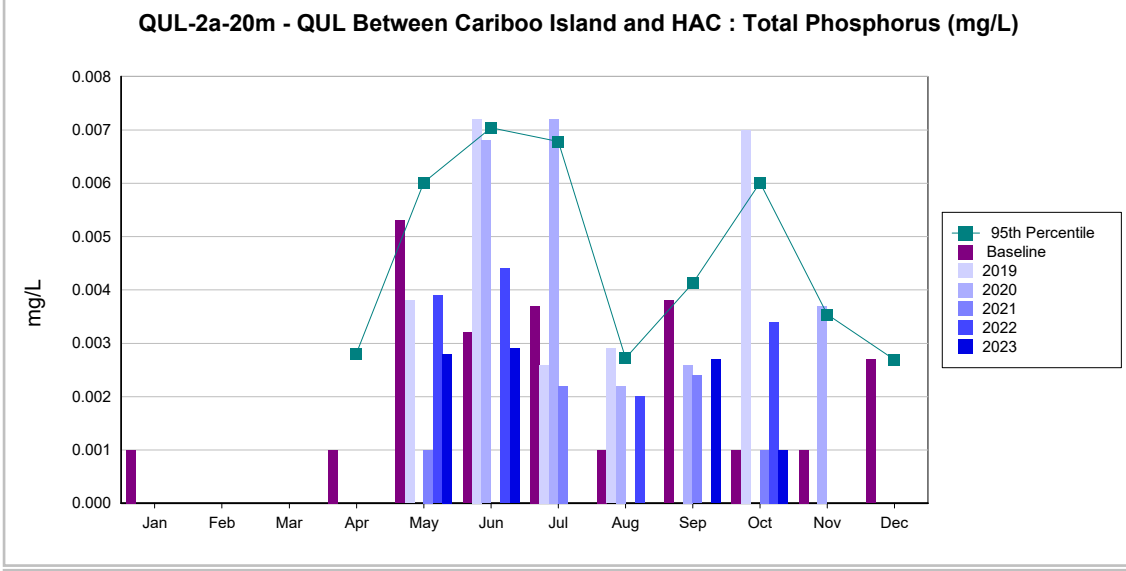

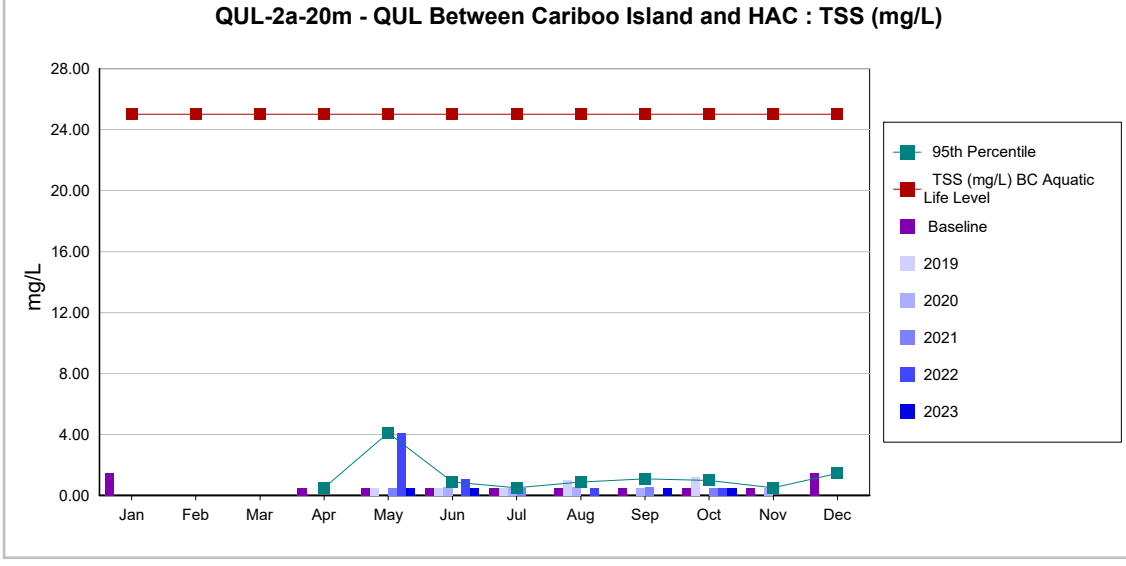

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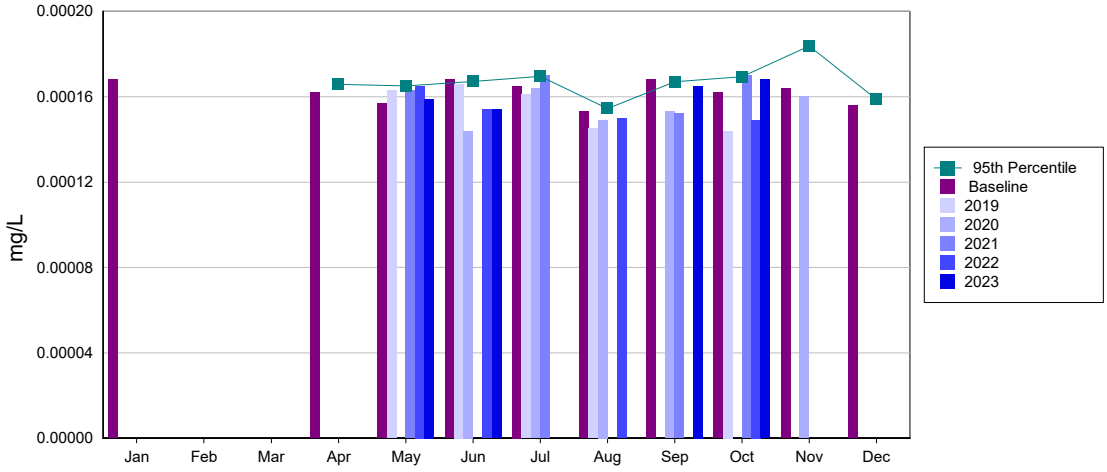

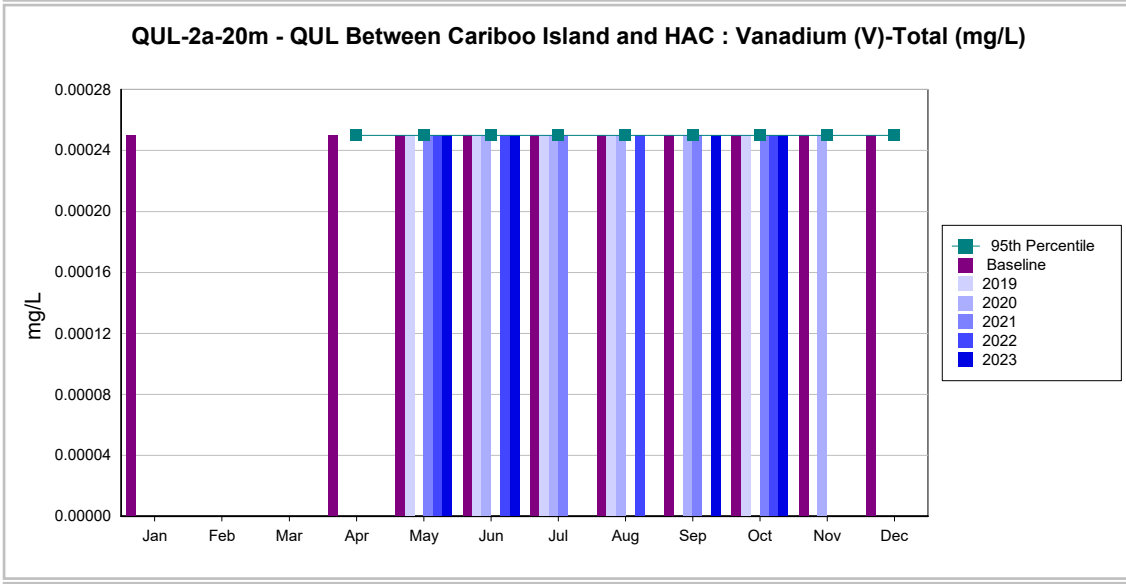

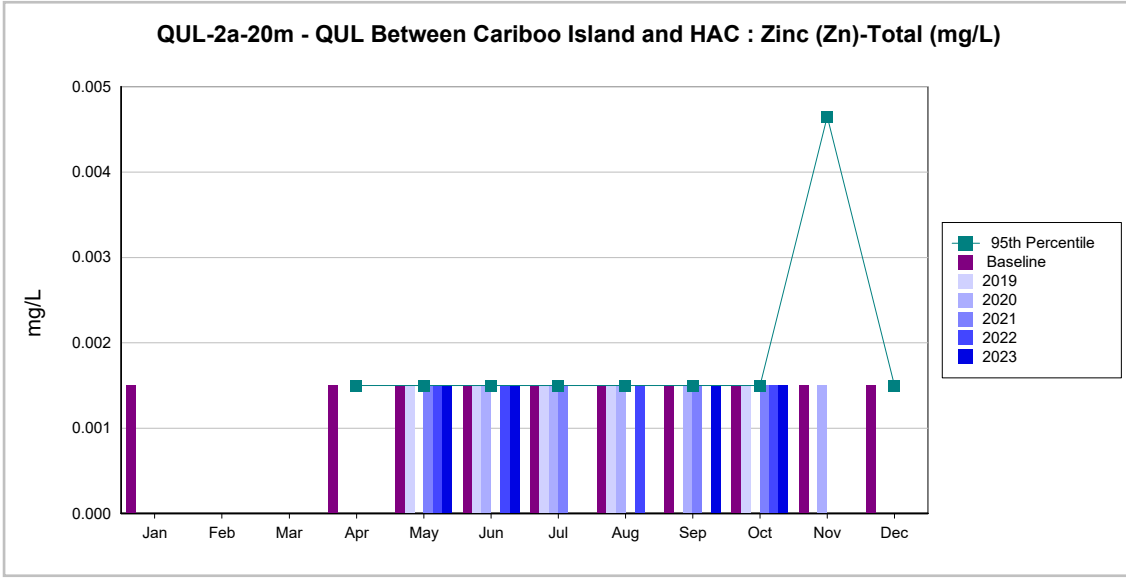

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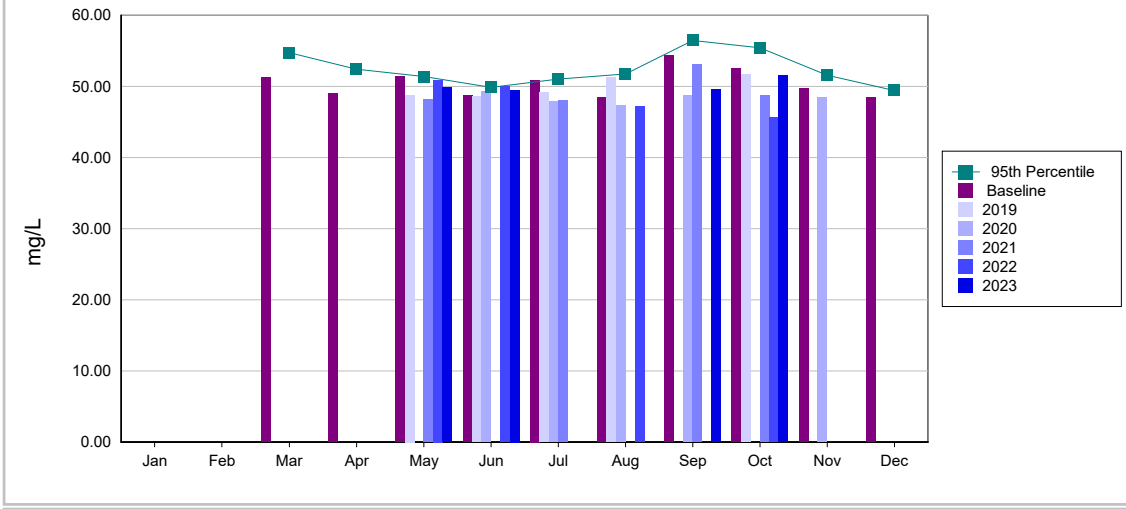

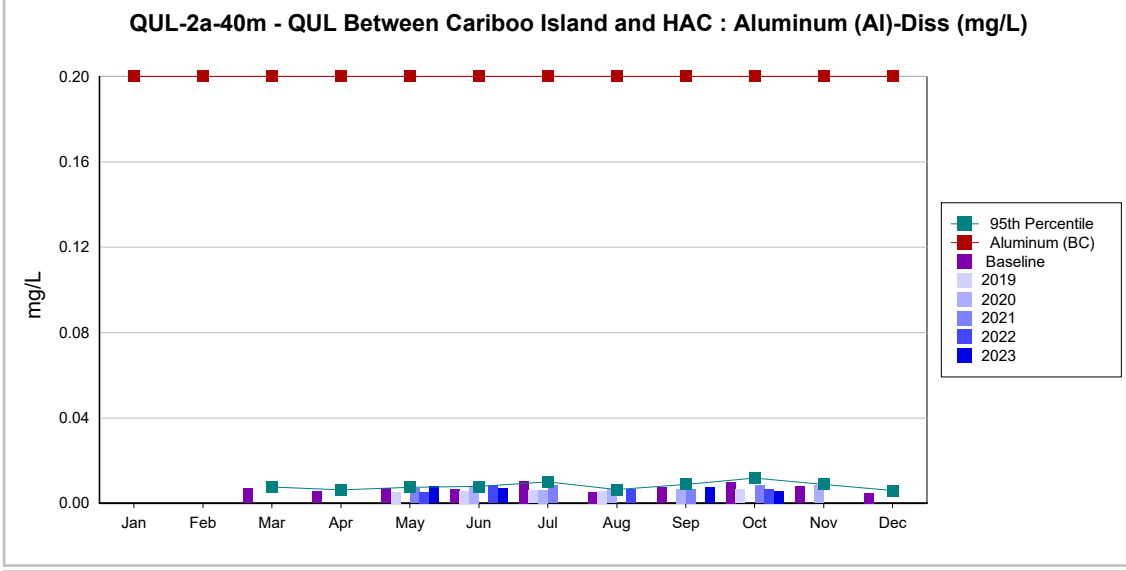

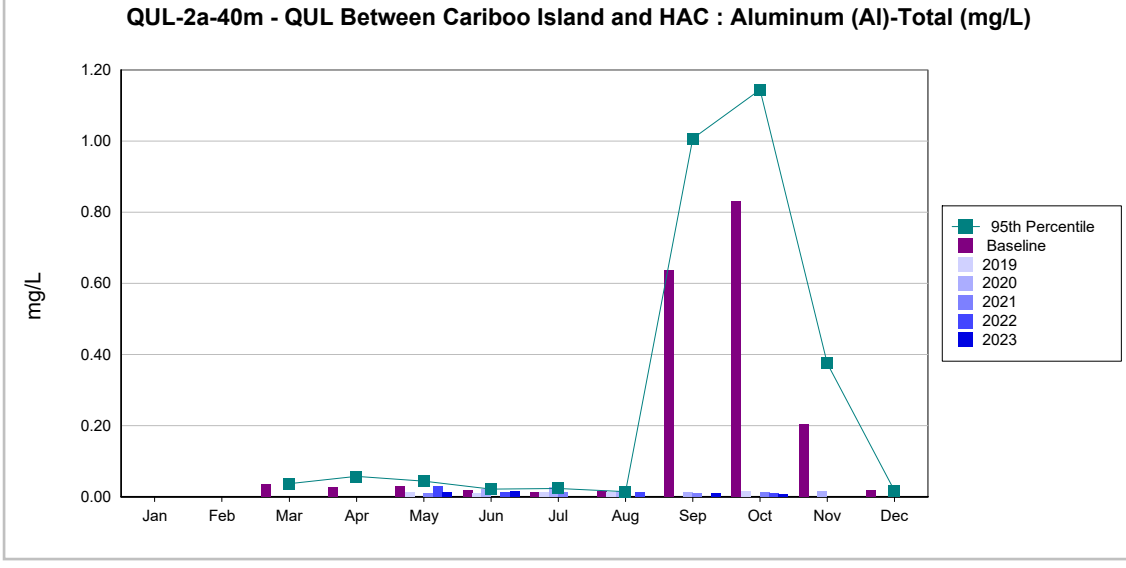

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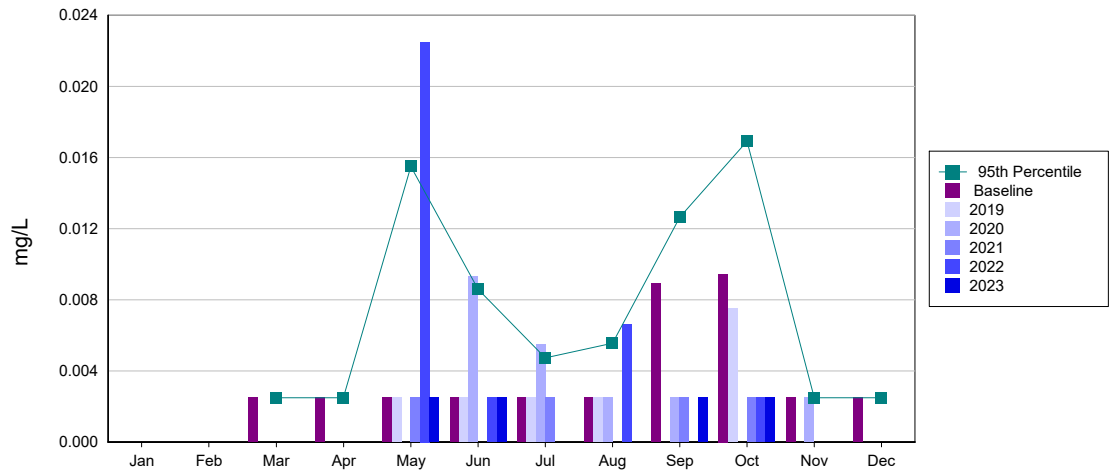
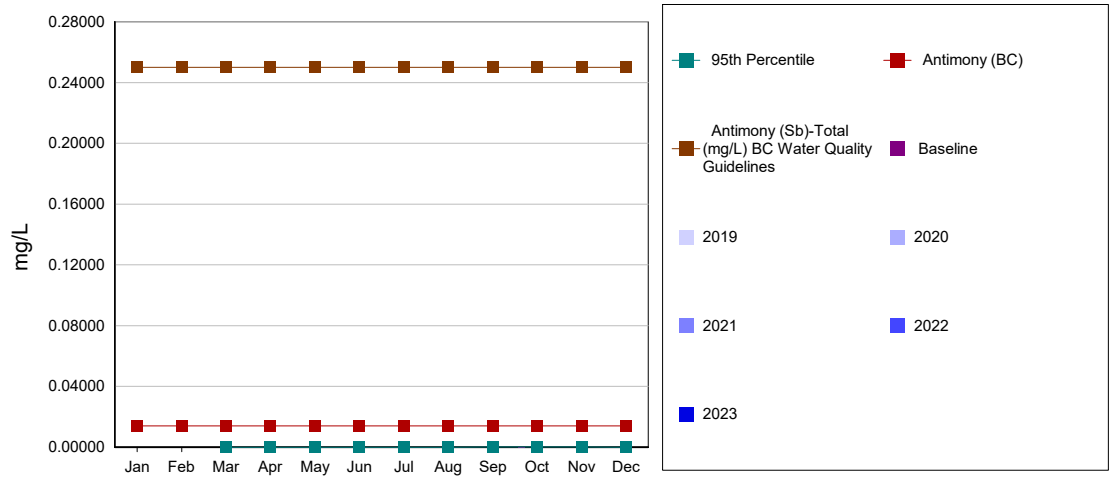
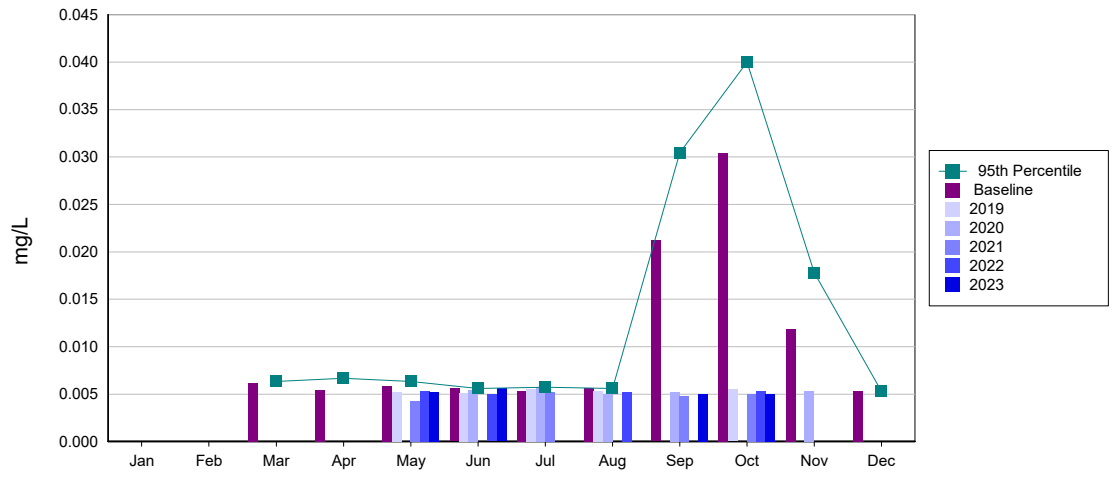
QUL-2a-40m - QUL Between Cariboo Island and HAC : Ammonia (as N) (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Antimony (Sb)-Total (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Barium (Ba)-Total (mg/L)



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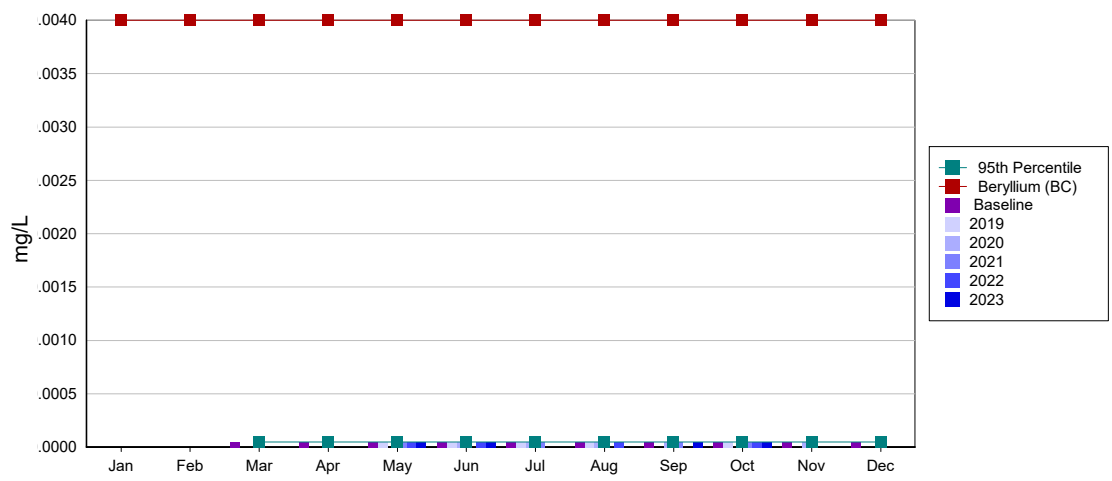

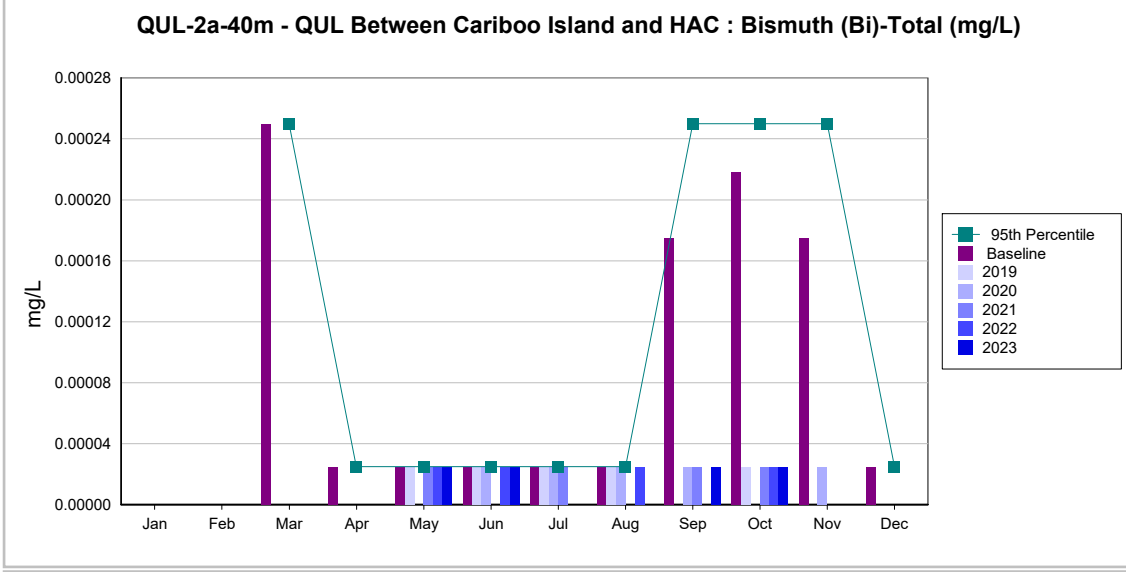

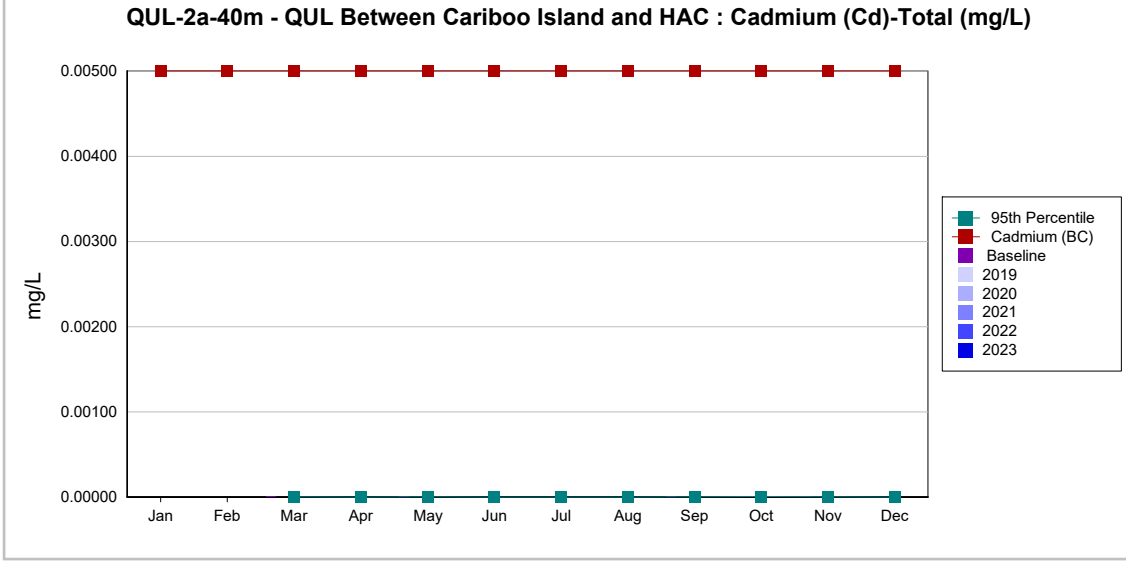

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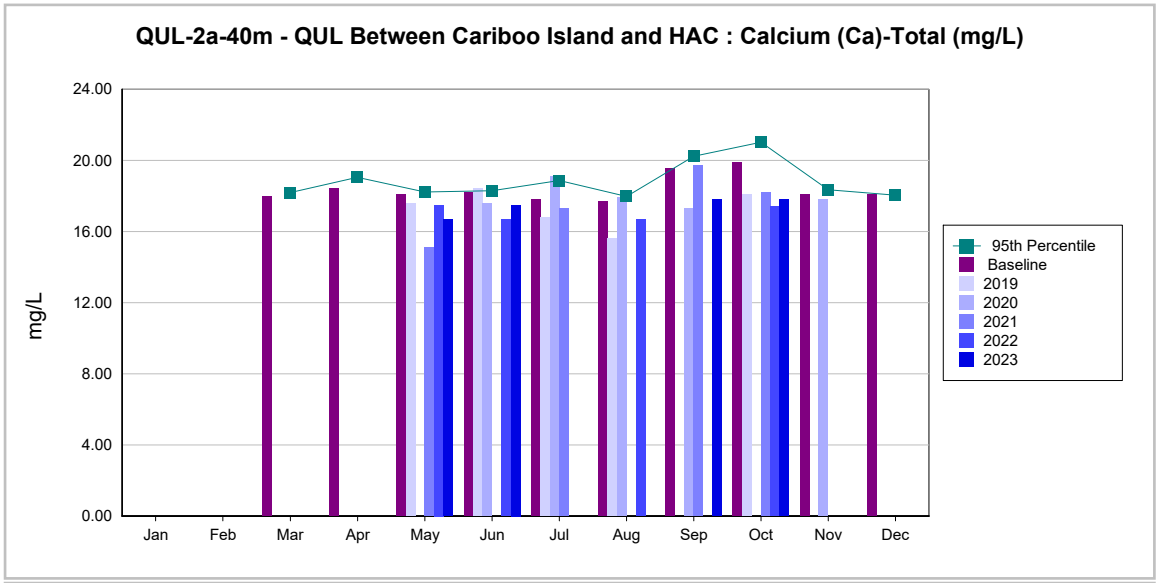

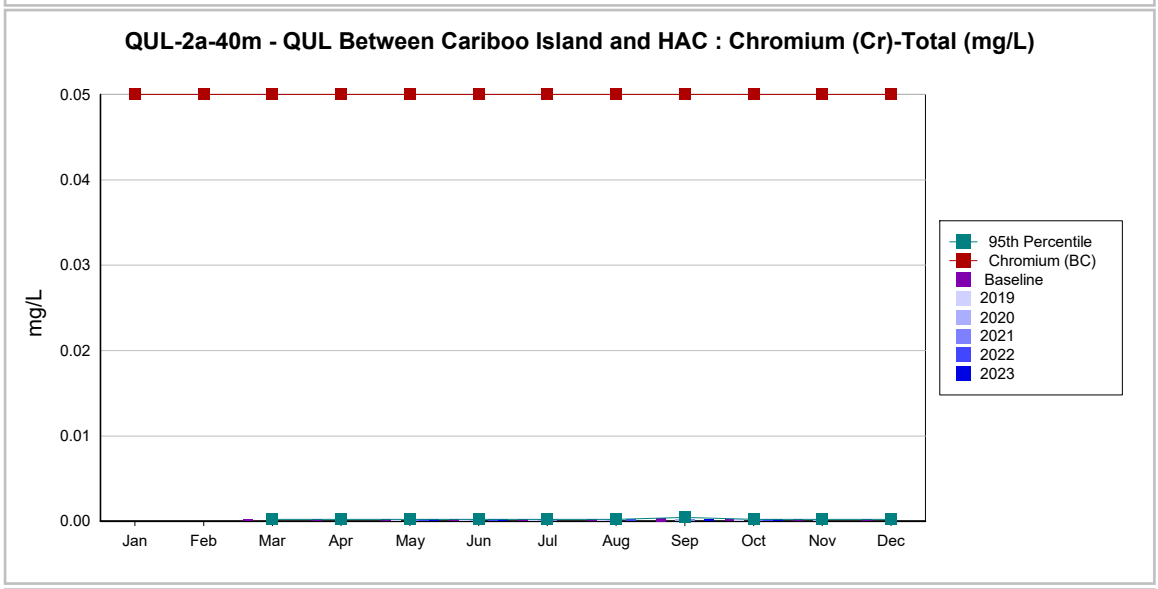

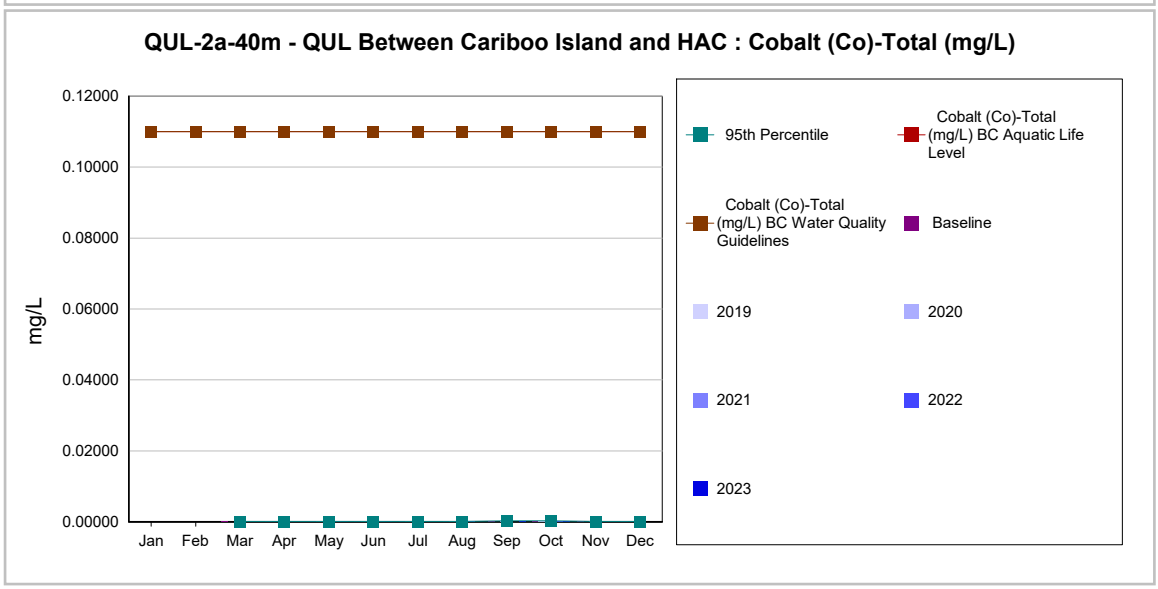

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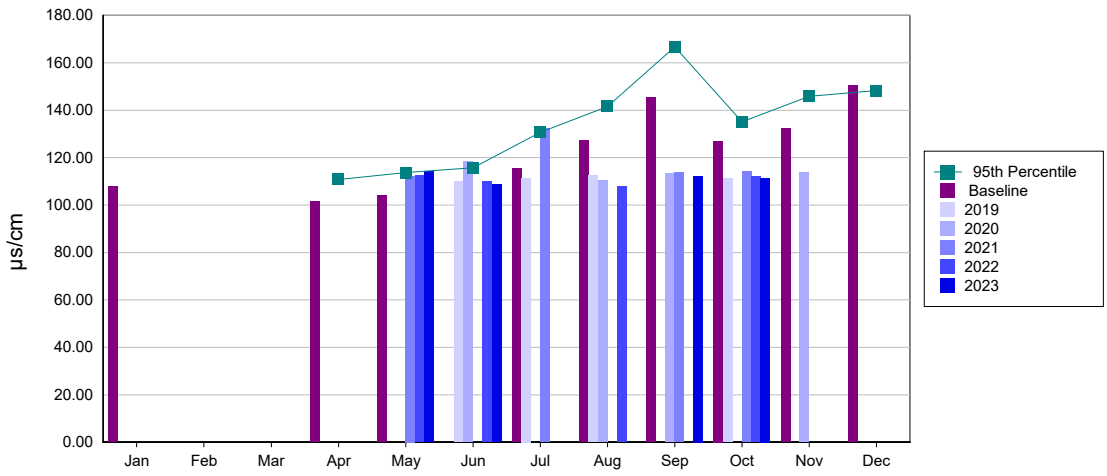
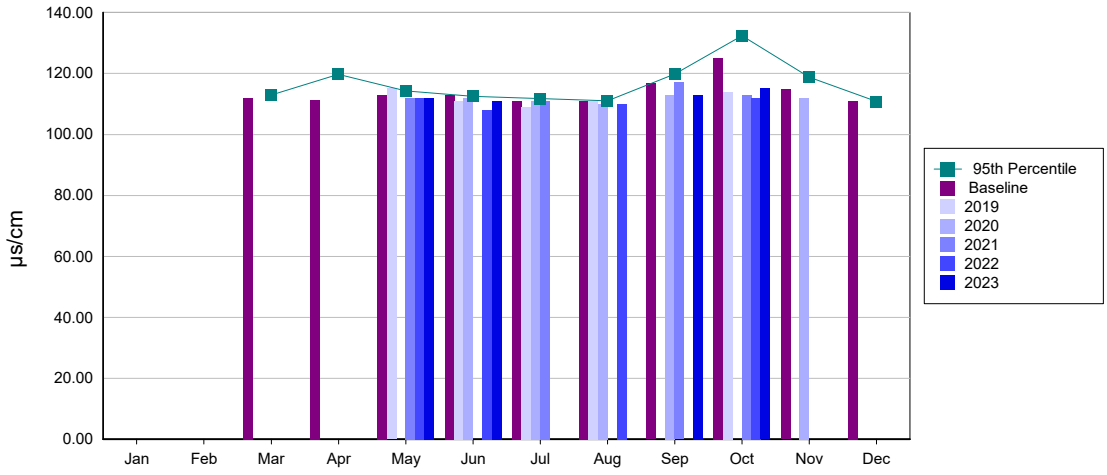
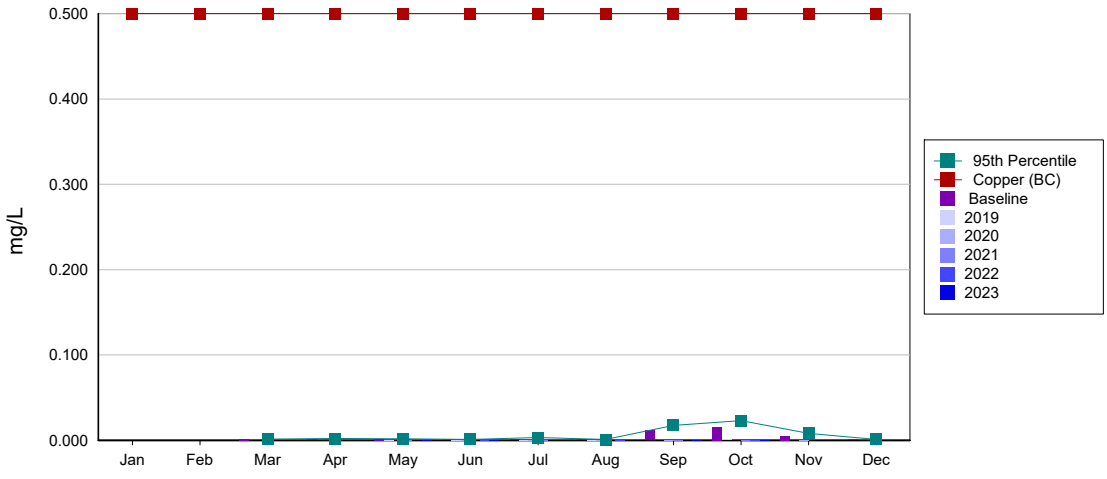
QUL-2a-40m - QUL Between Cariboo Island and HAC : Cond (in situ) (µs/cm)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Conductivity (µs/cm)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Copper (Cu)-Total (mg/L)



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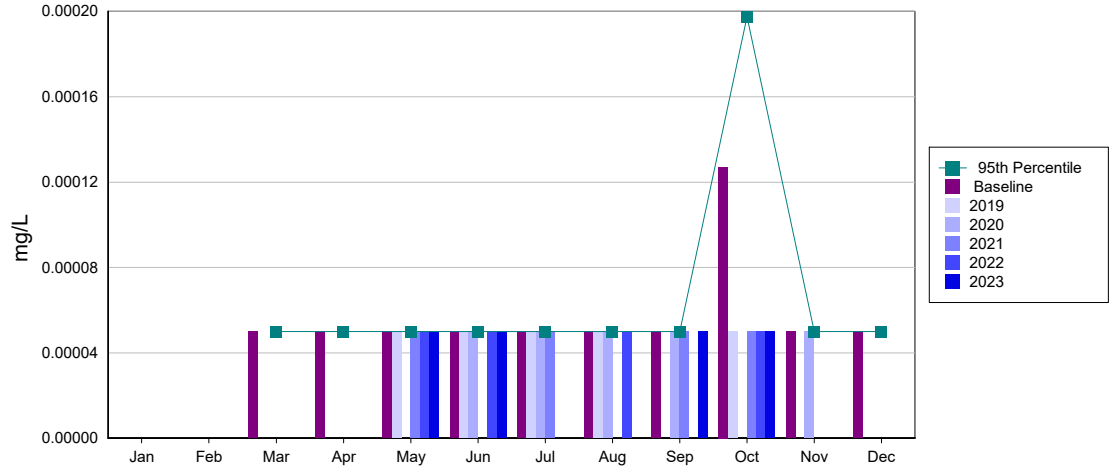

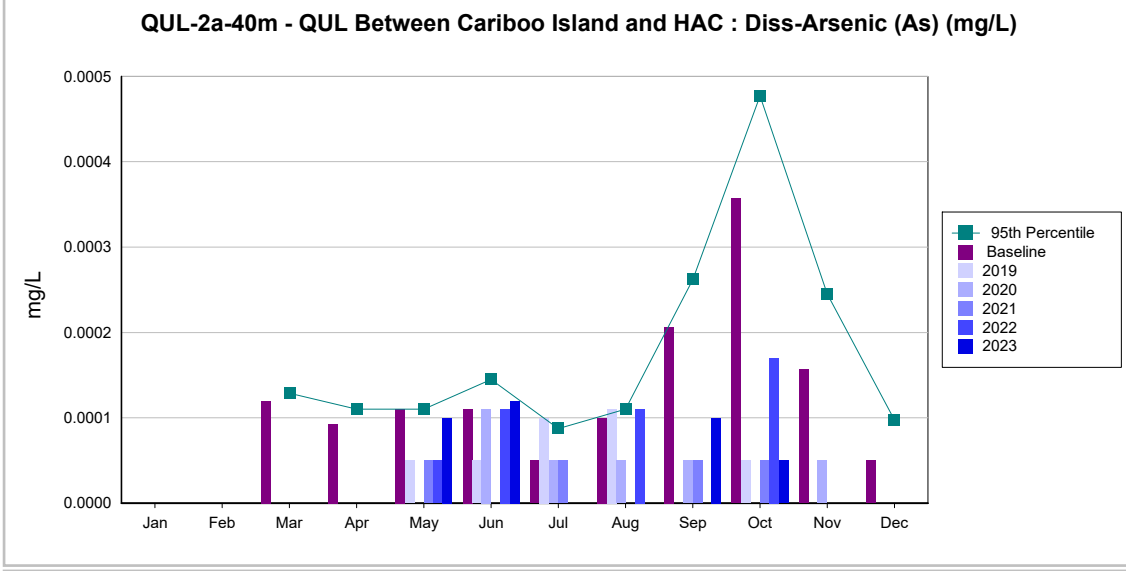

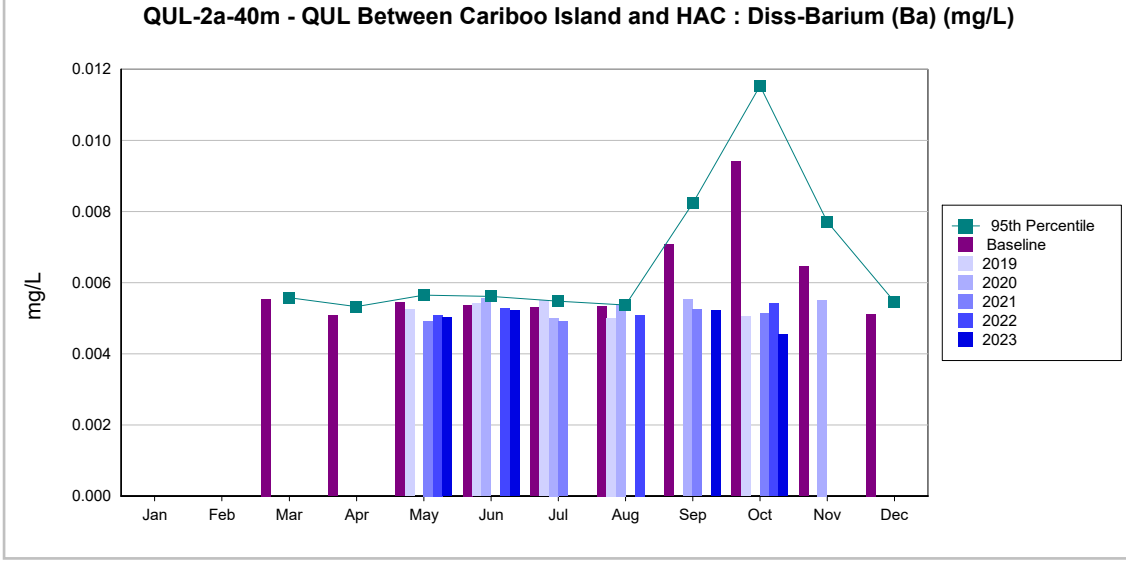

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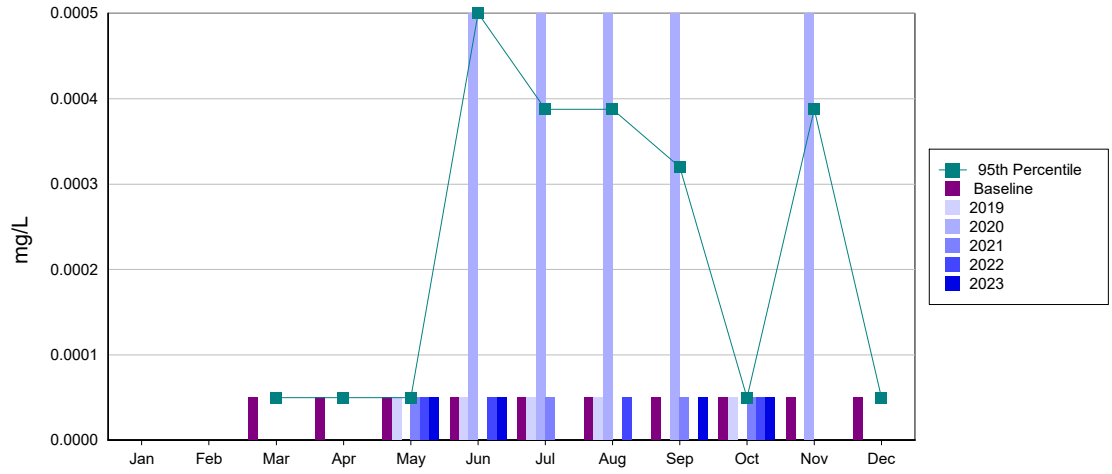

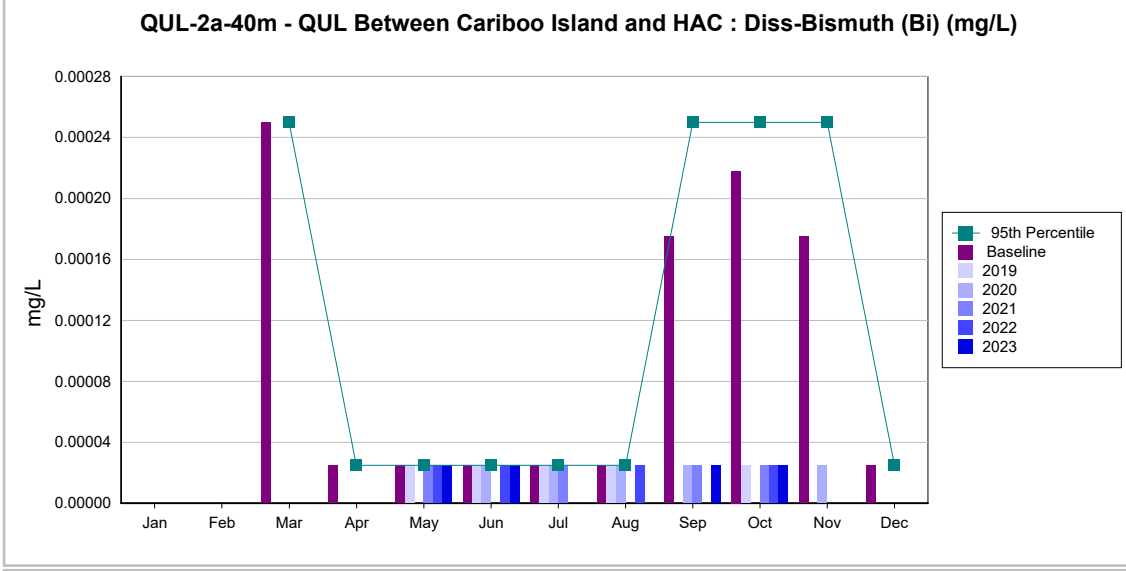

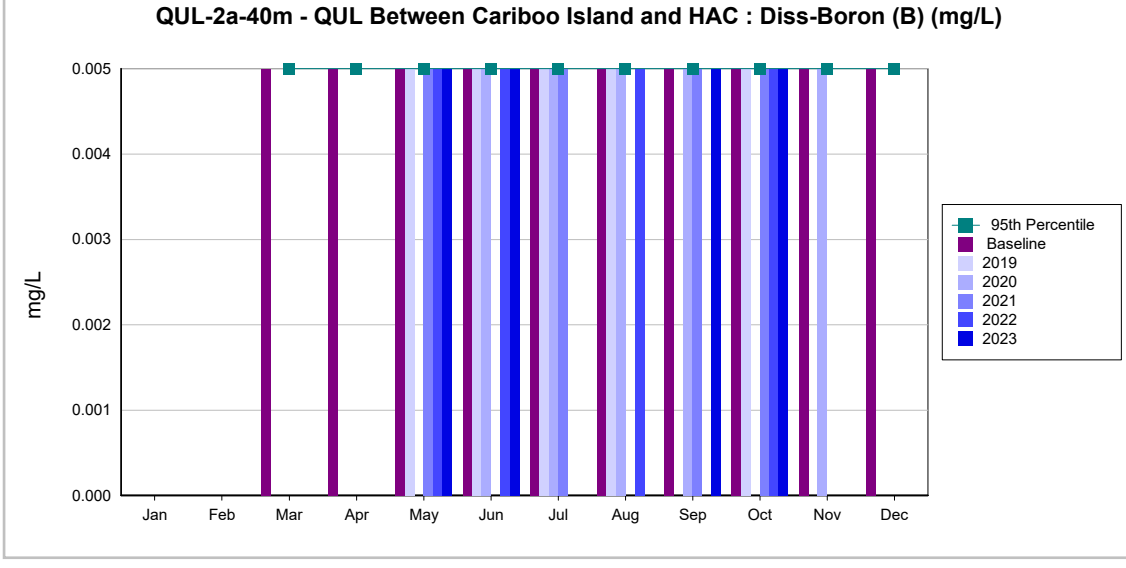

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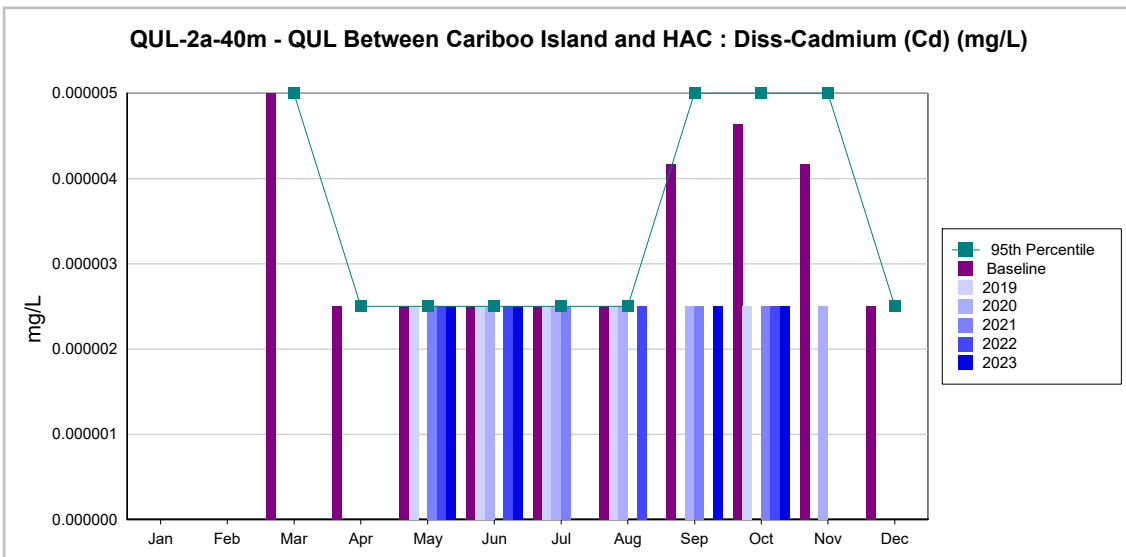

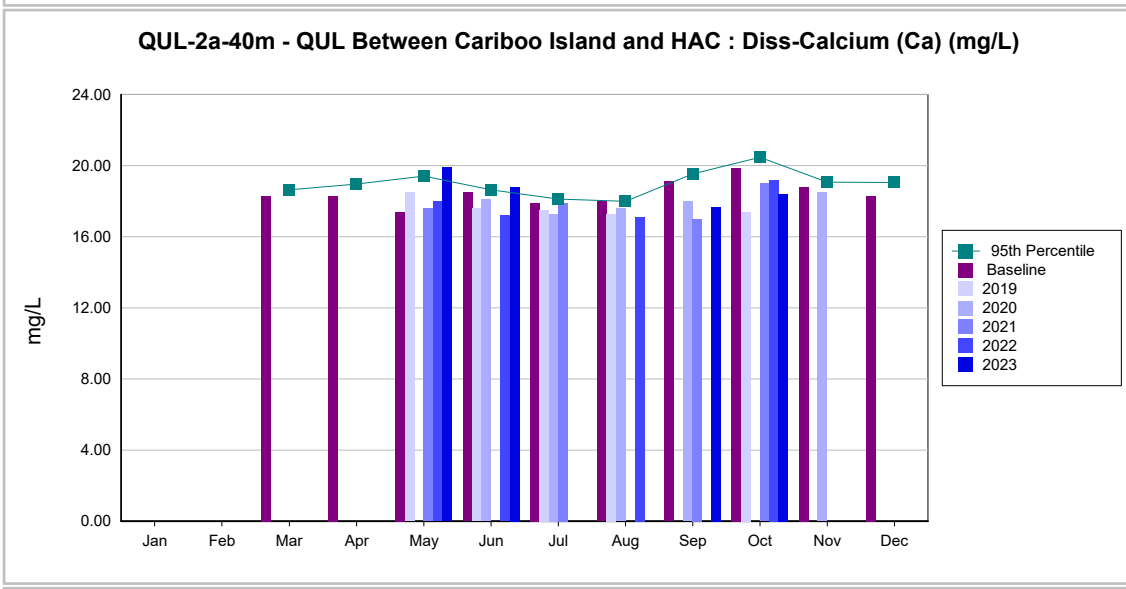

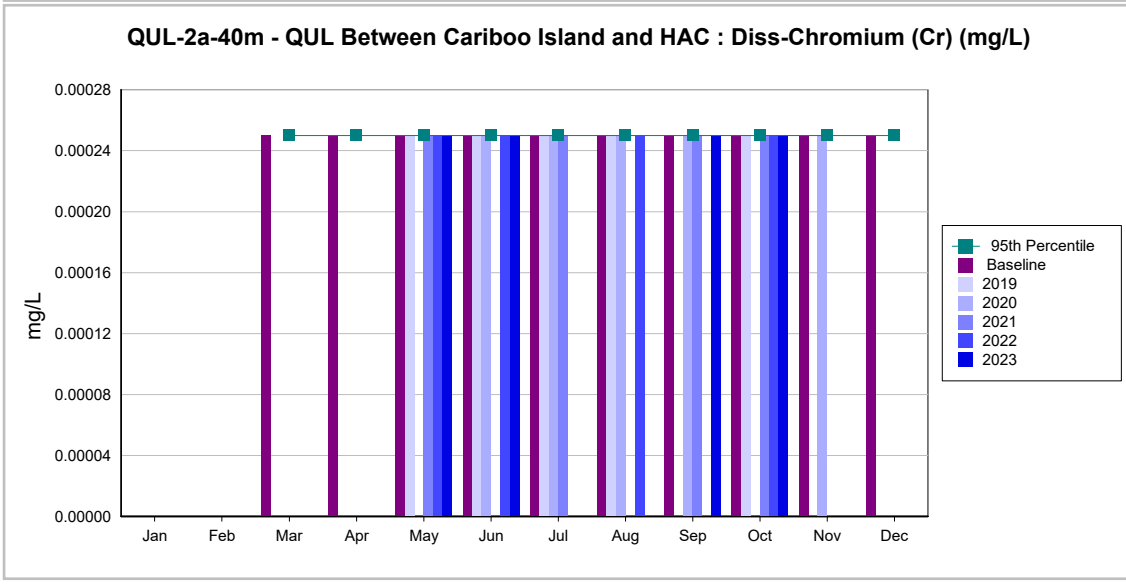

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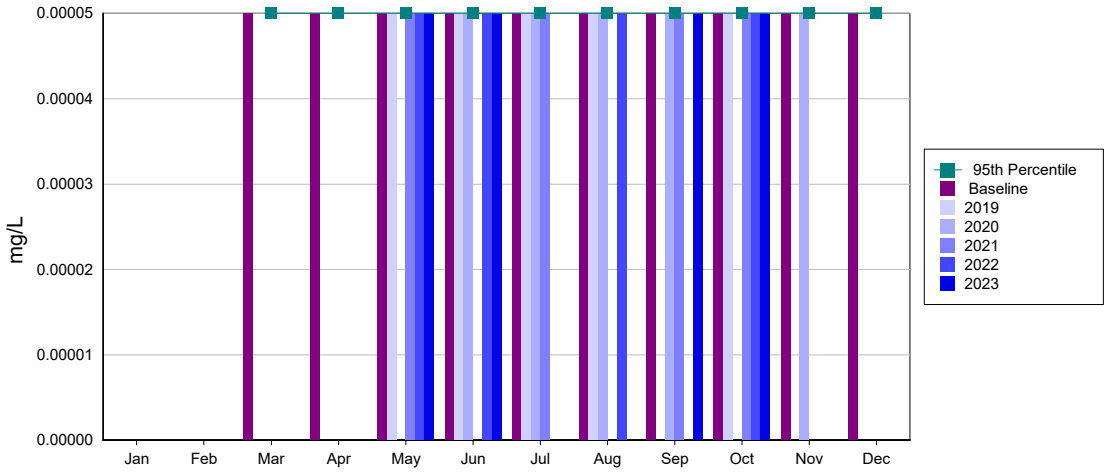

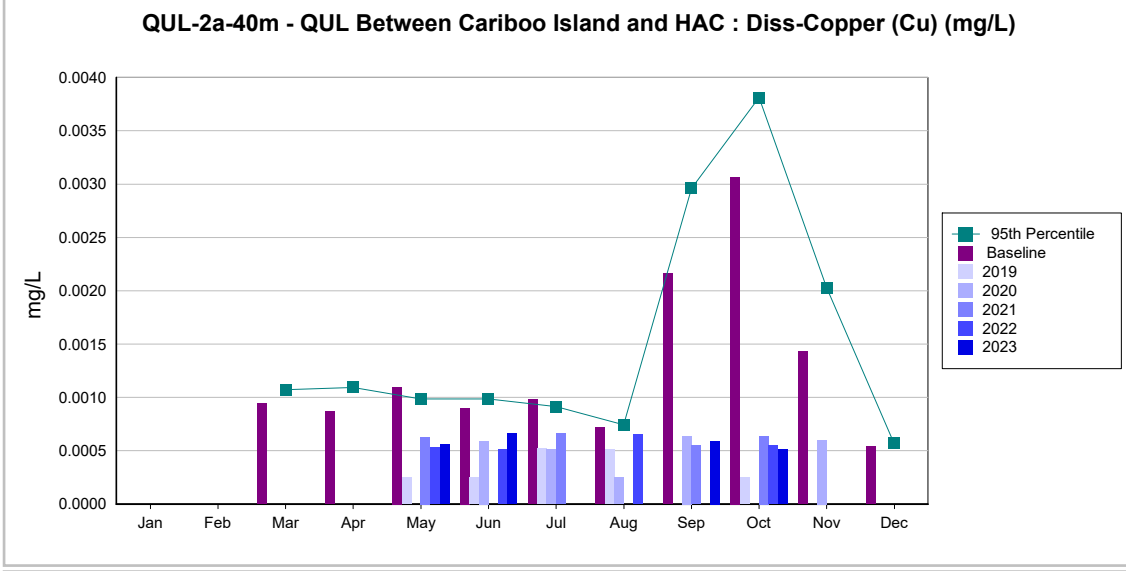

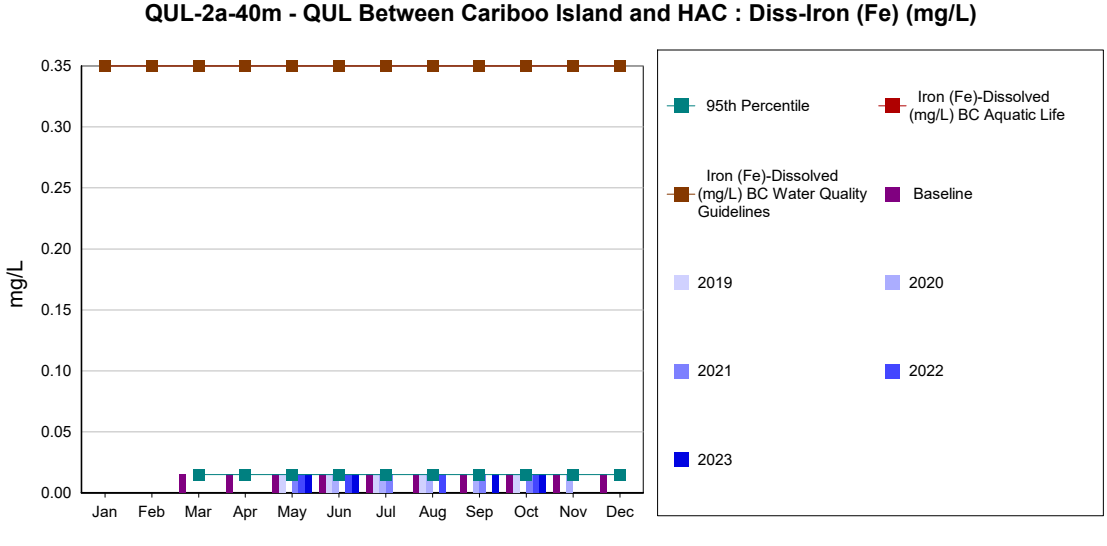

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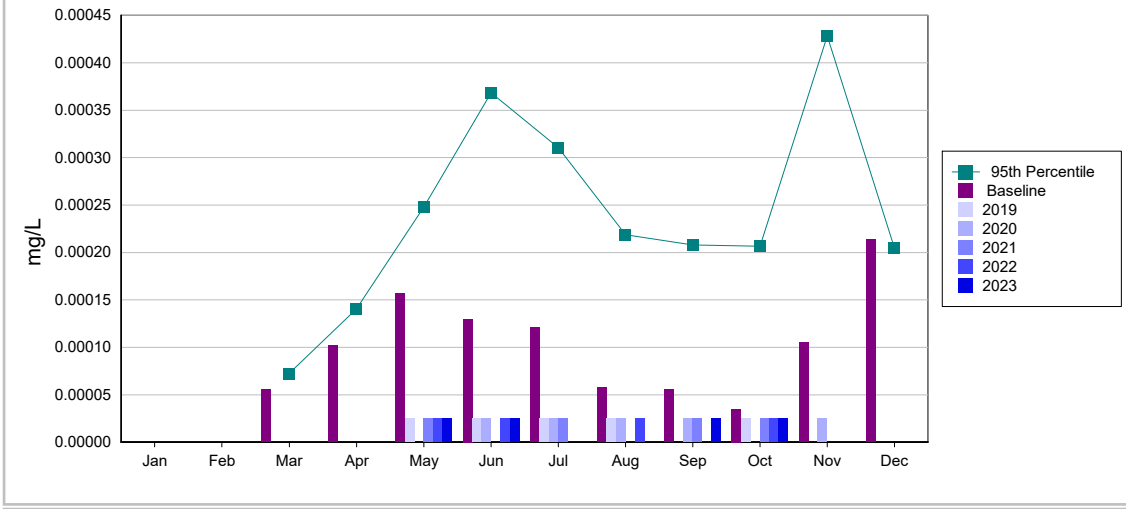

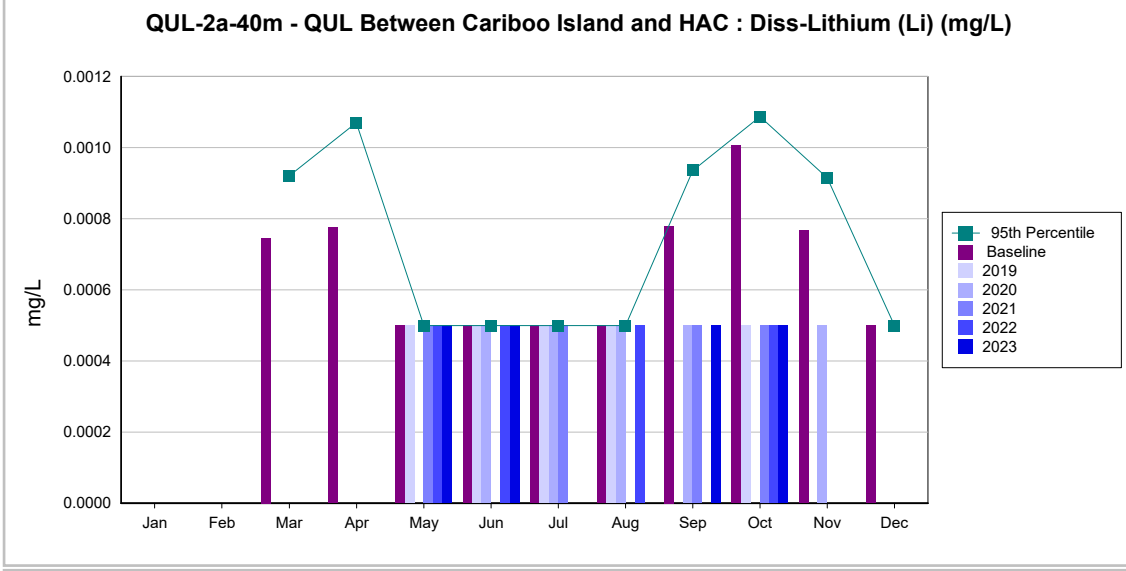

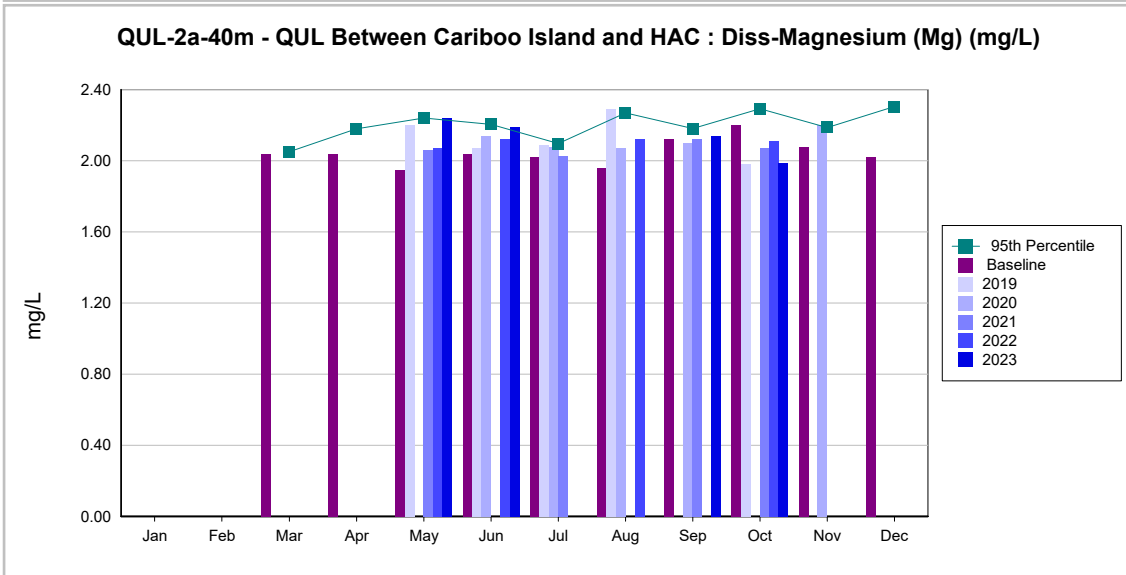

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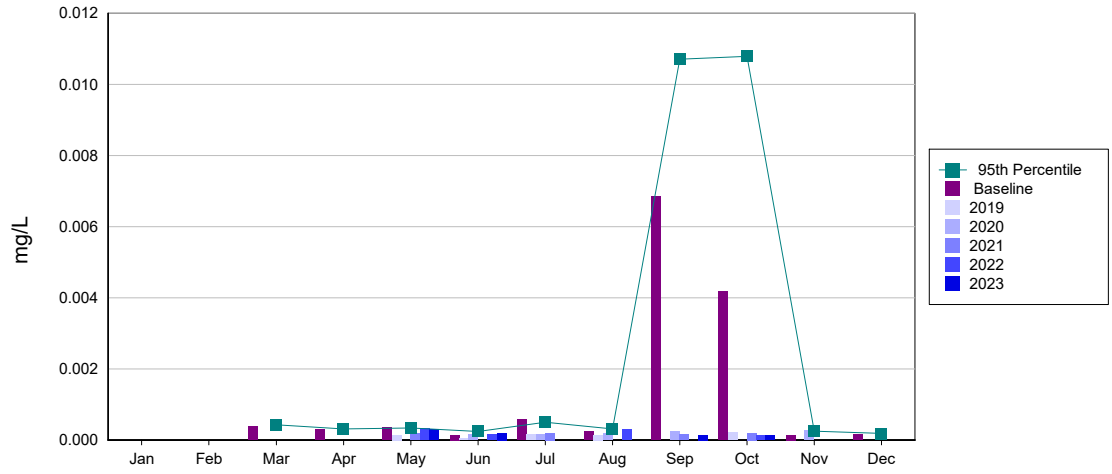
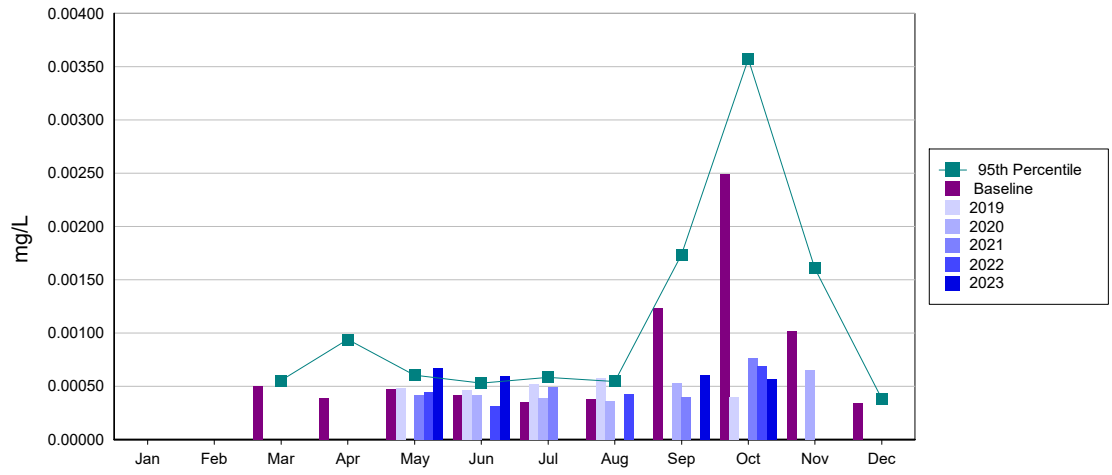
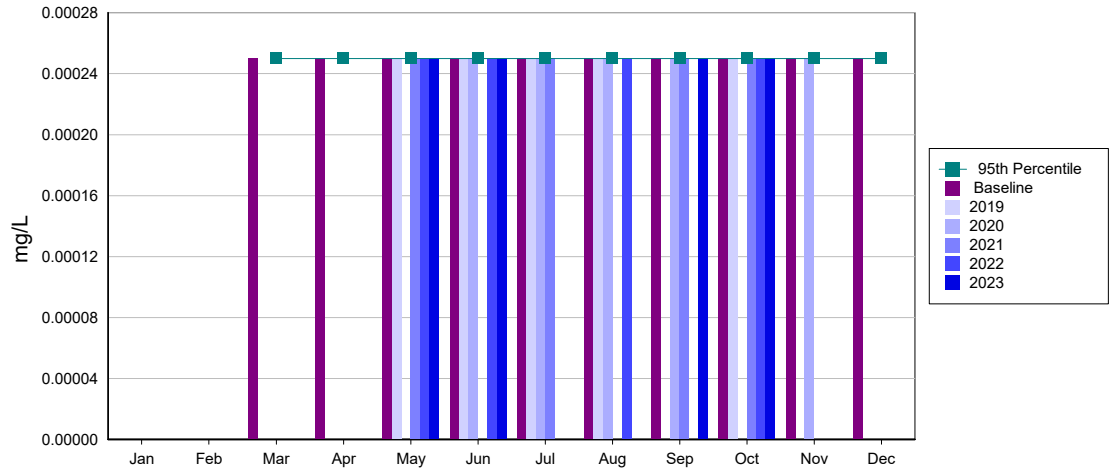
QUL-2a-40m - QUL Between Cariboo Island and HAC : Diss-Manganese (Mn) (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Diss-Molybdenum (Mo) (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Diss-Nickel (Ni) (mg/L)



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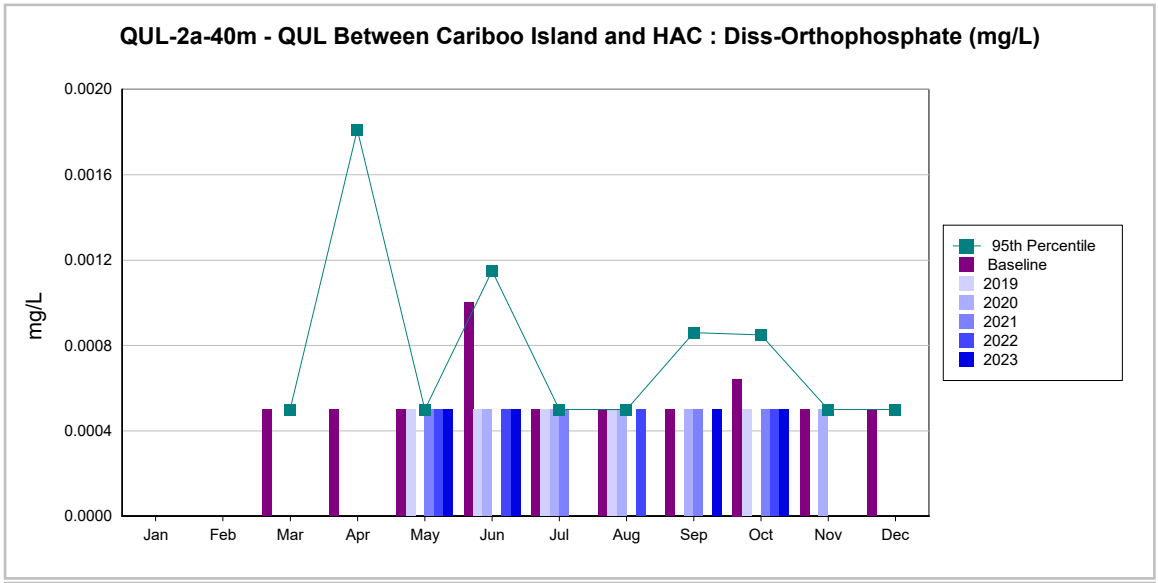

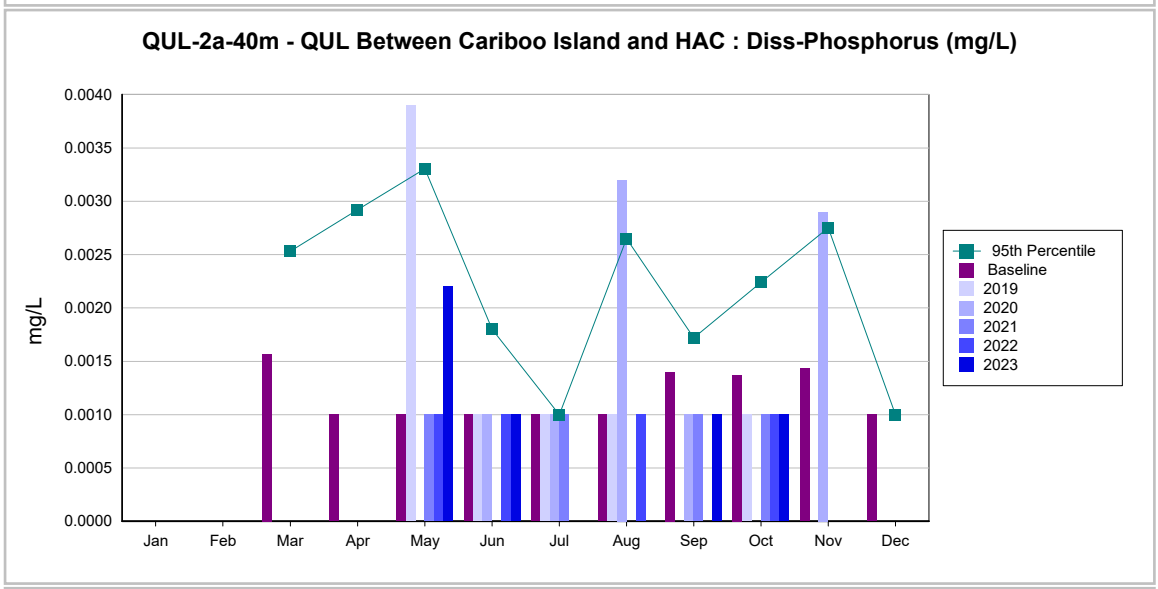

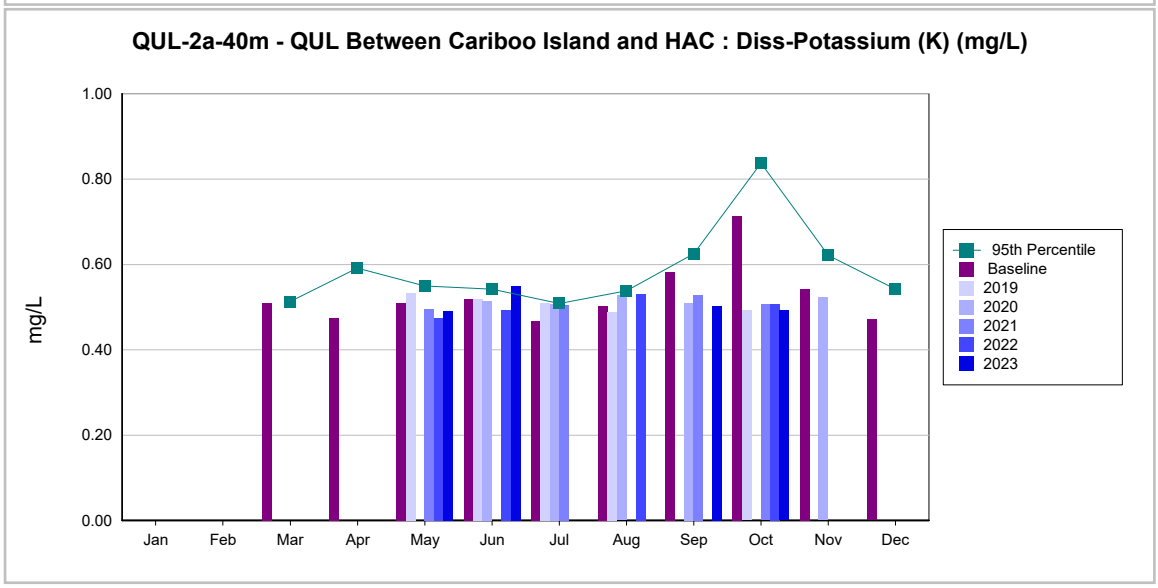

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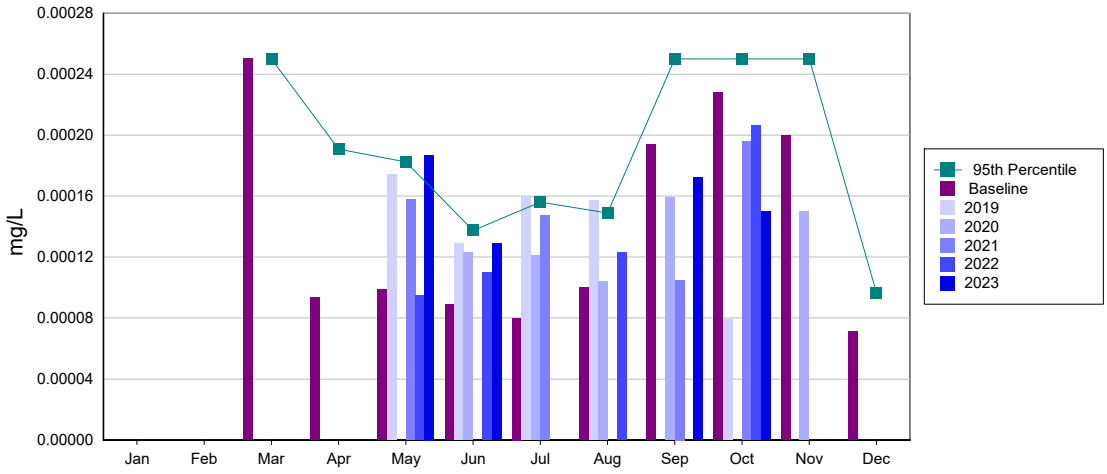
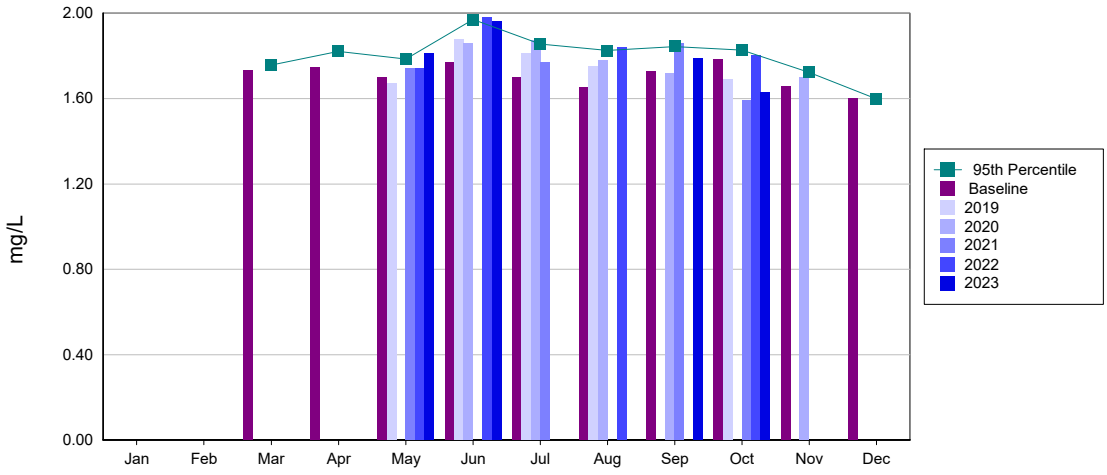
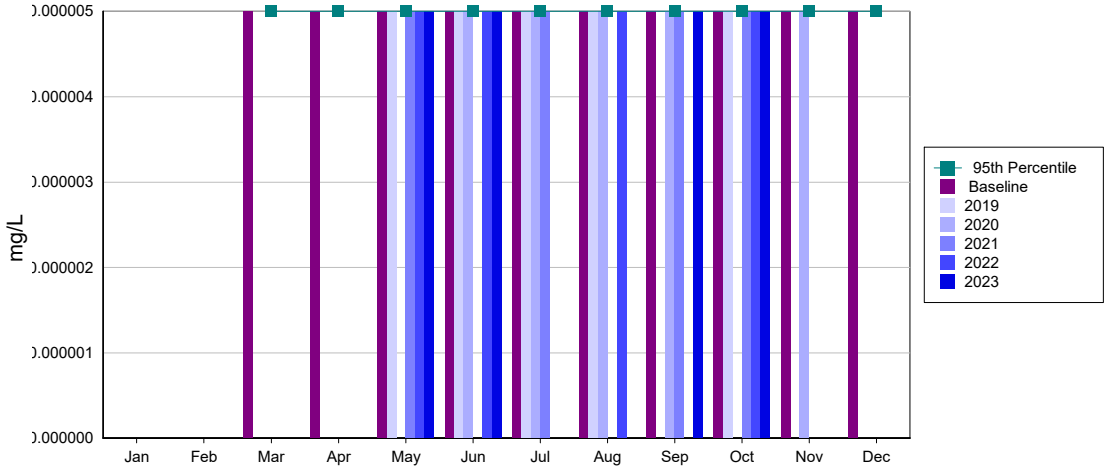
QUL-2a-40m - QUL Between Cariboo Island and HAC : Diss-Selenium (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Diss-Silicon (Si) (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Diss-Silver (Ag) (mg/L)



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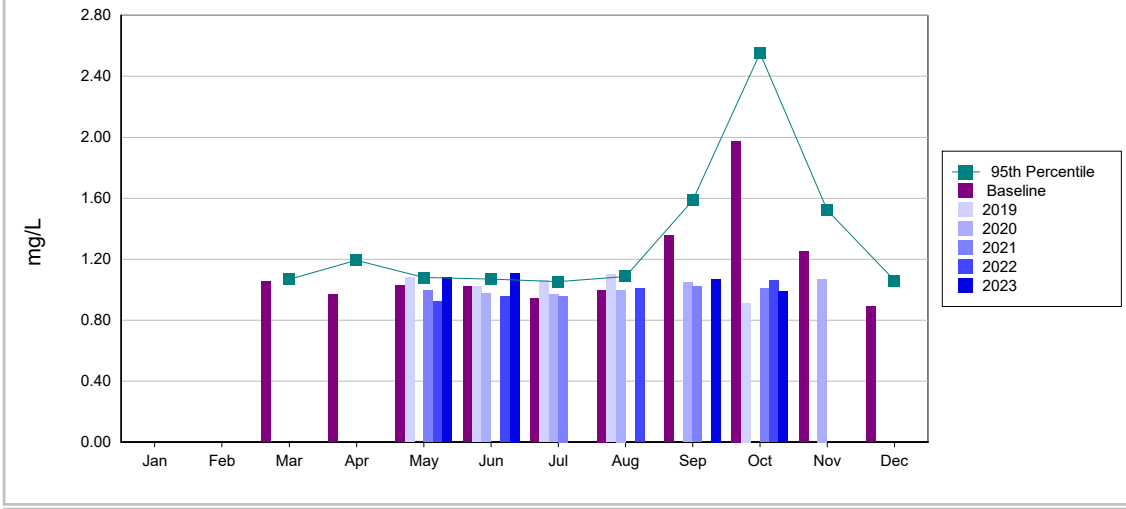

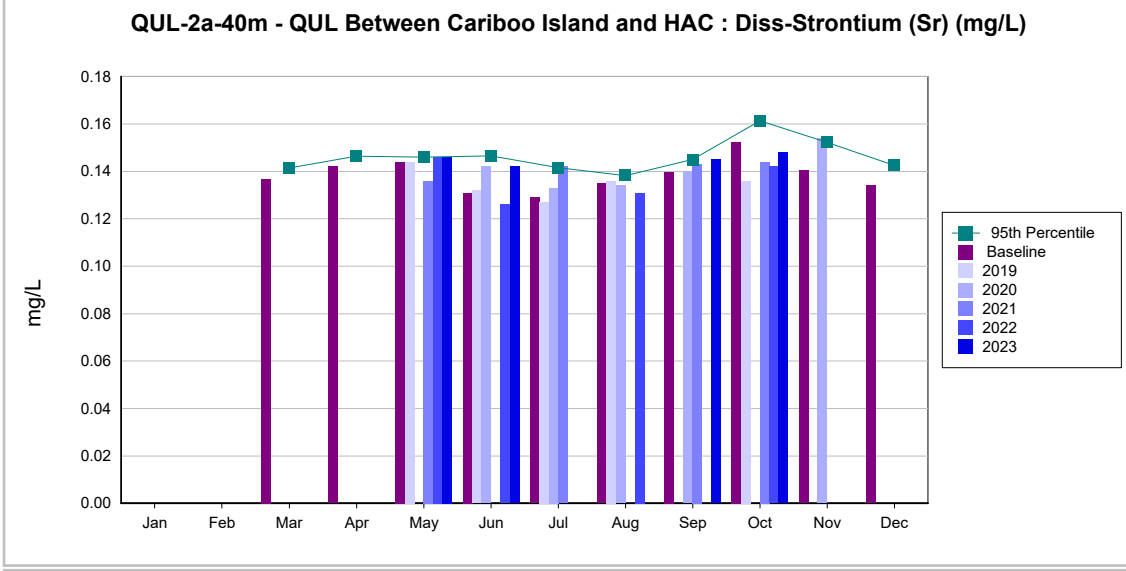

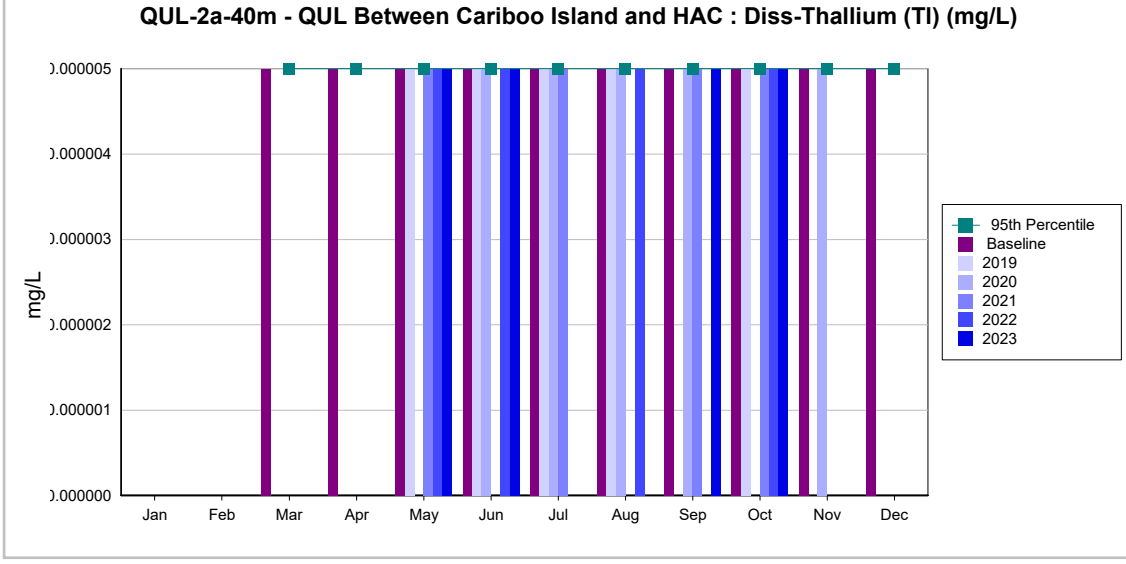

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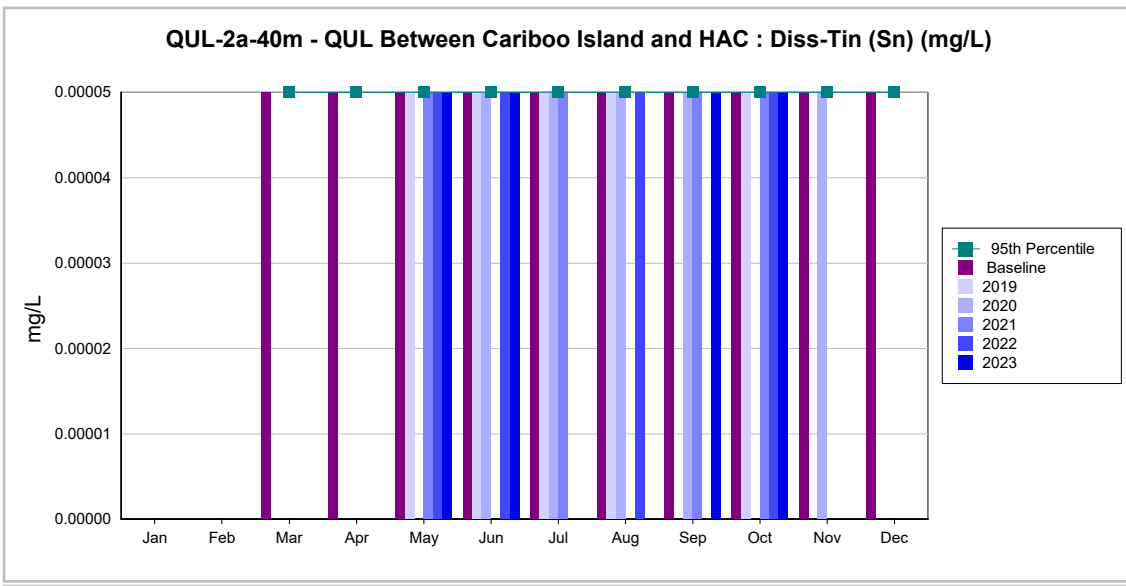

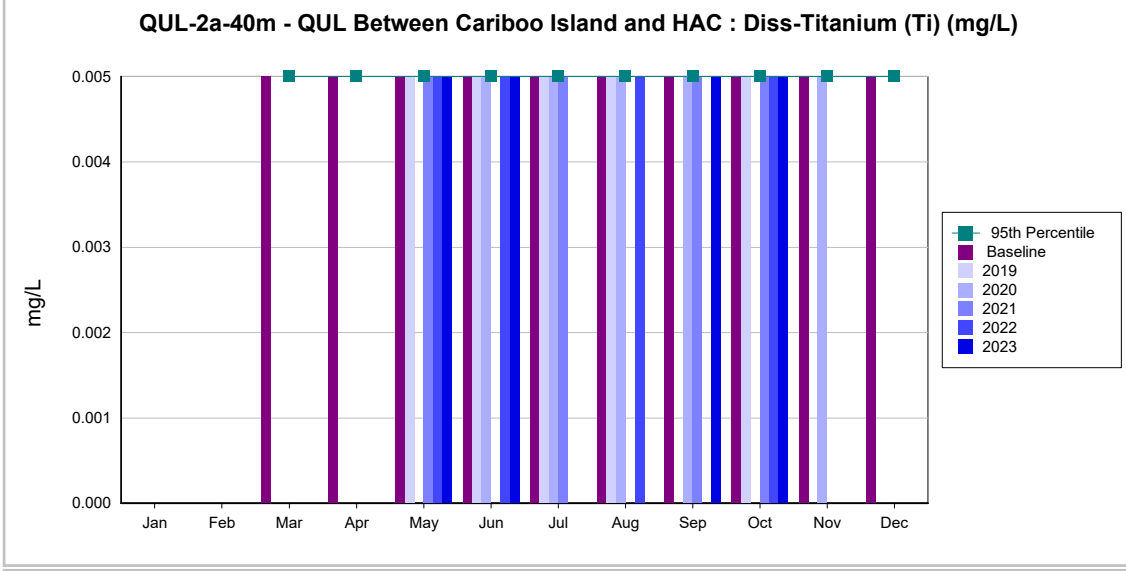

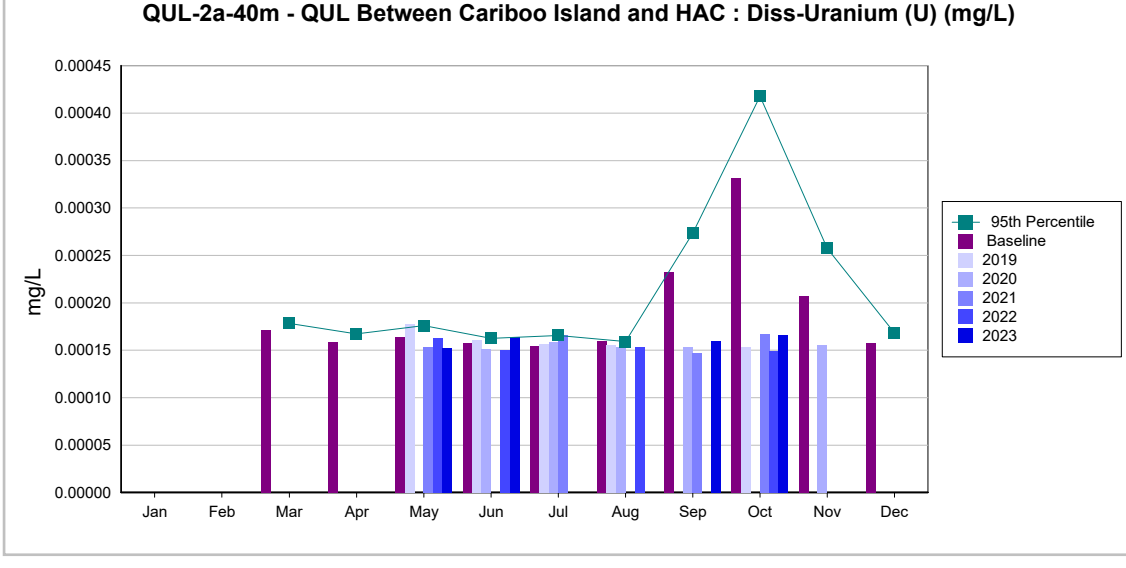

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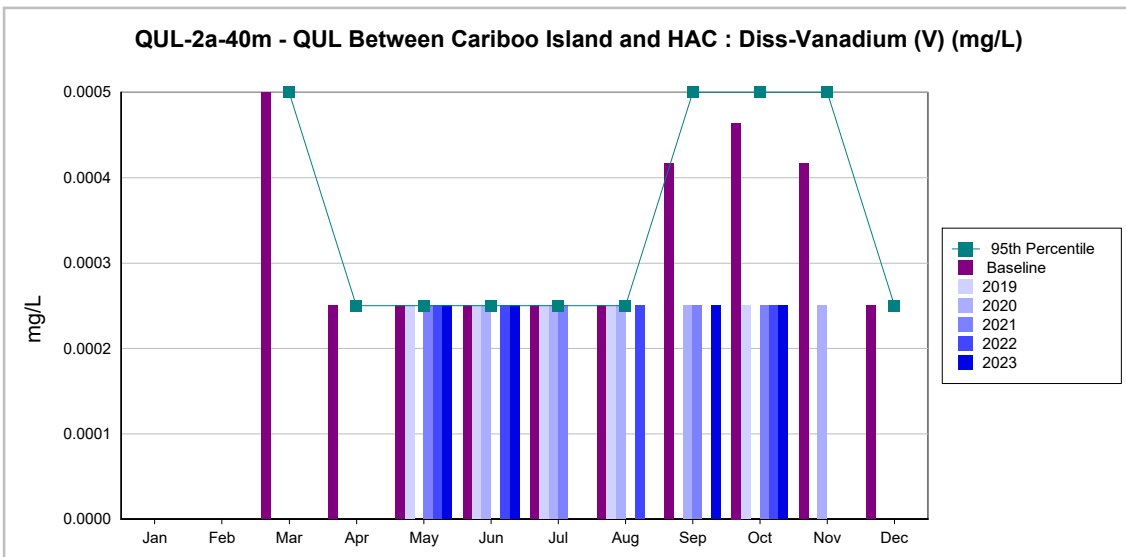

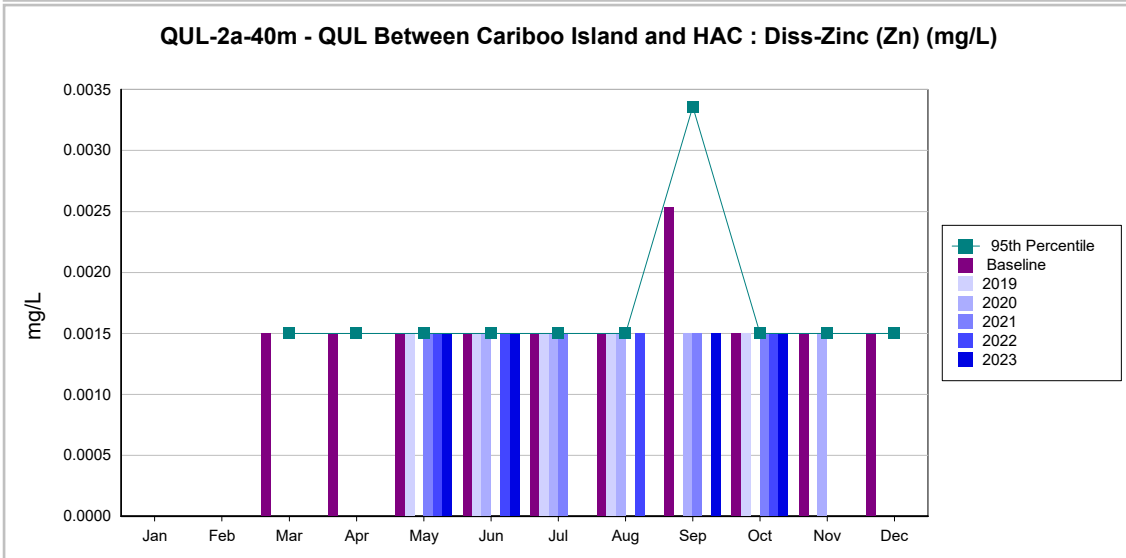

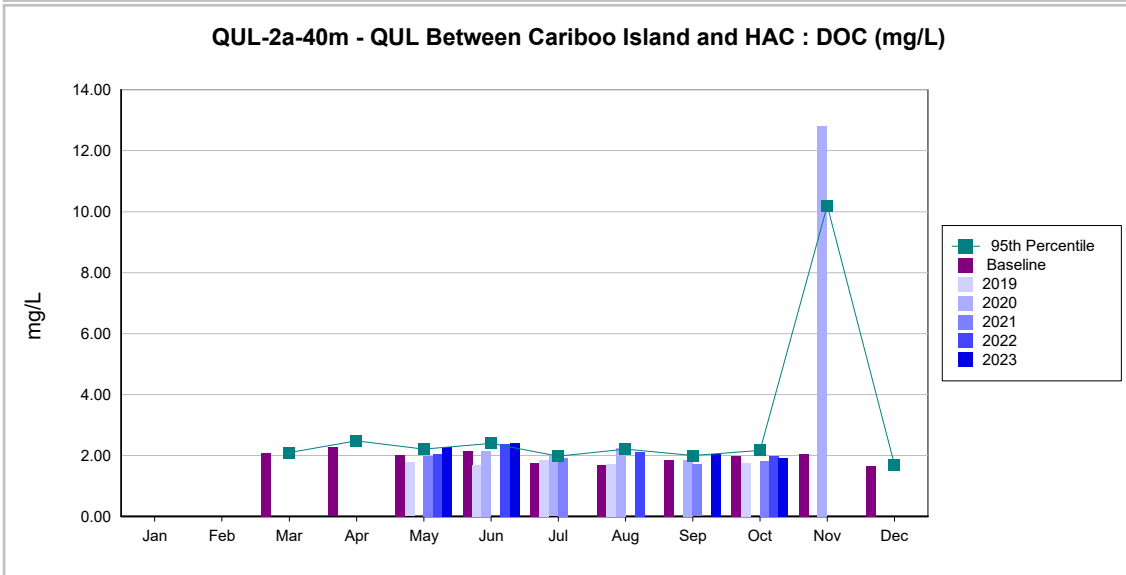

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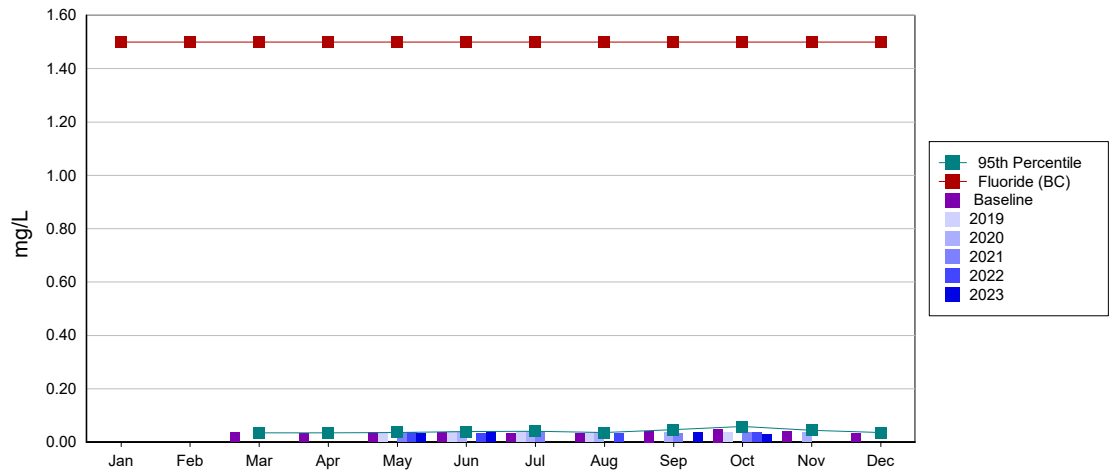
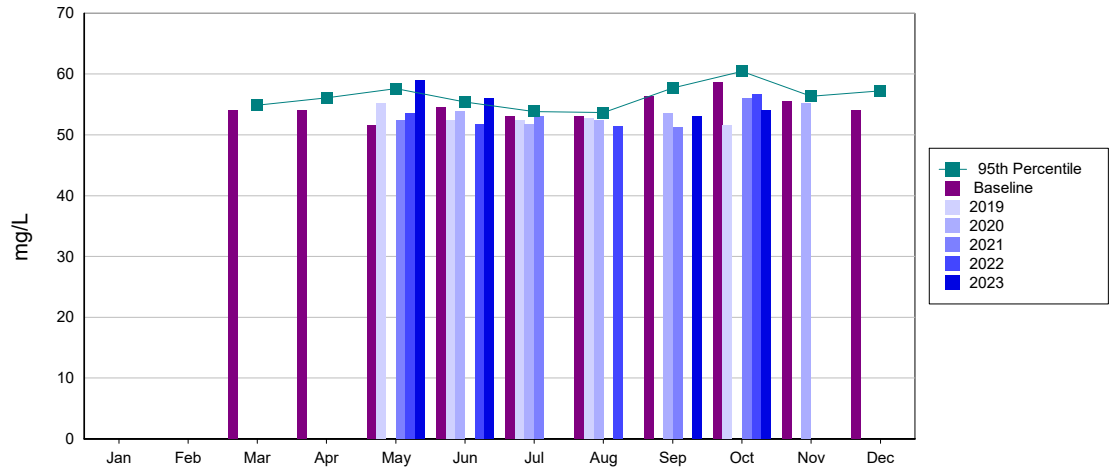
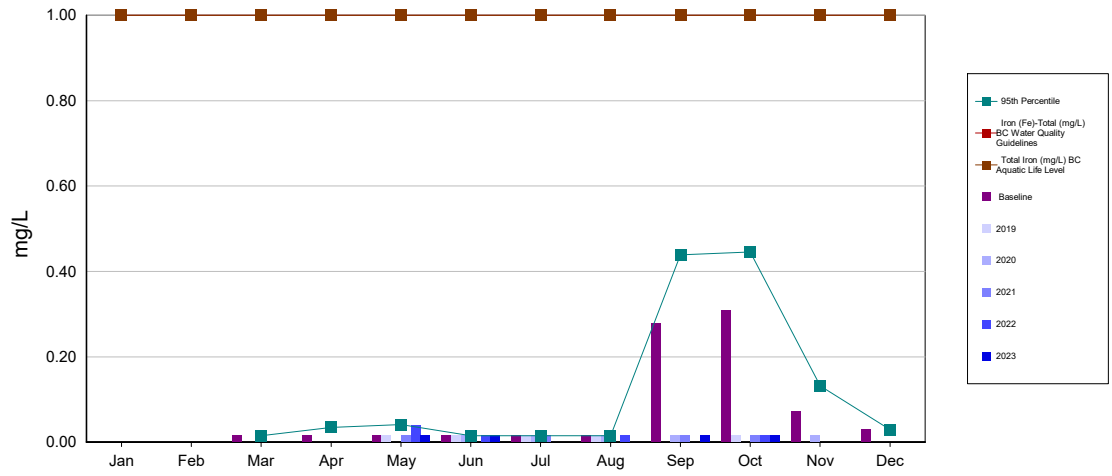
QUL-2a-40m - QUL Between Cariboo Island and HAC : Floride (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Hardness (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Iron (Fe)-Total (mg/L)



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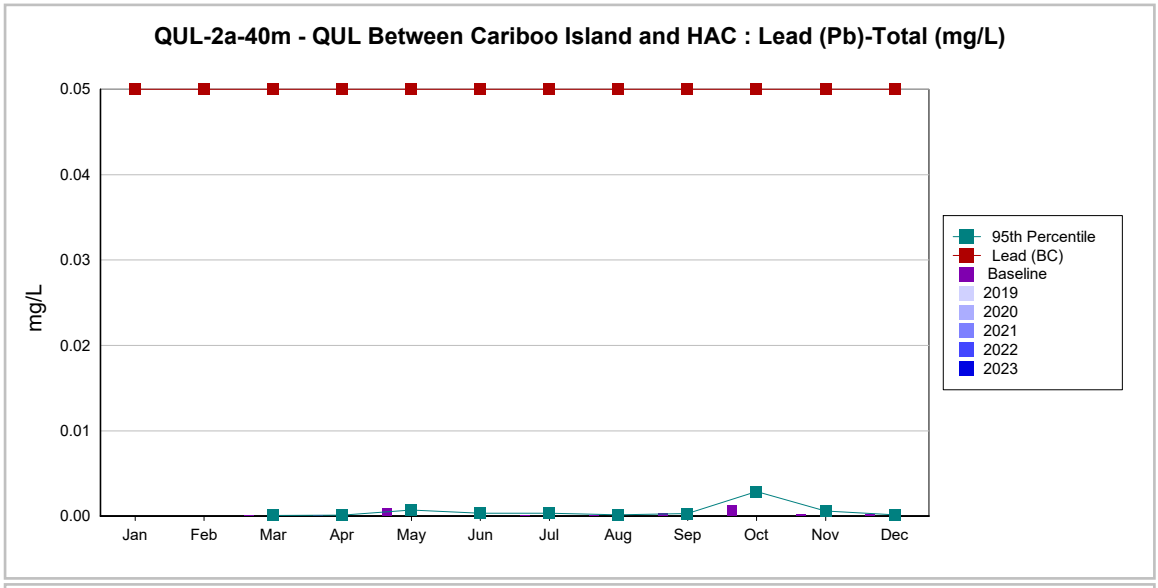

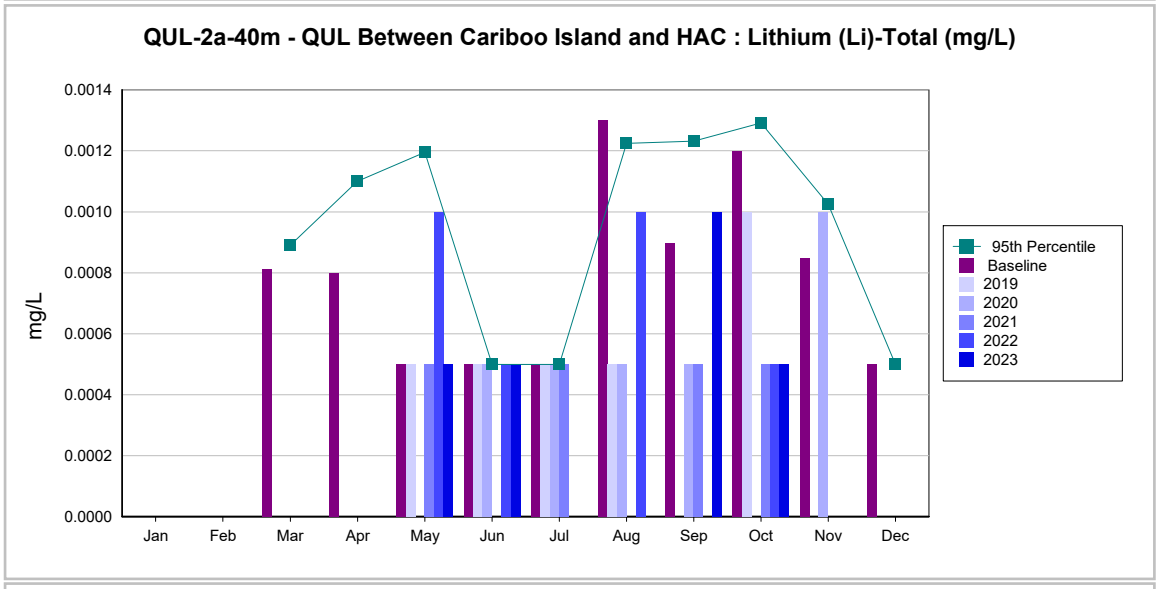

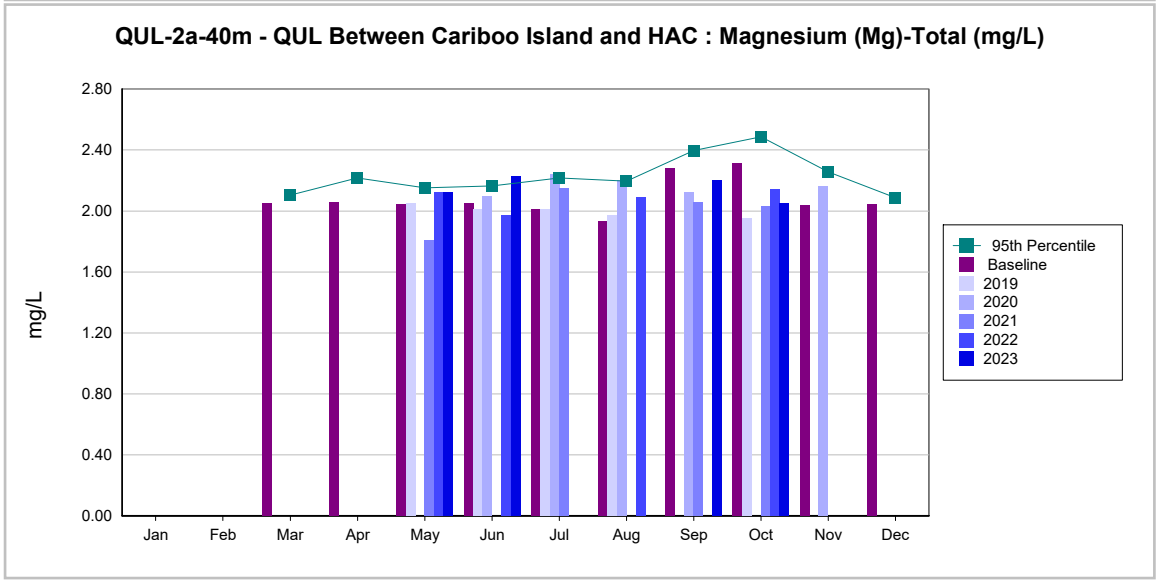

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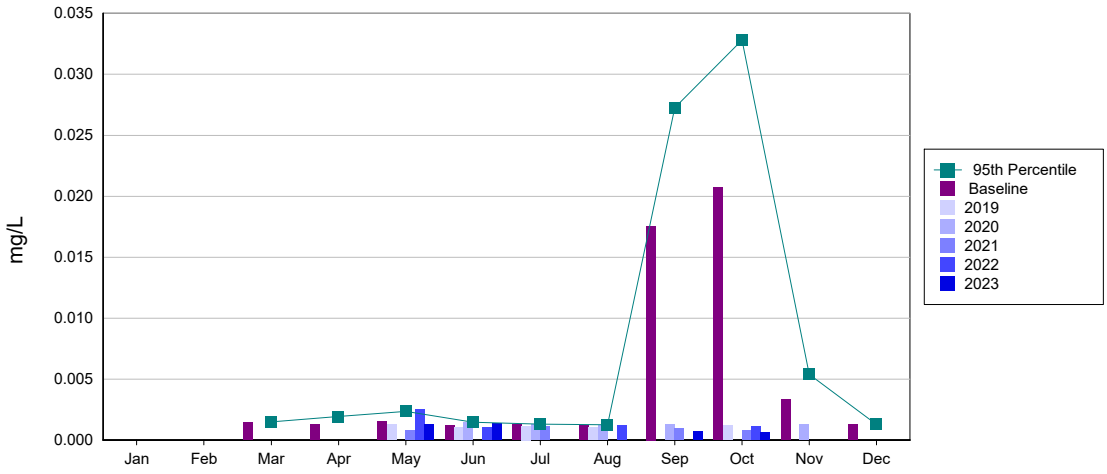
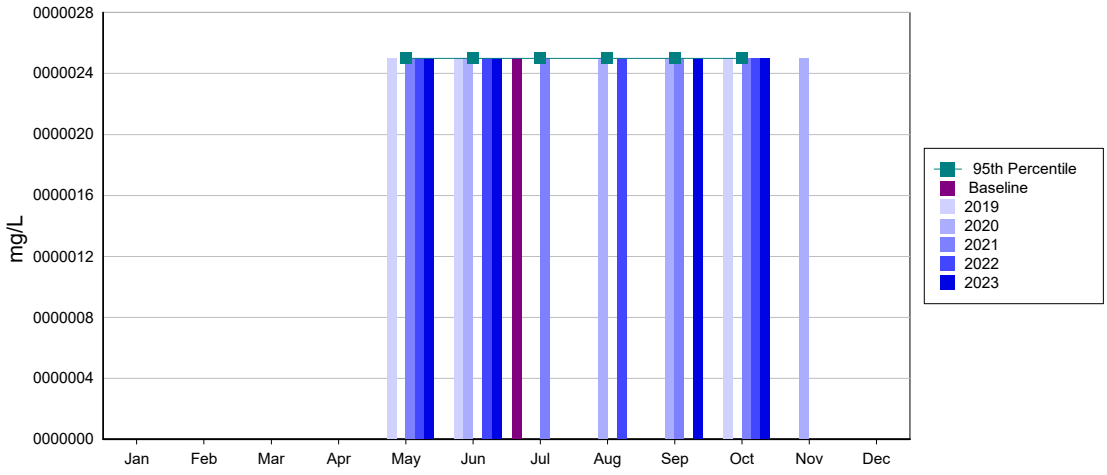
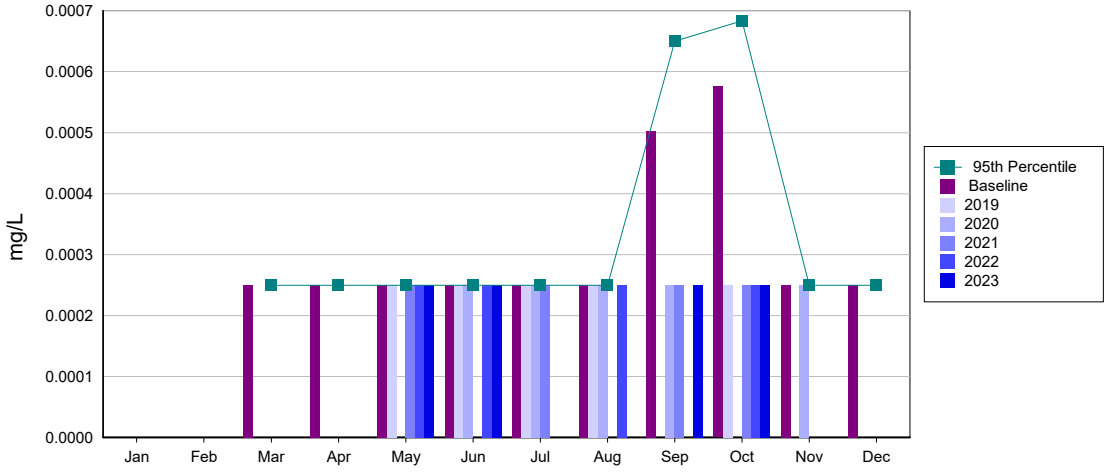
QUL-2a-40m - QUL Between Cariboo Island and HAC : Manganese (Mn)-Total (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Mercury (Hg)-Total (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Nickel (Ni)-Total (mg/L)



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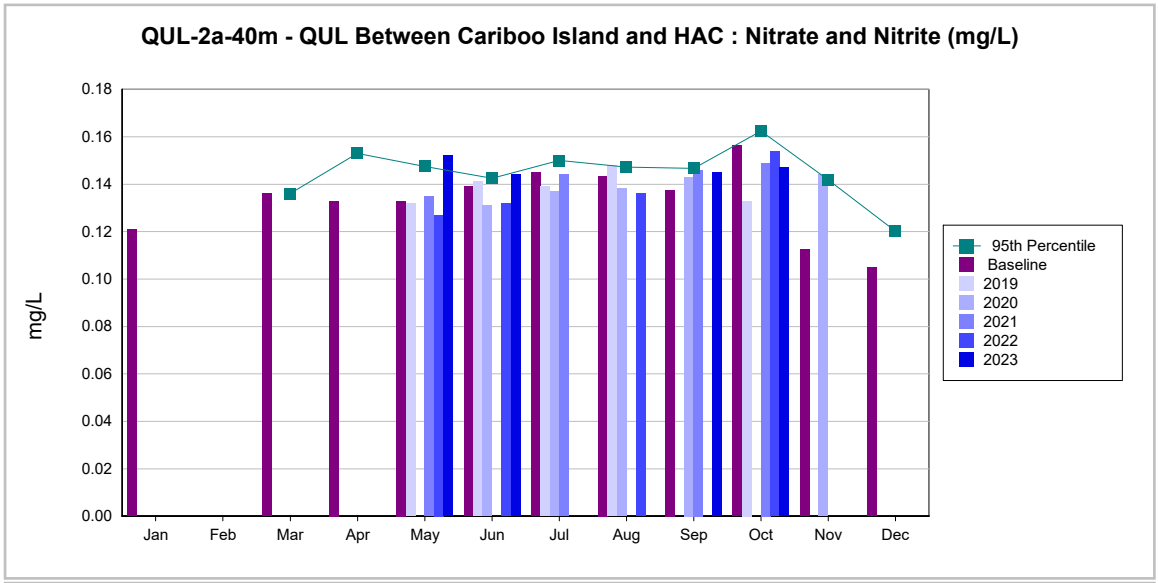

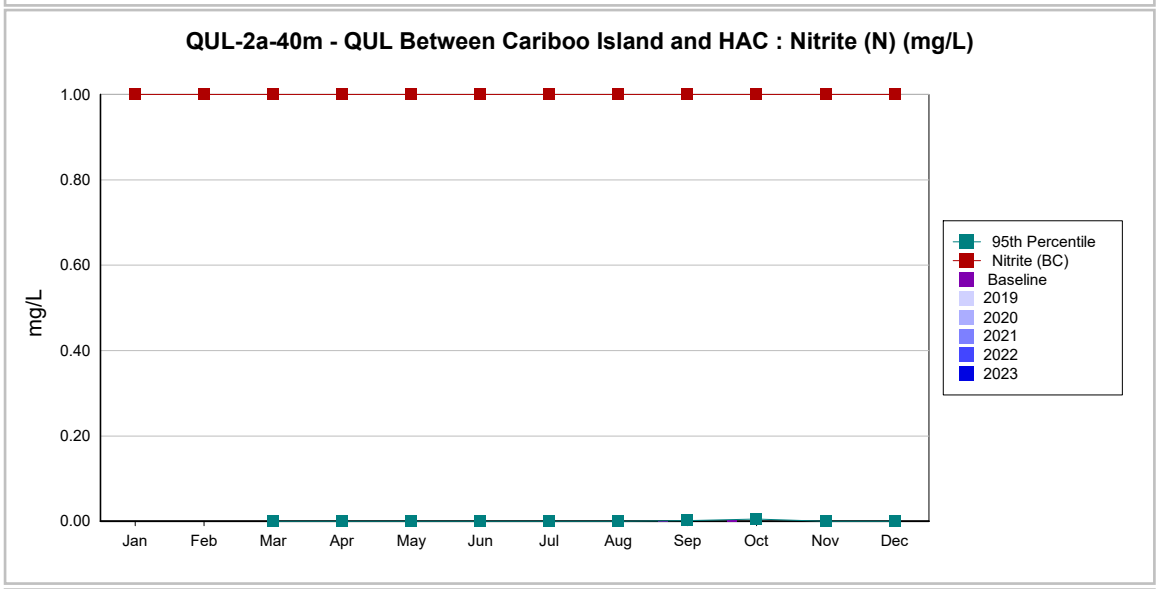

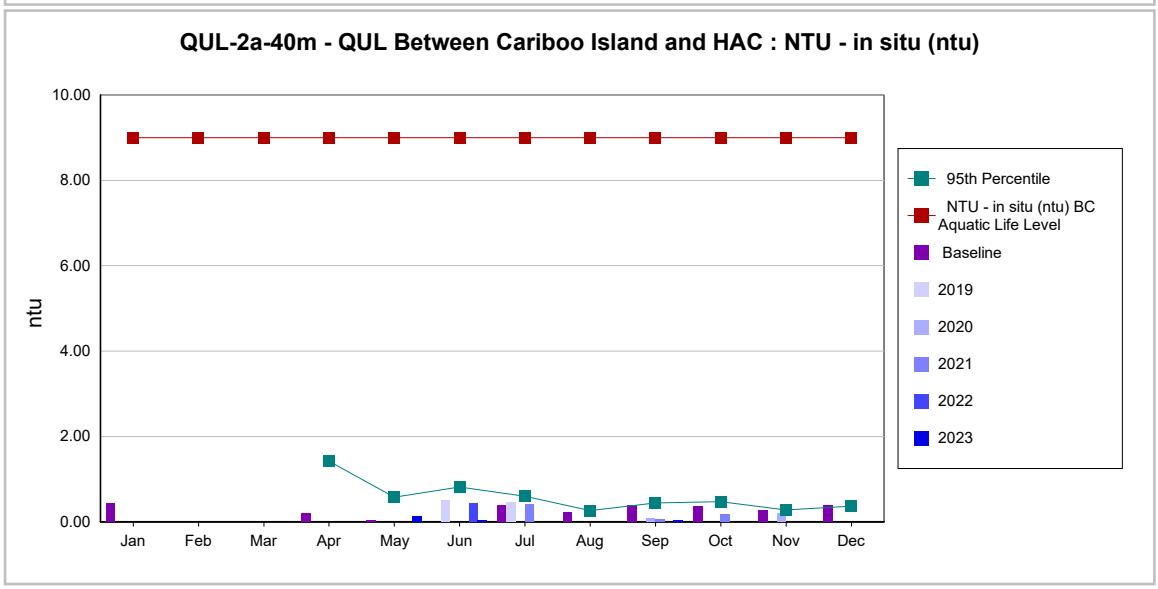

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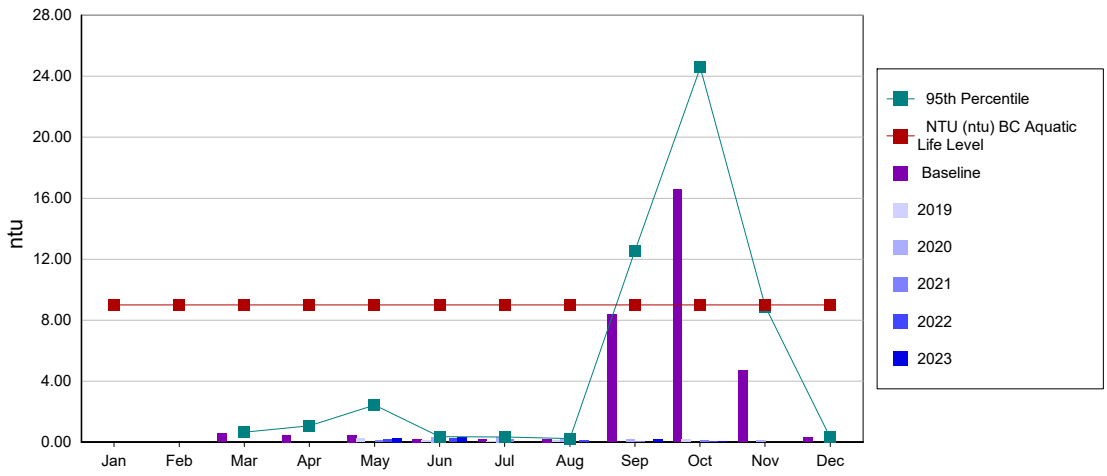
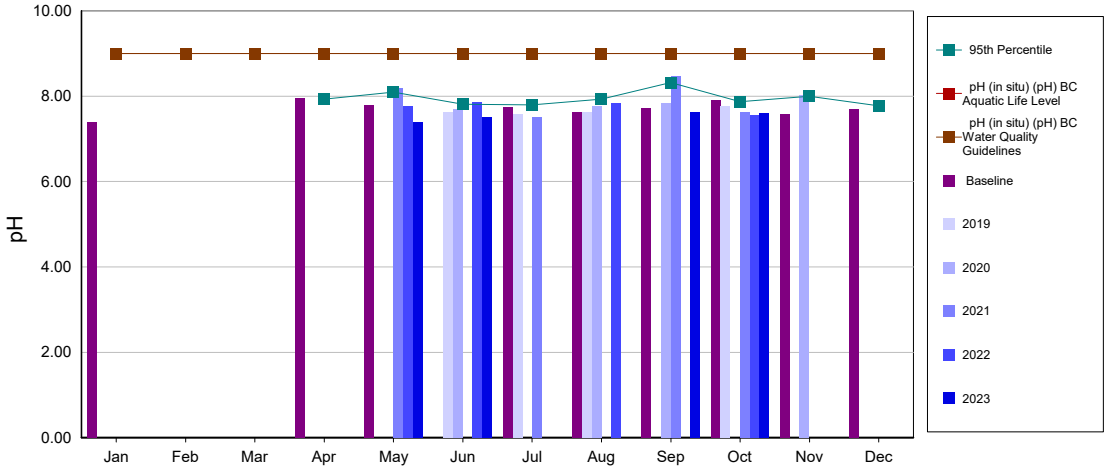
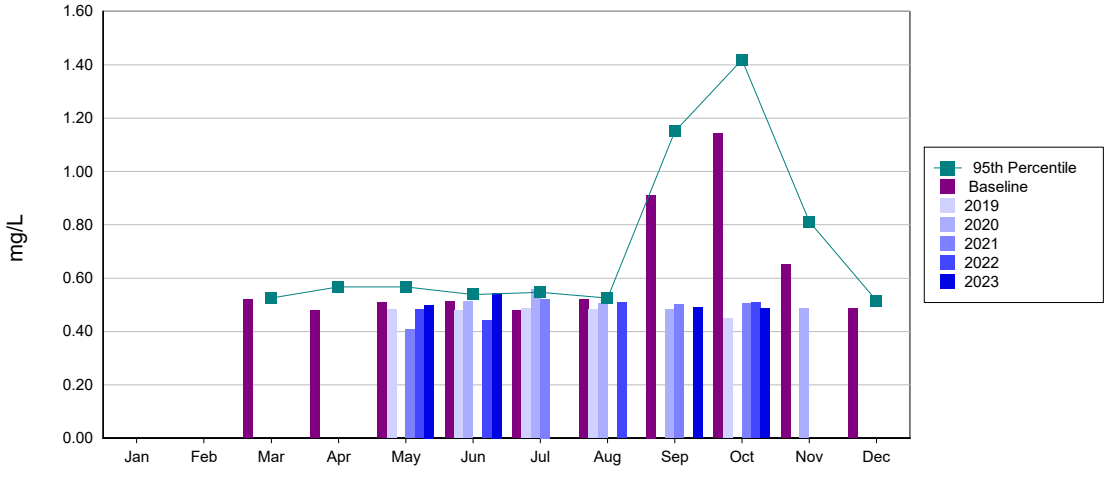
QUL-2a-40m - QUL Between Cariboo Island and HAC : NTU (ntu)



QUL-2a-40m - QUL Between Cariboo Island and HAC : pH (in situ) (pH)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Potassium (K)-Total (mg/L)



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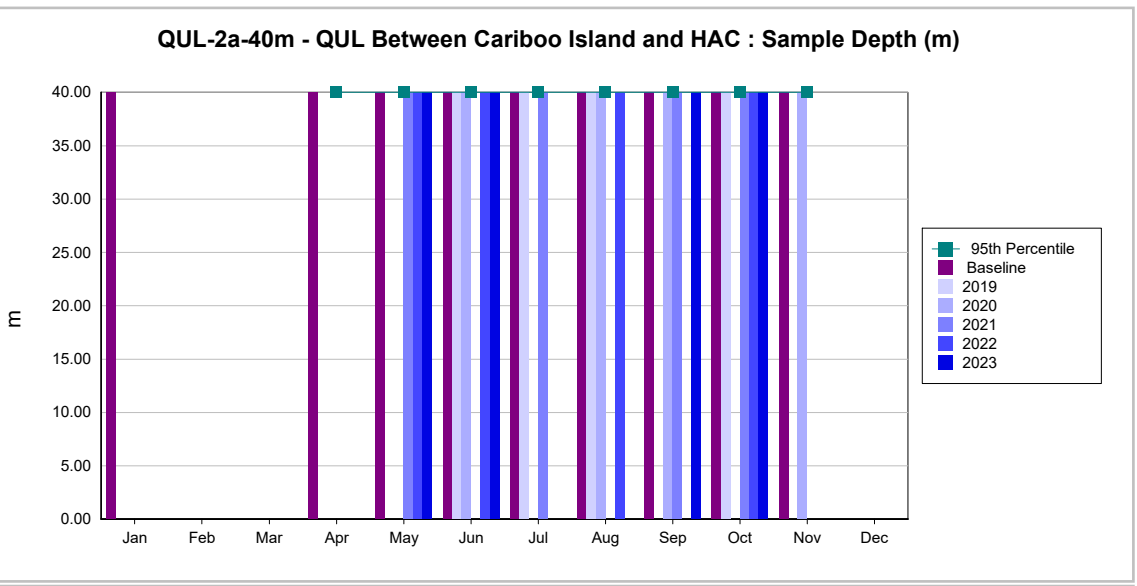

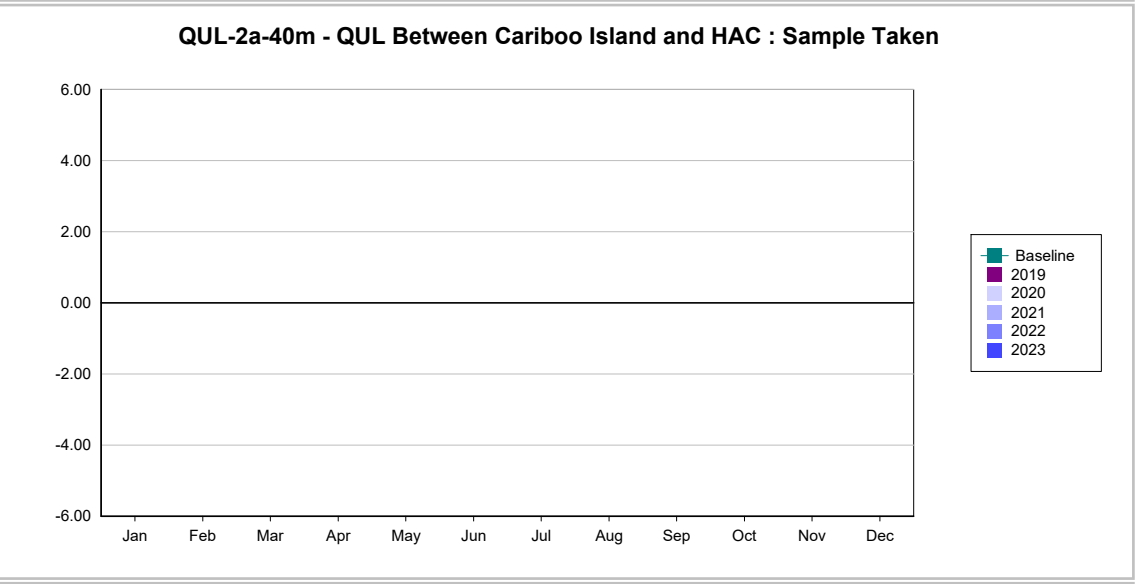

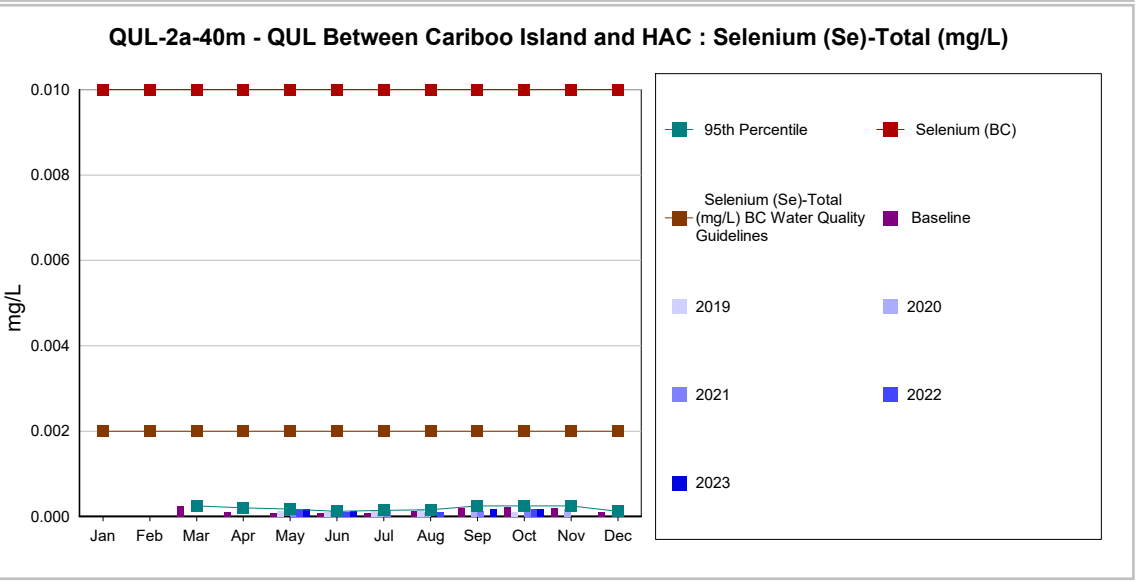

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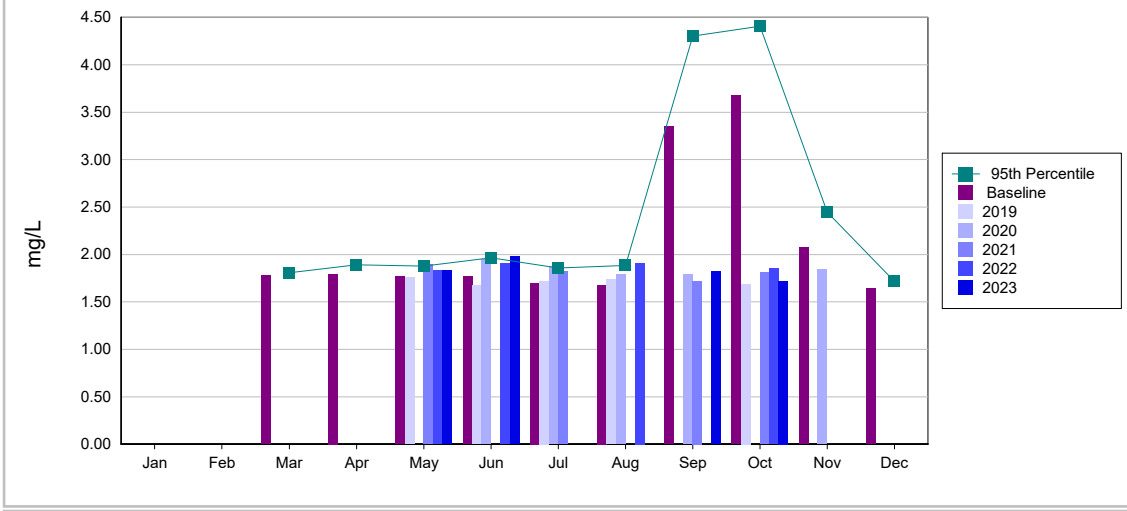

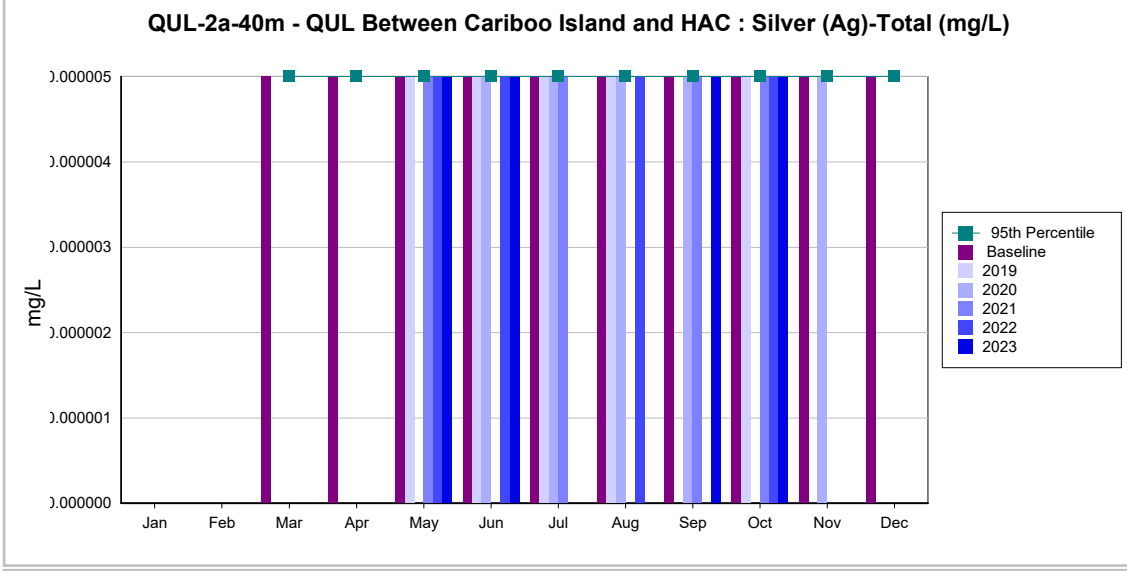

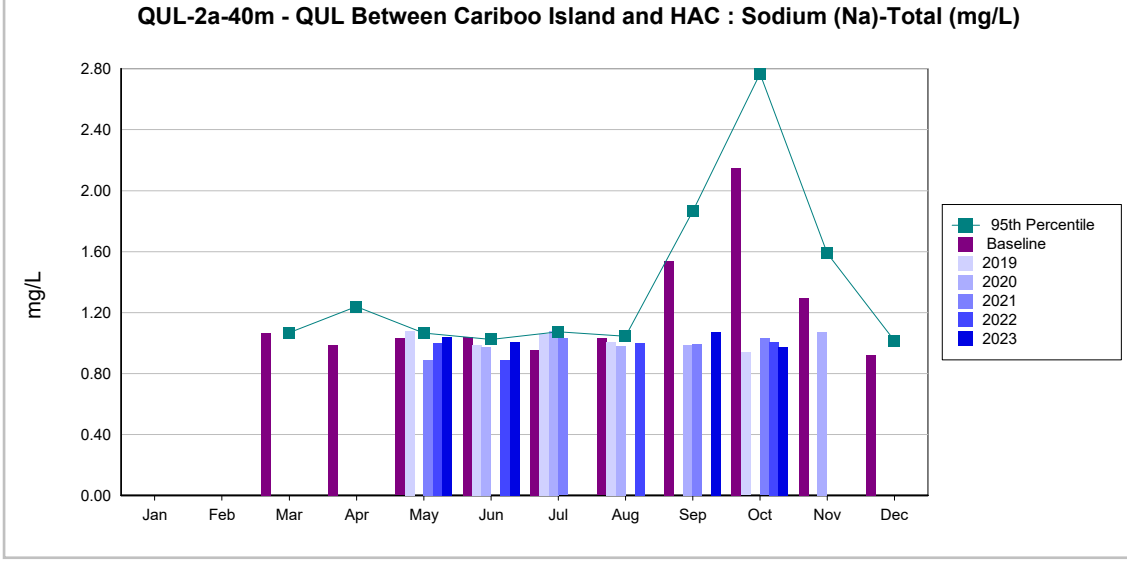

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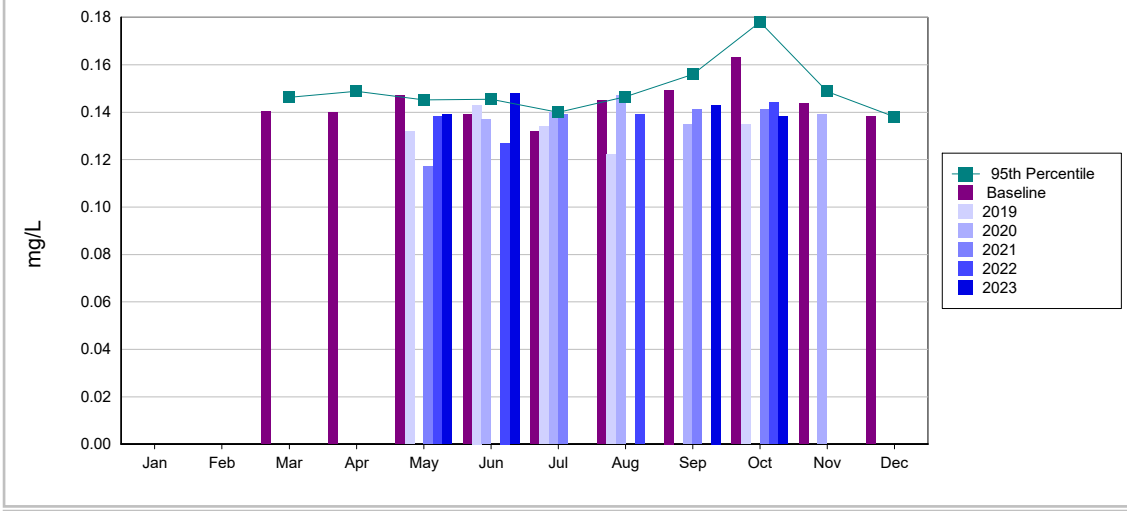

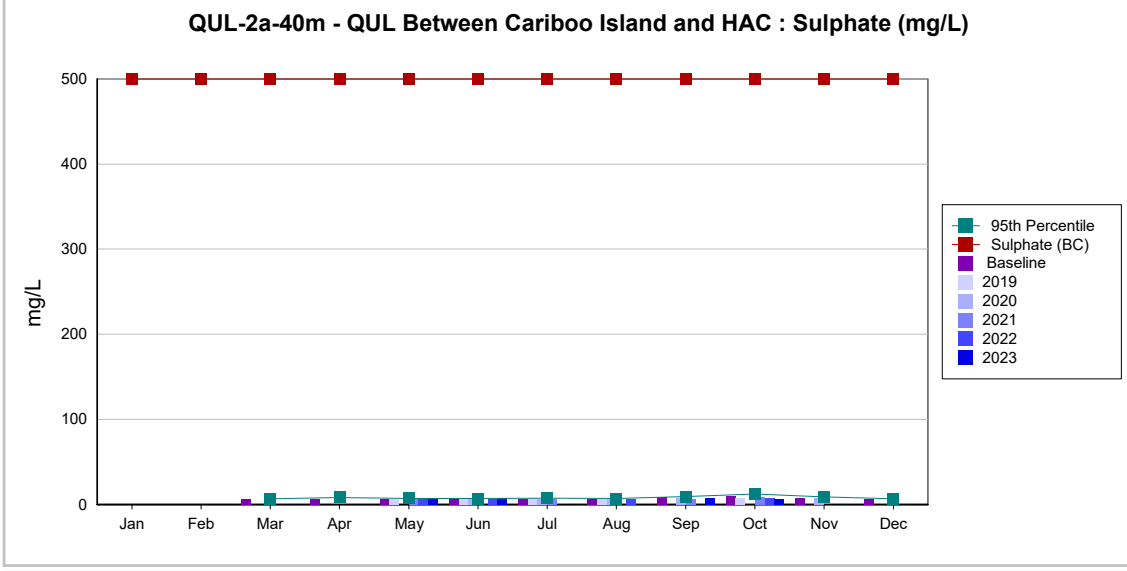

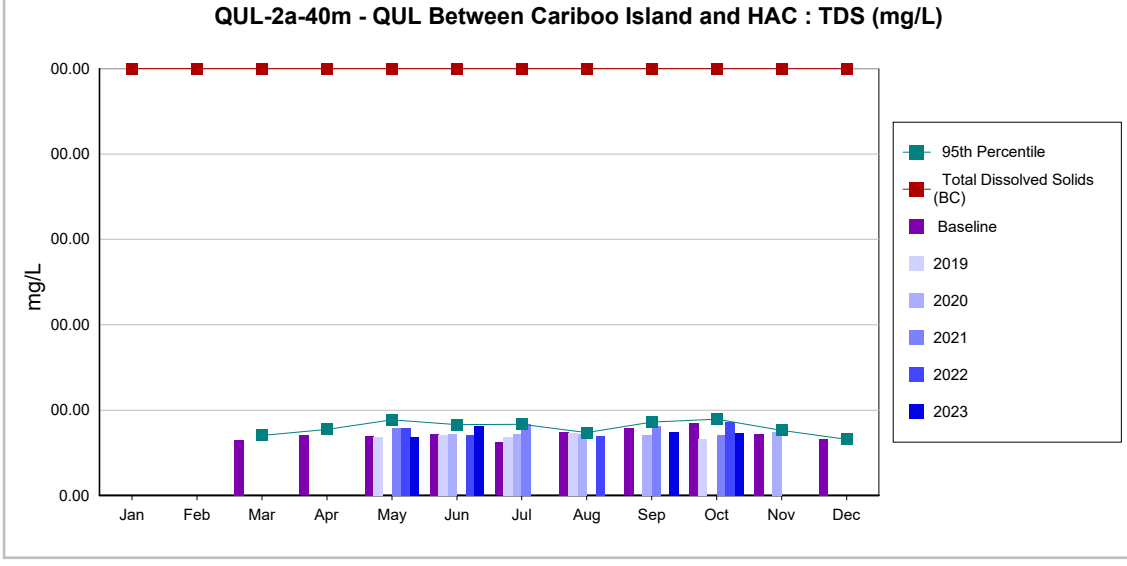

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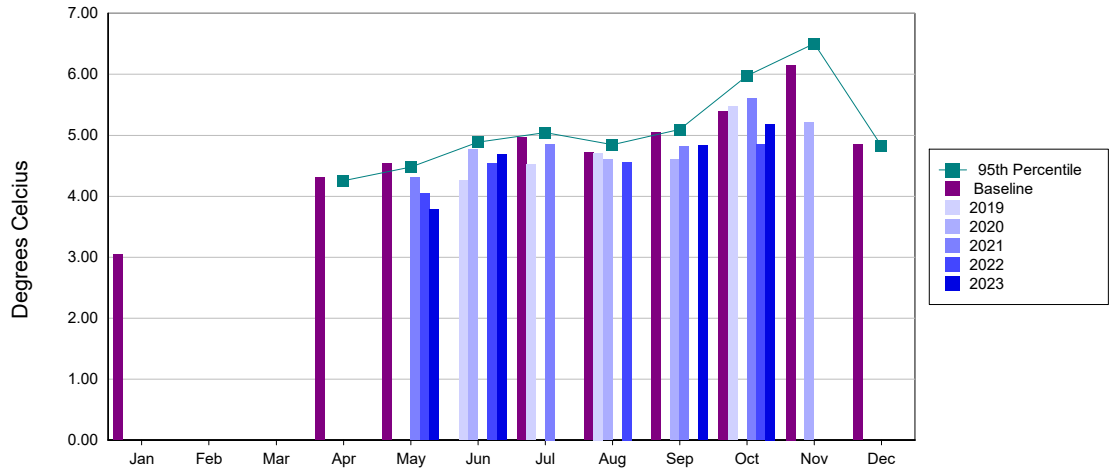
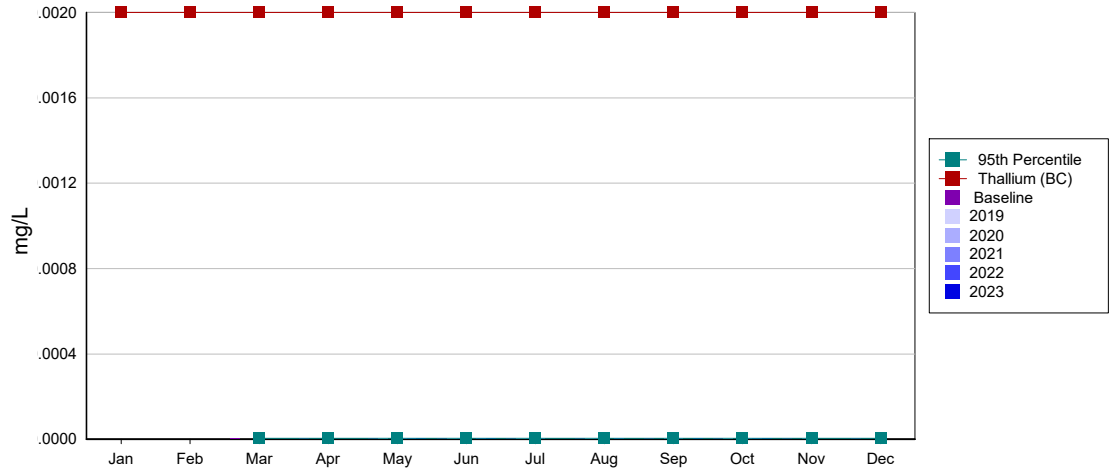
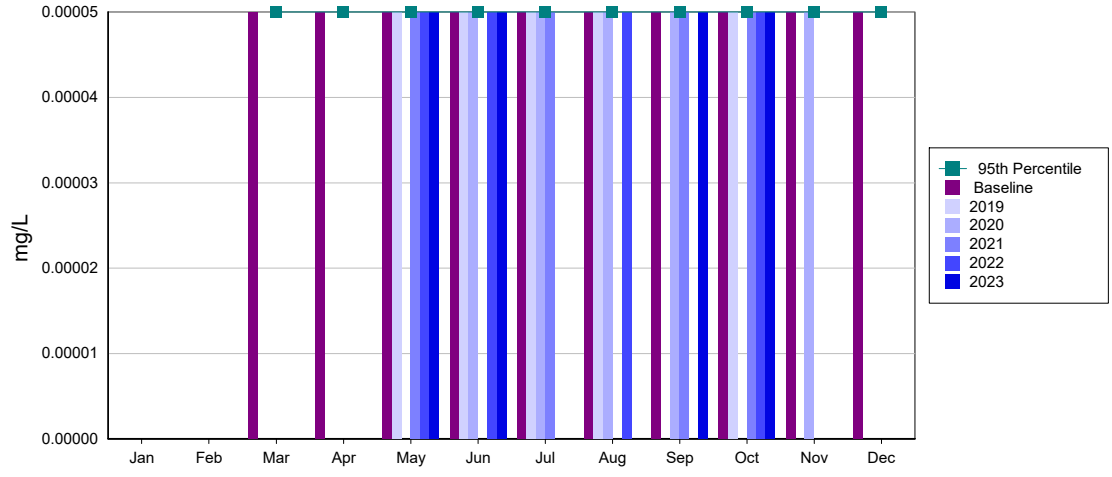
QUL-2a-40m - QUL Between Cariboo Island and HAC : Temp (in situ) (Degrees Celcius)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Thallium (Tl)-Total (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Tin (Sn)-Total (mg/L)



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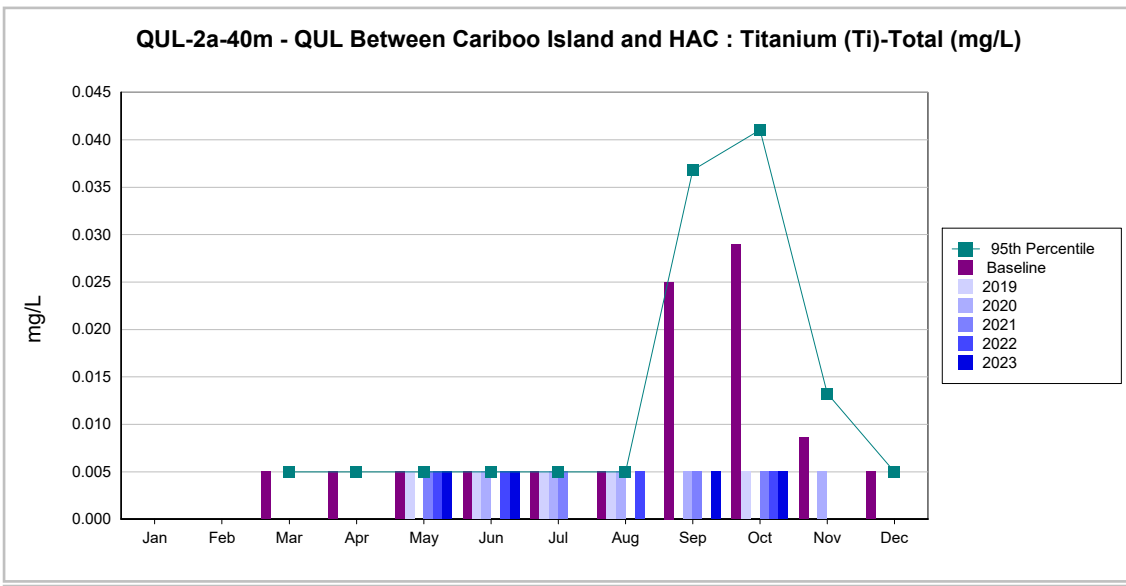

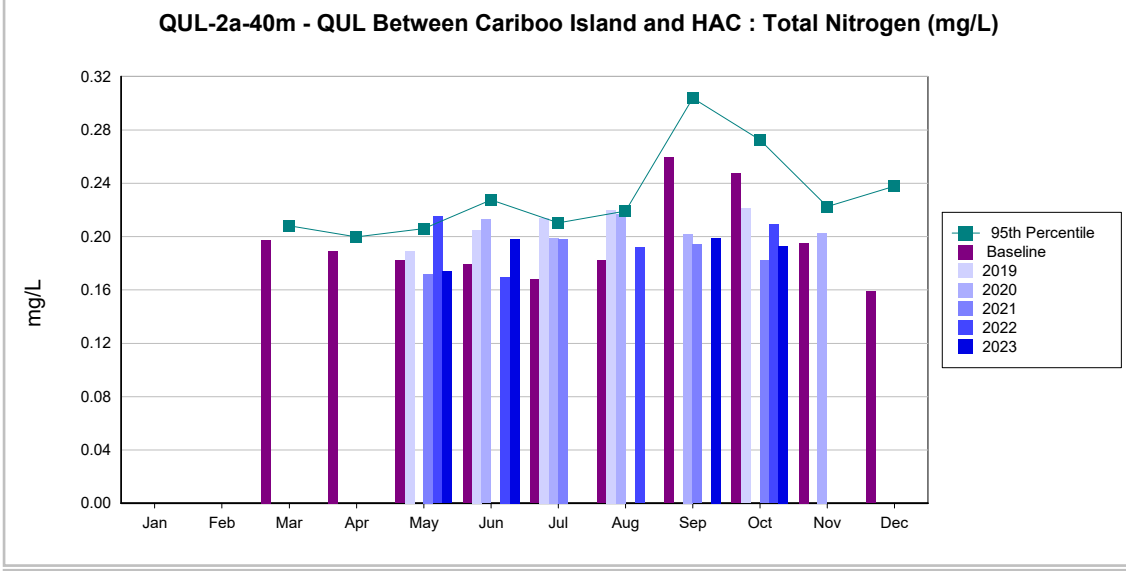

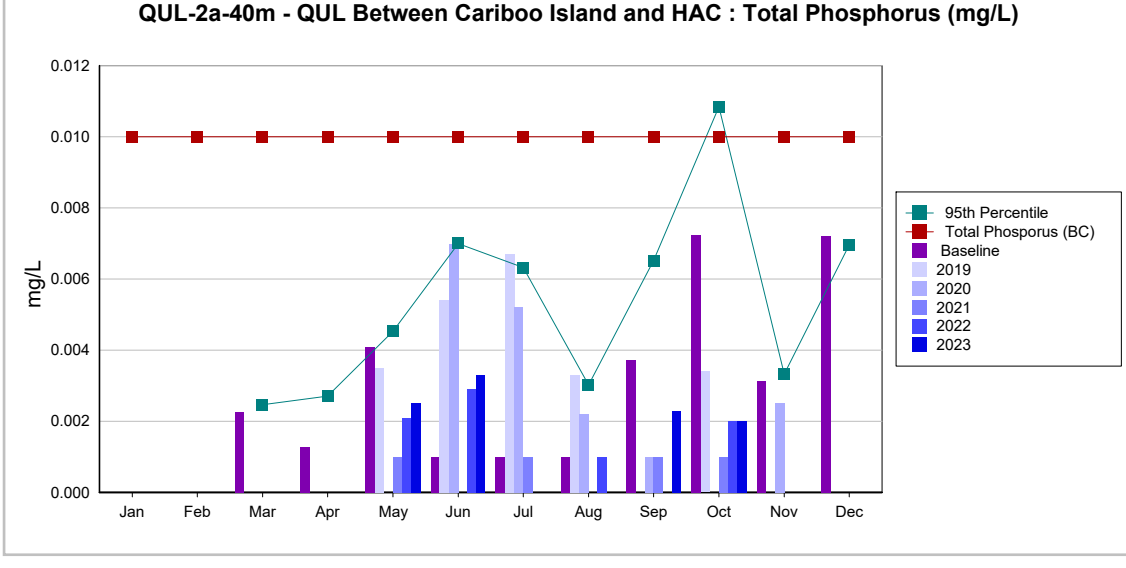

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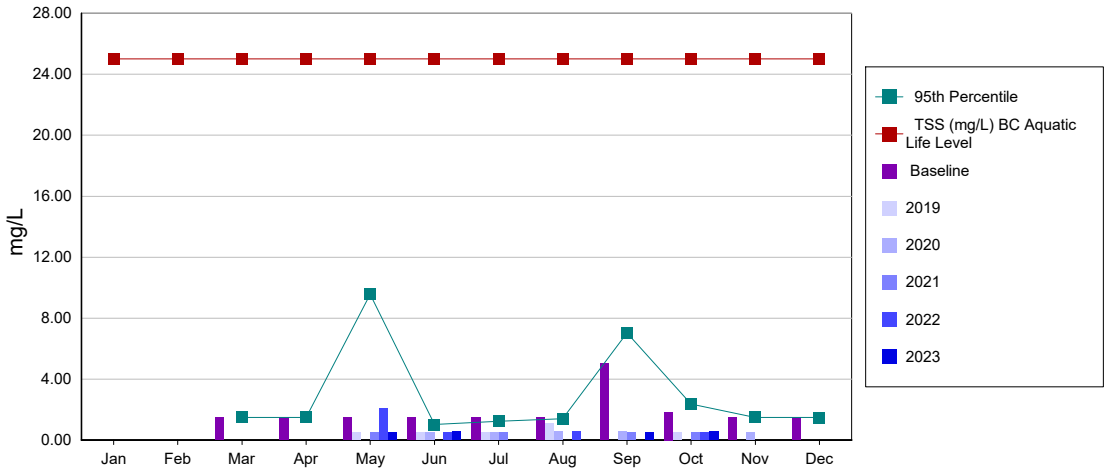
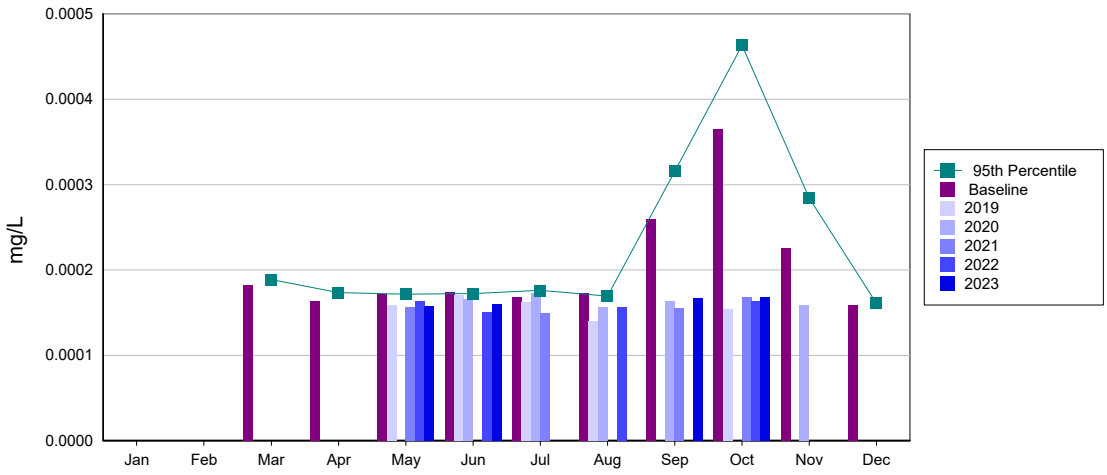
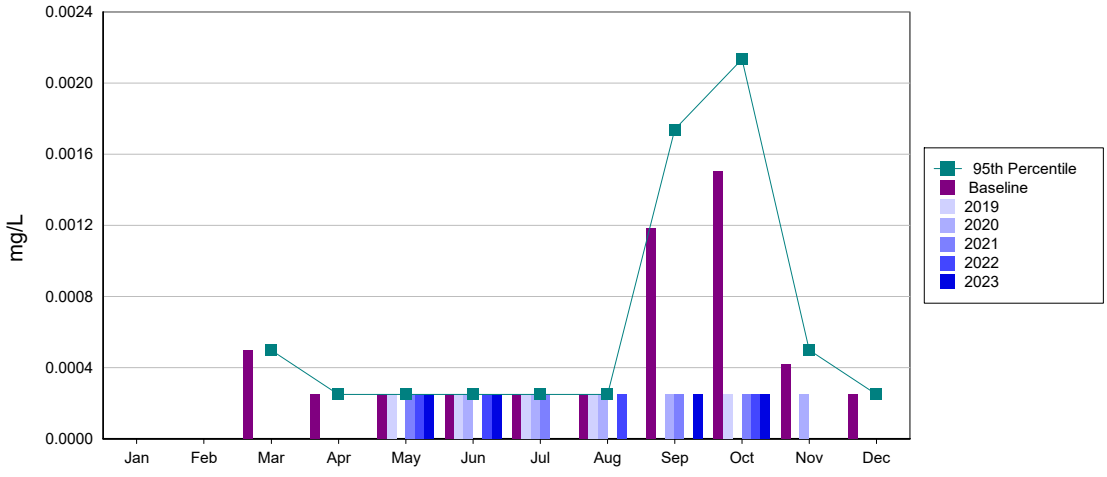
QUL-2a-40m - QUL Between Cariboo Island and HAC : TSS (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Uranium (U)-Total (mg/L)



QUL-2a-40m - QUL Between Cariboo Island and HAC : Vanadium (V)-Total (mg/L)



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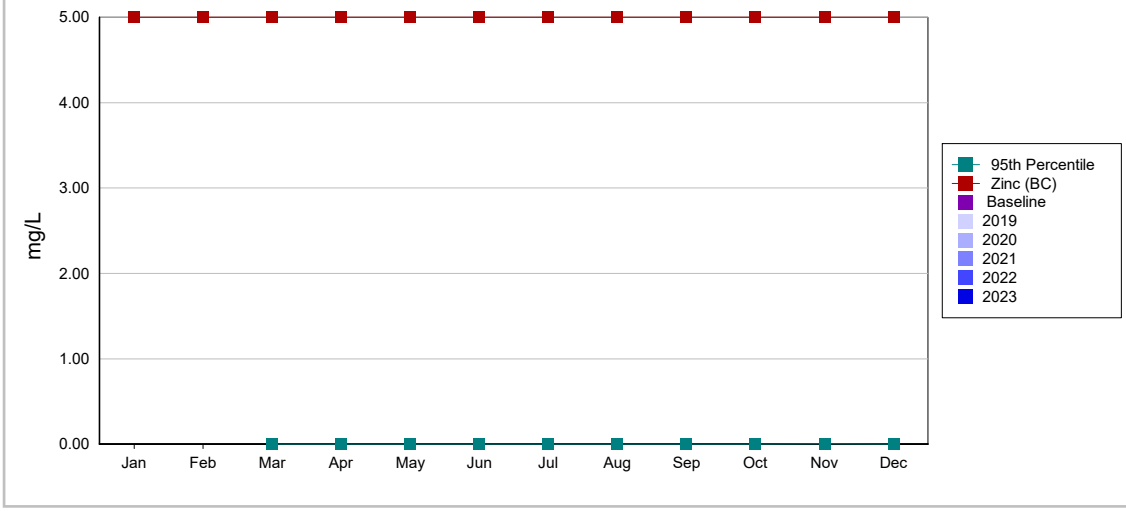

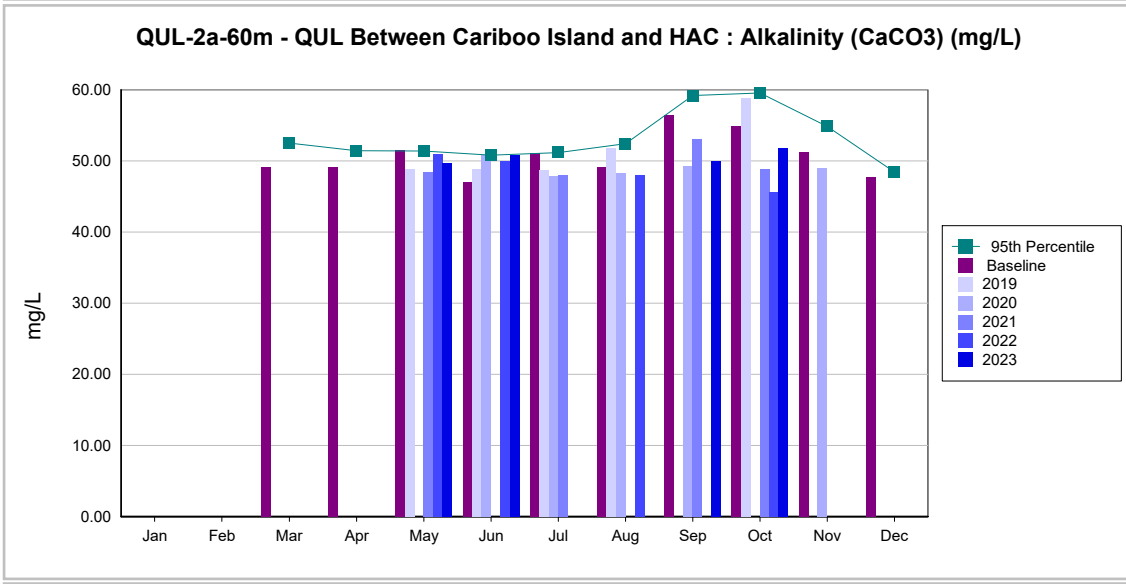

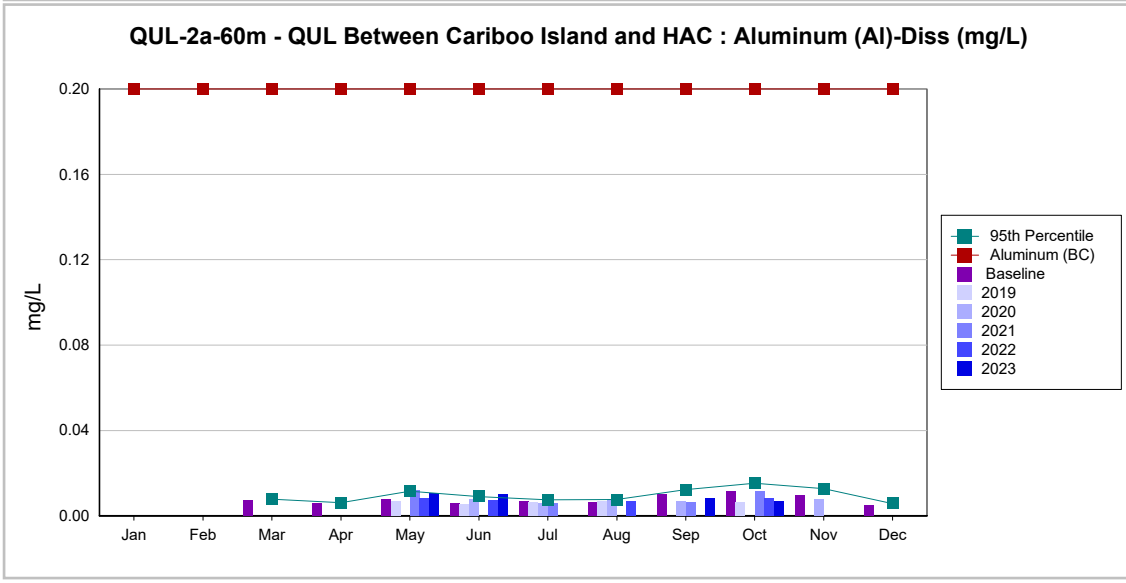

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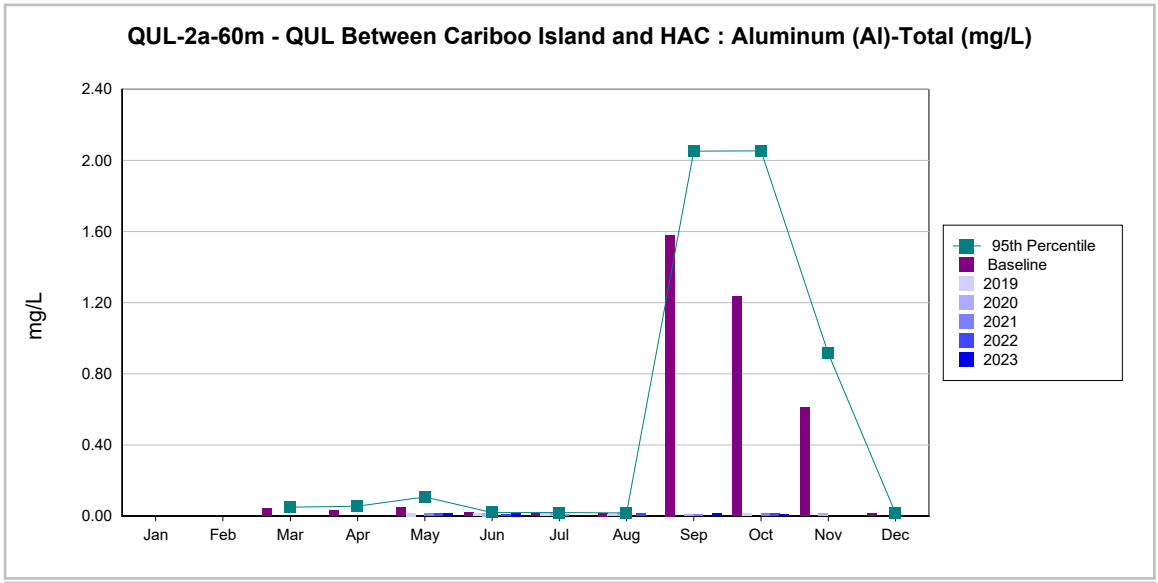

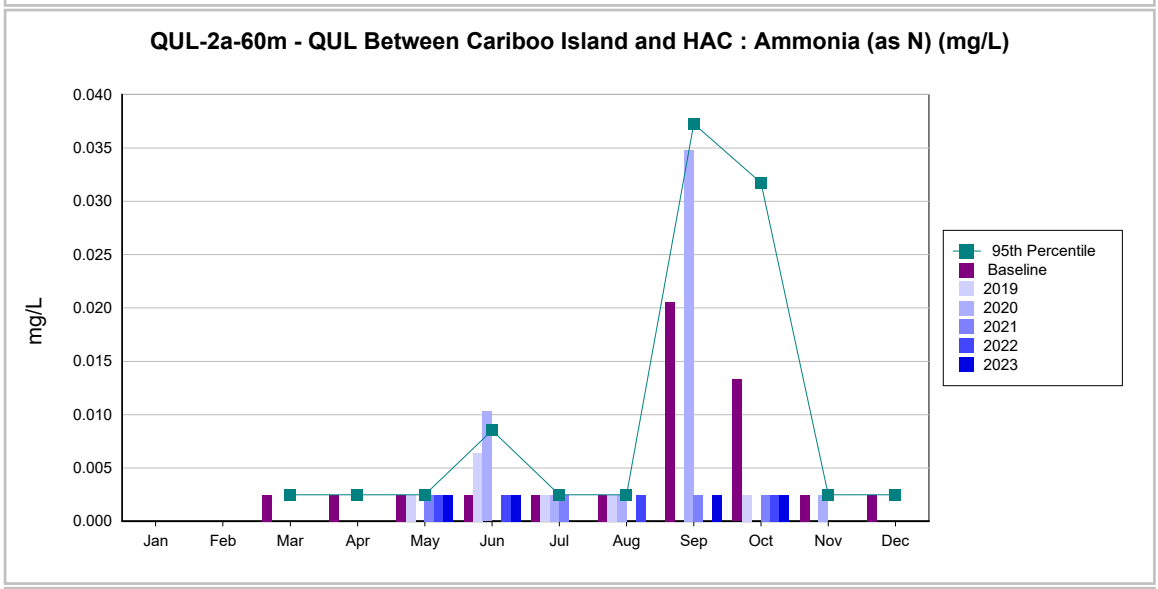

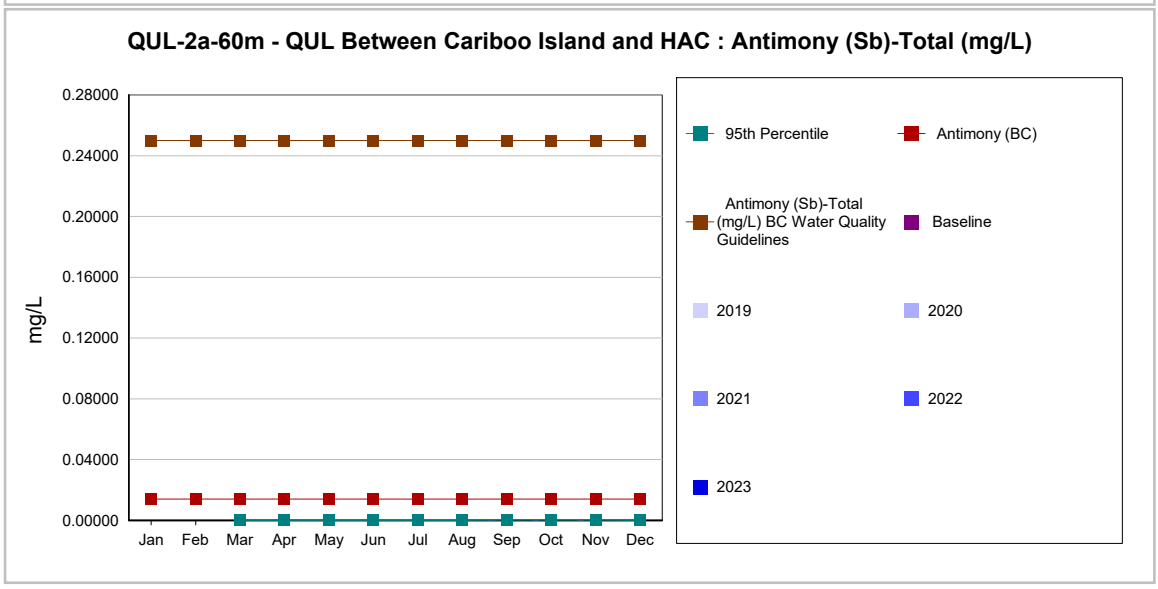

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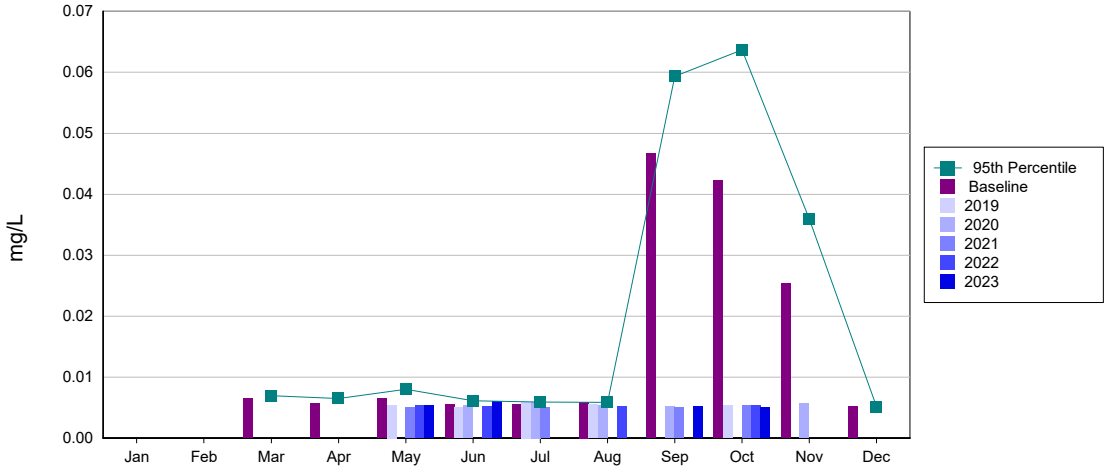

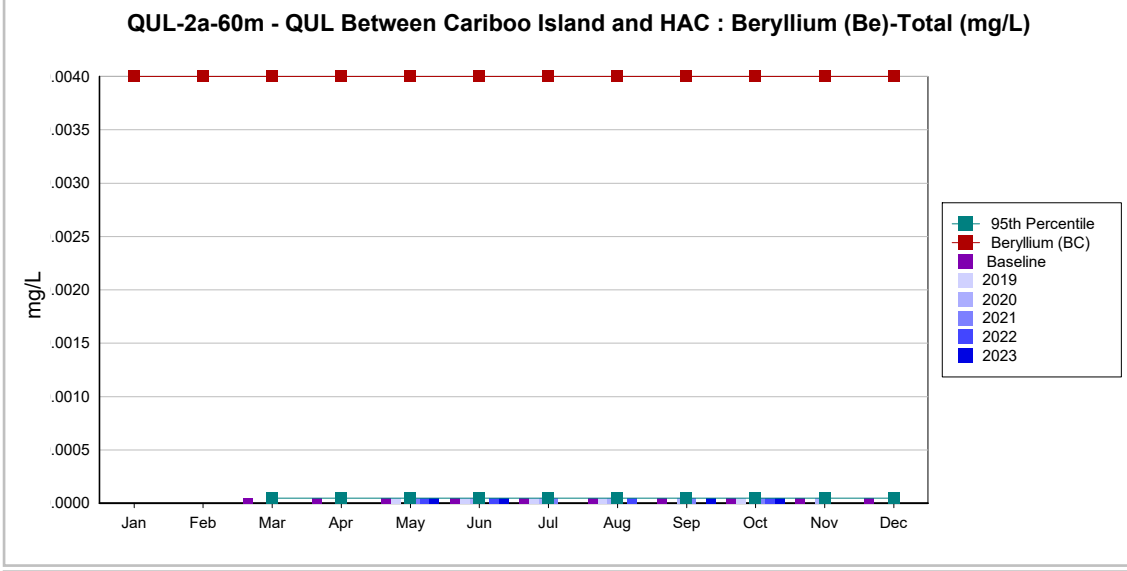

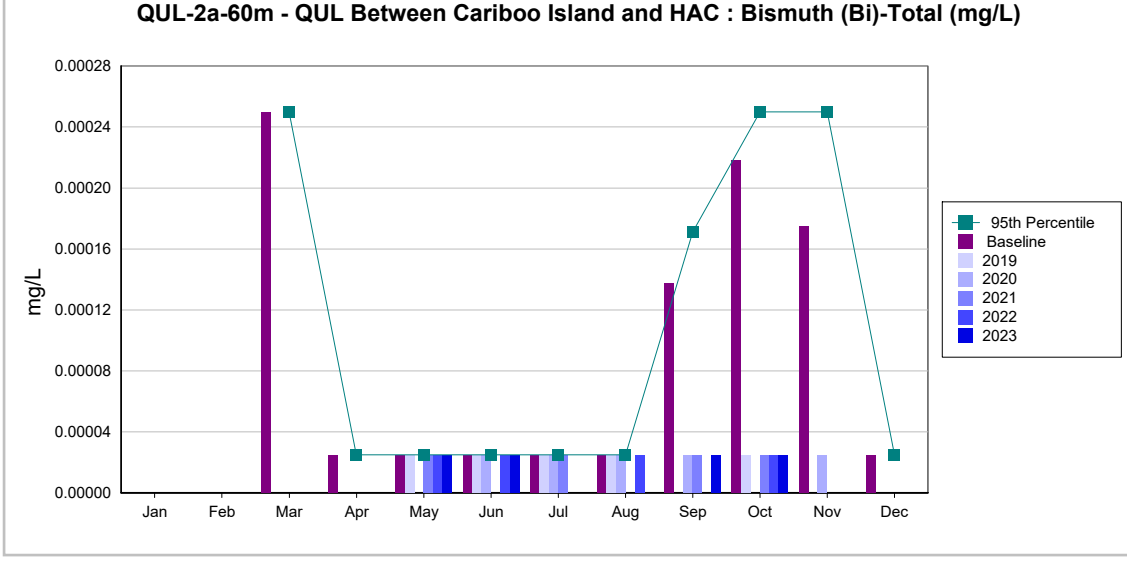

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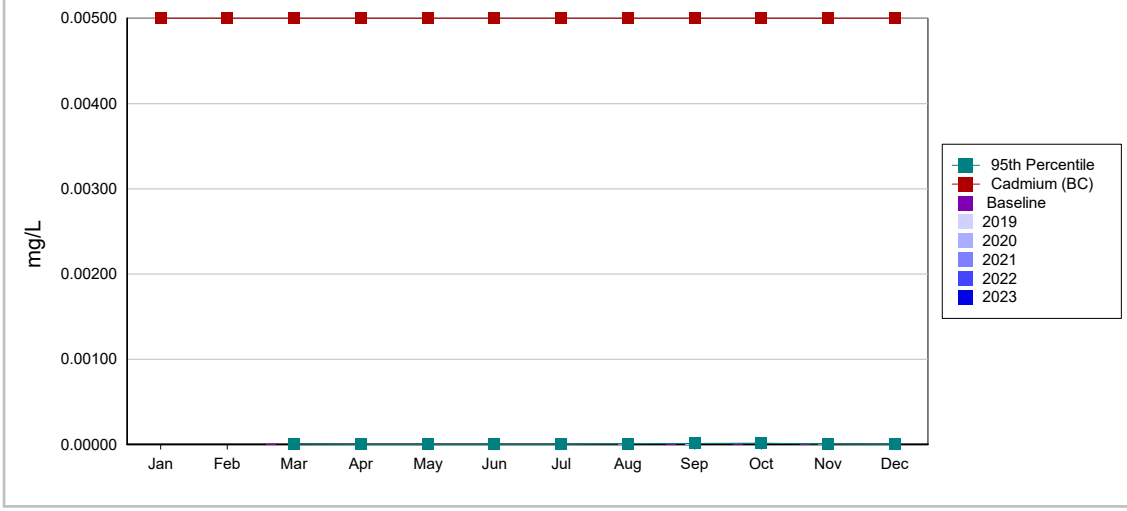

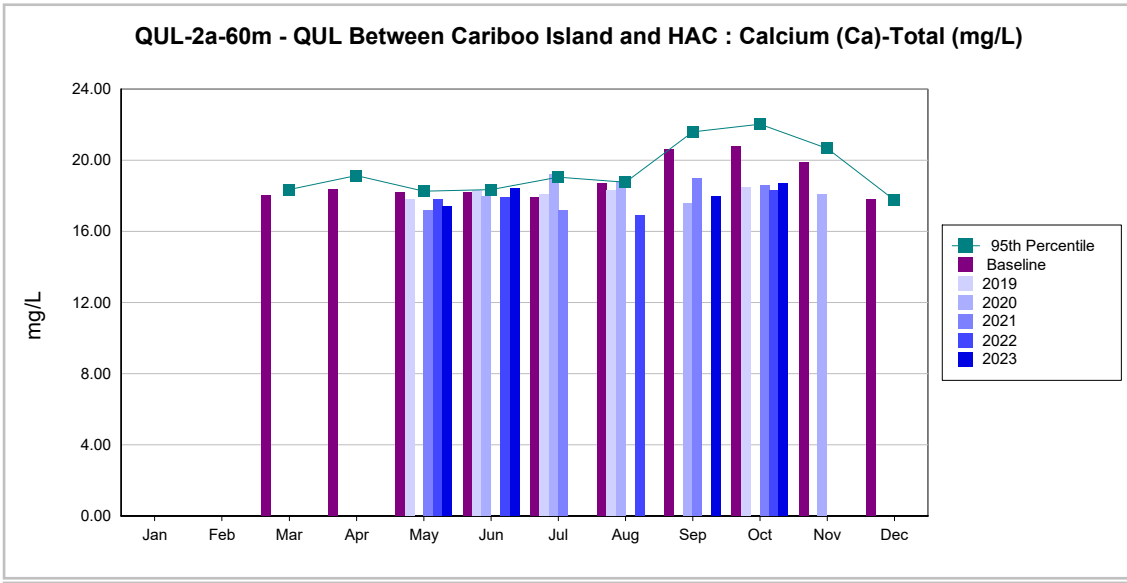

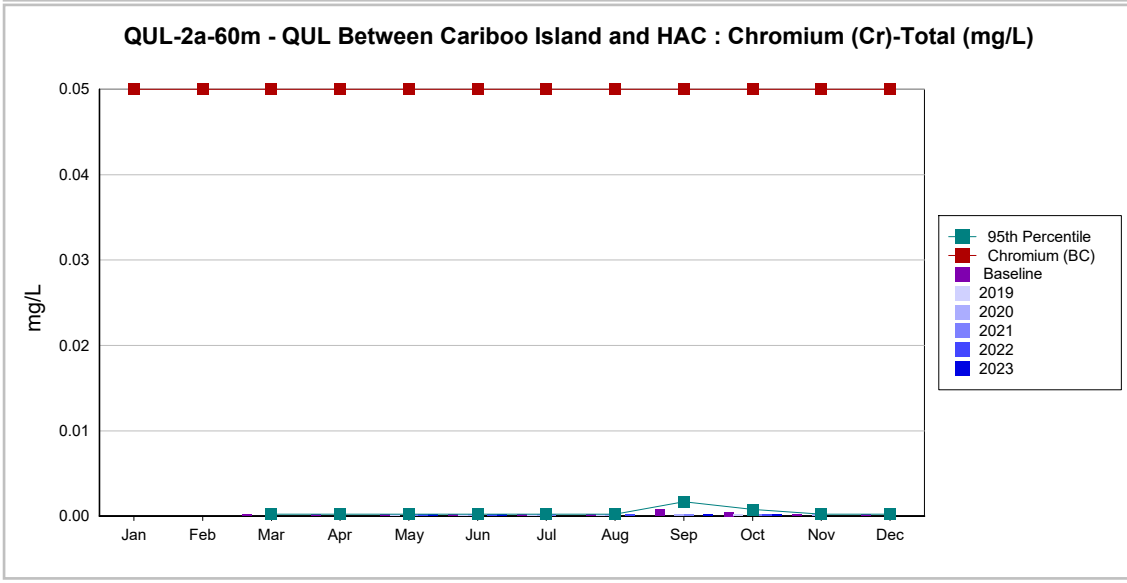

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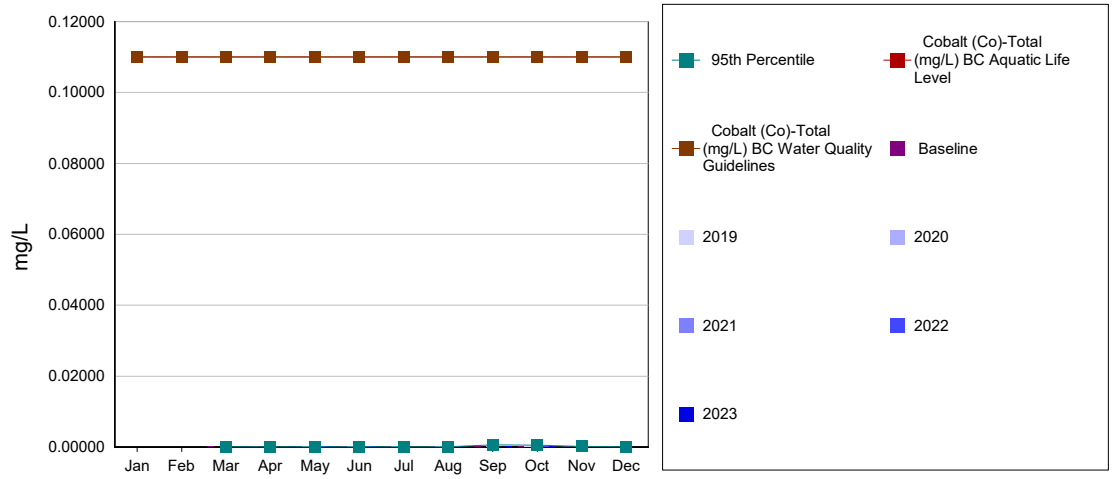
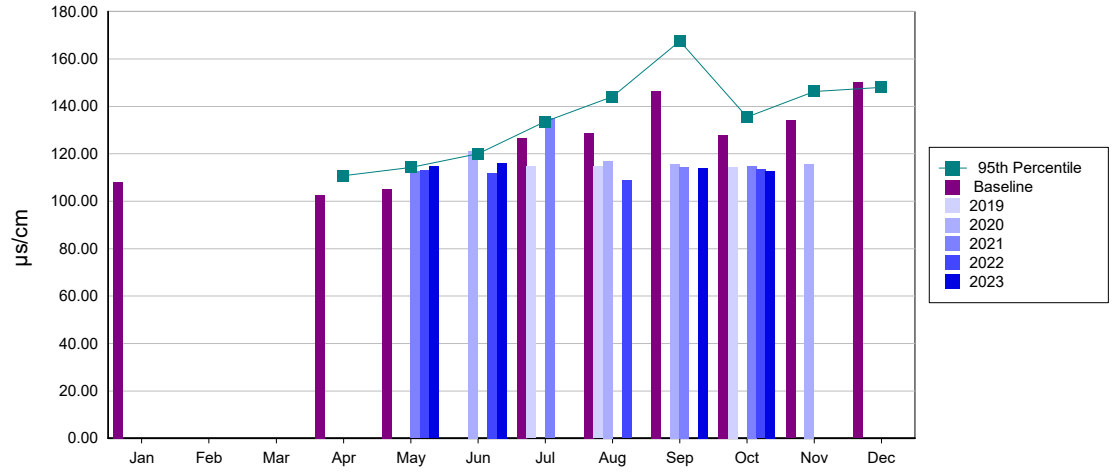
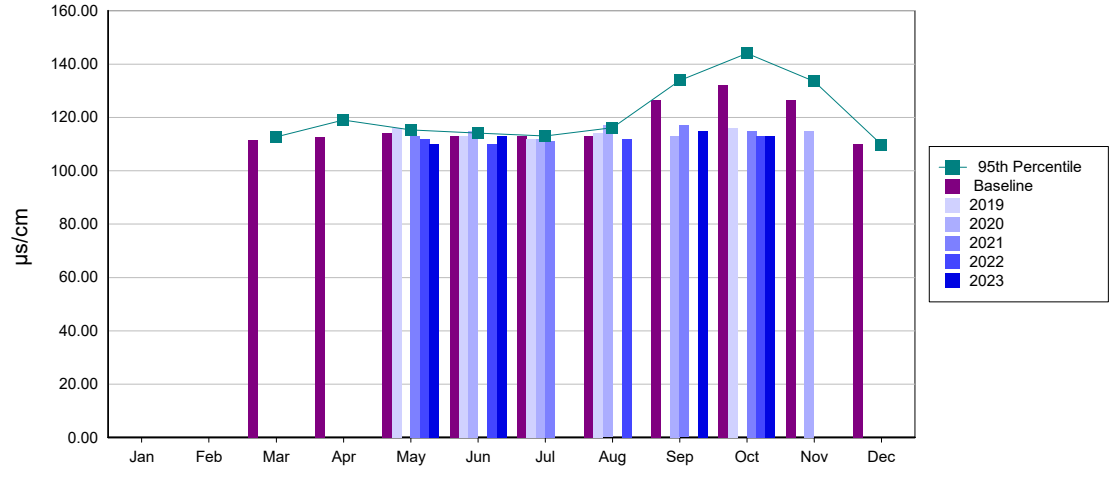
QUL-2a-60m - QUL Between Cariboo Island and HAC : Cobalt (Co)-Total (mg/L)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Cond (in situ) (µs/cm)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Conductivity (µs/cm)



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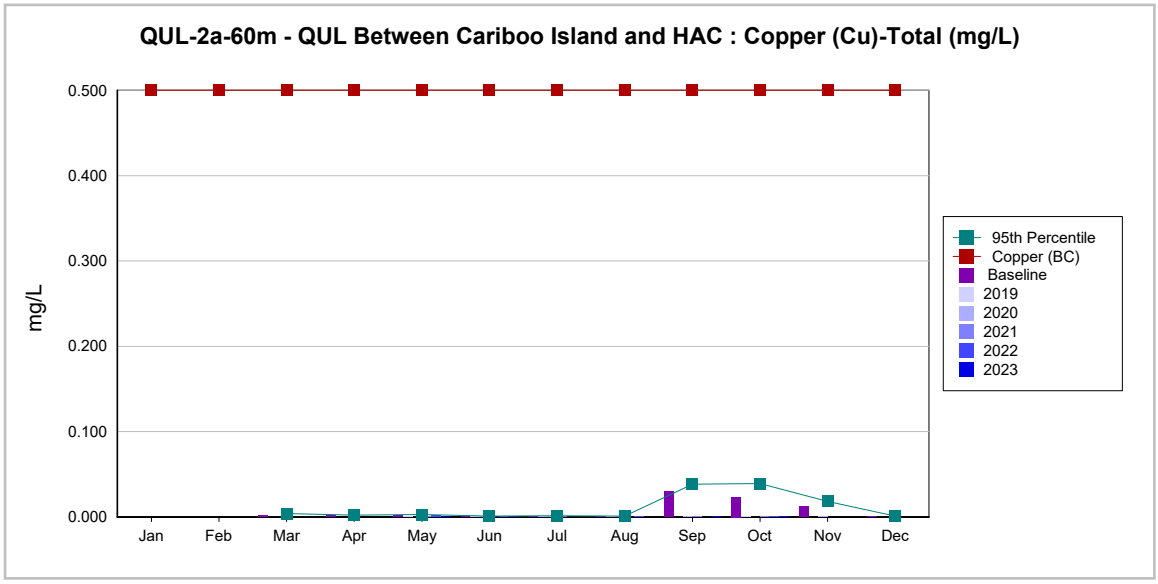

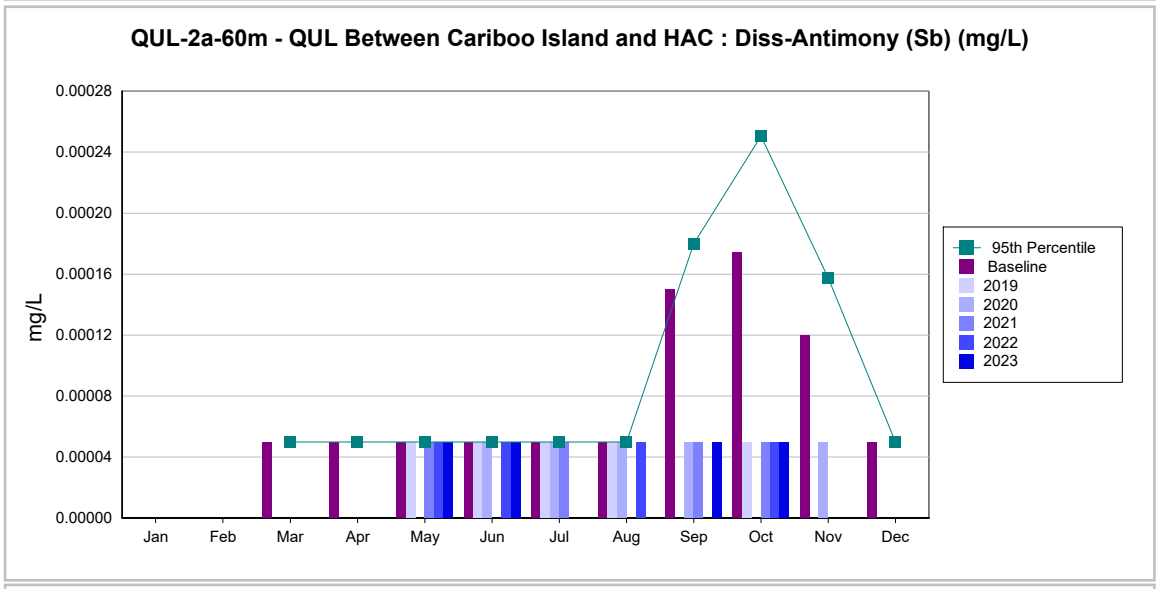

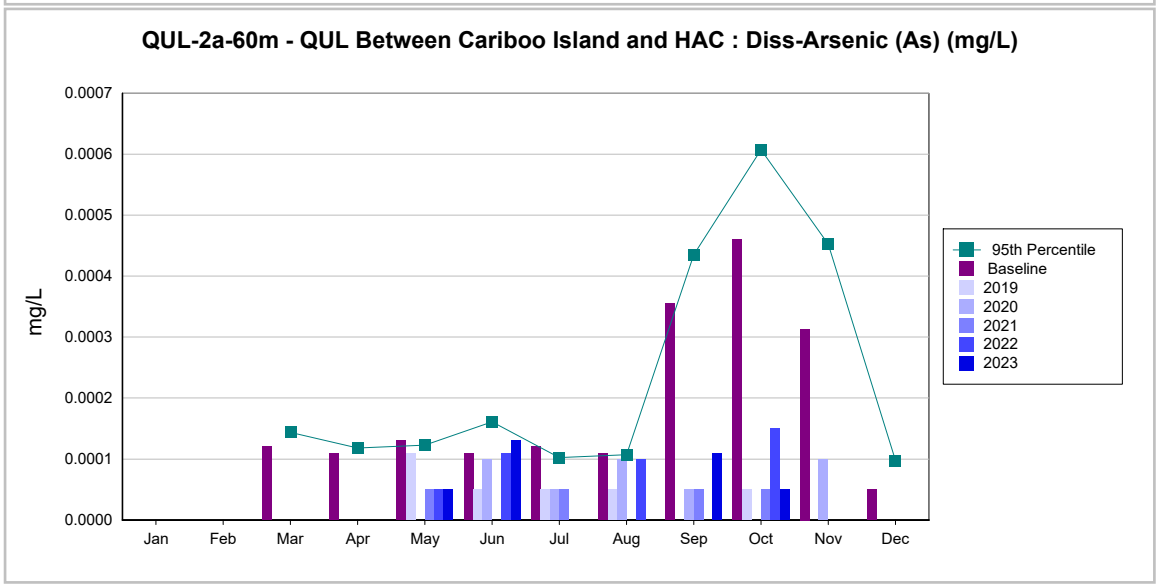

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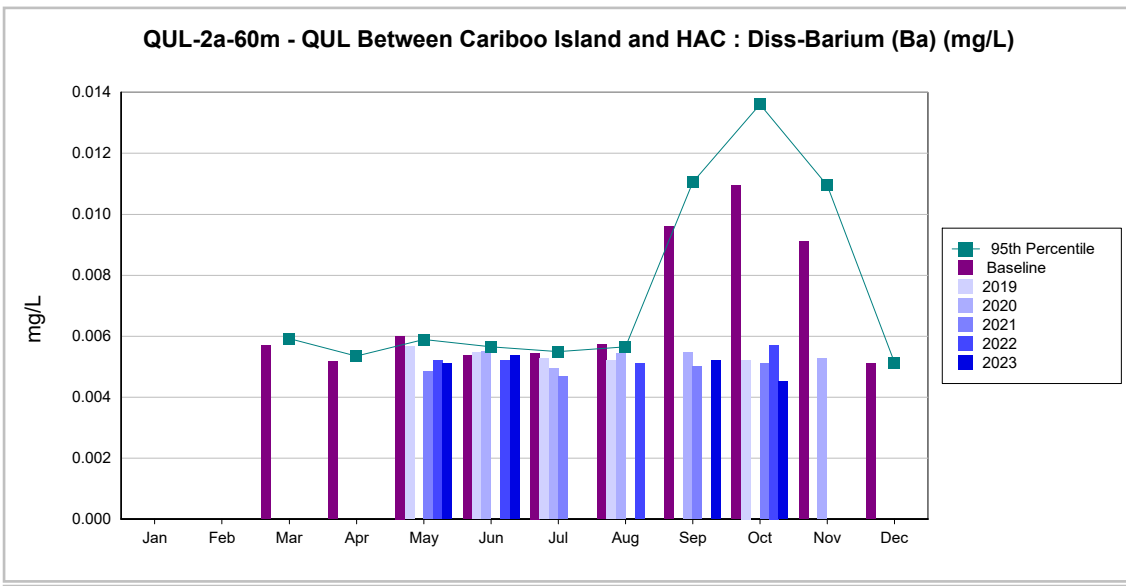

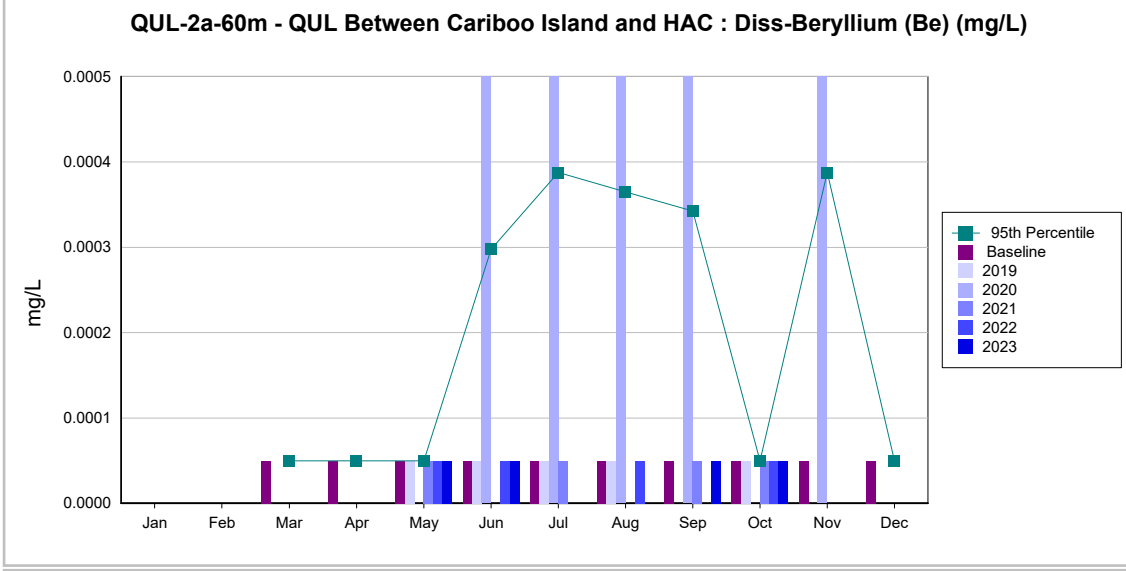

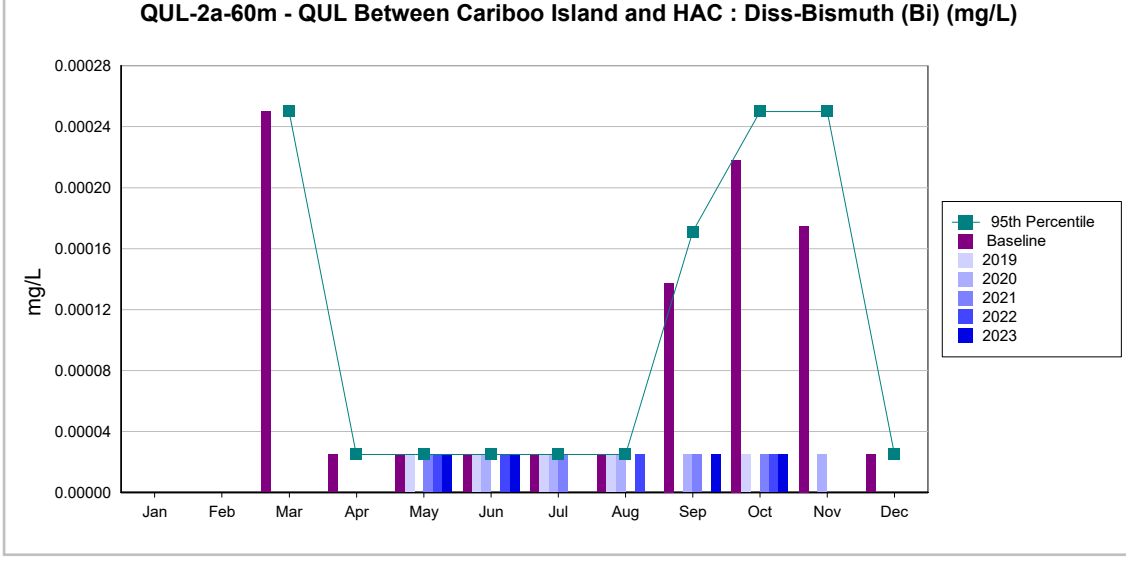

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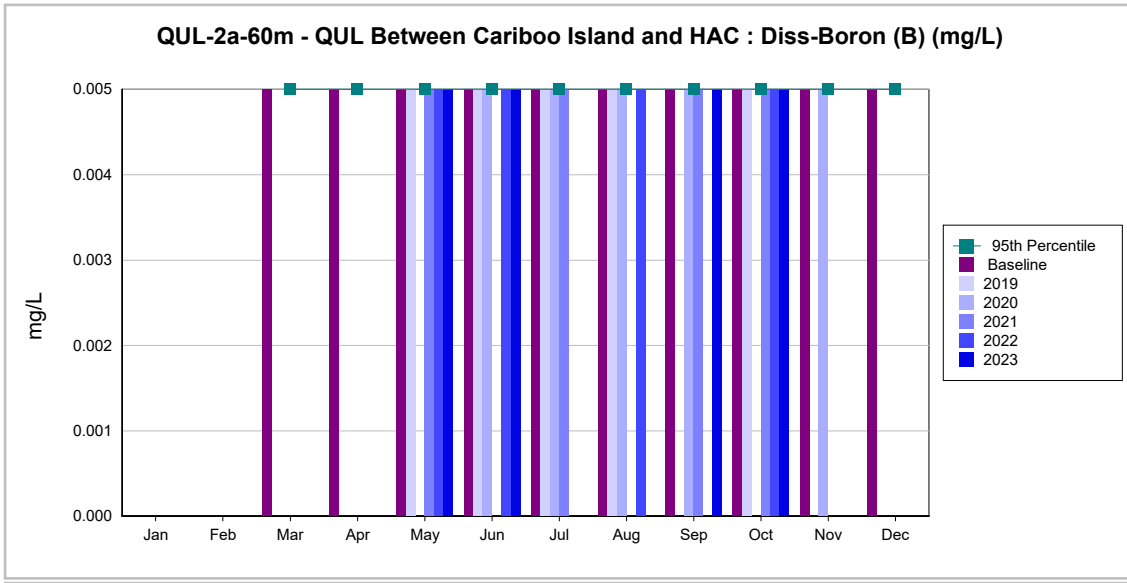

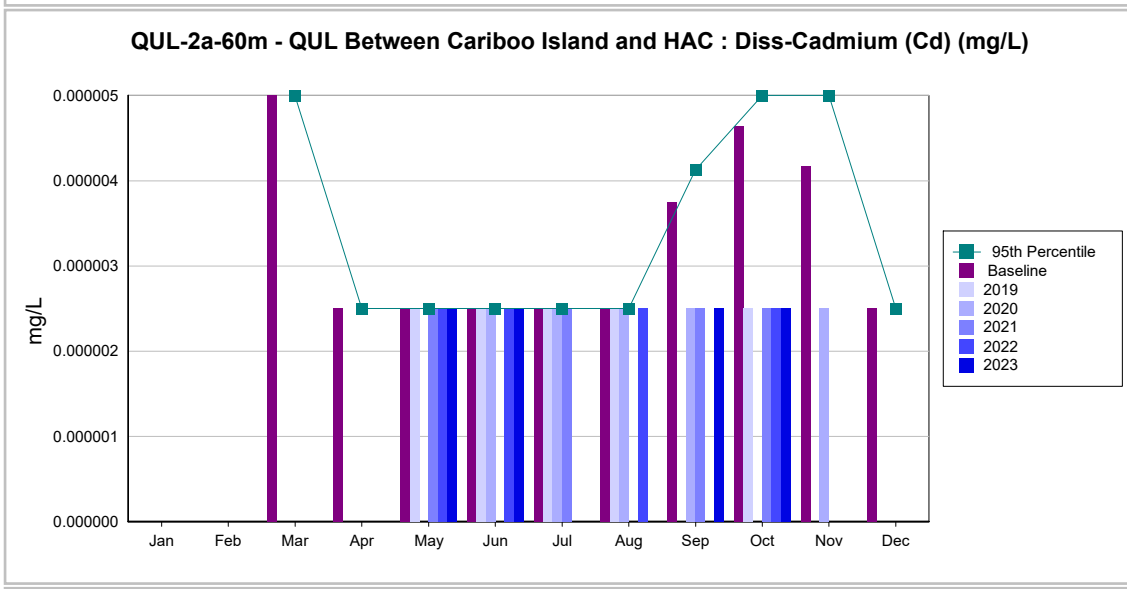

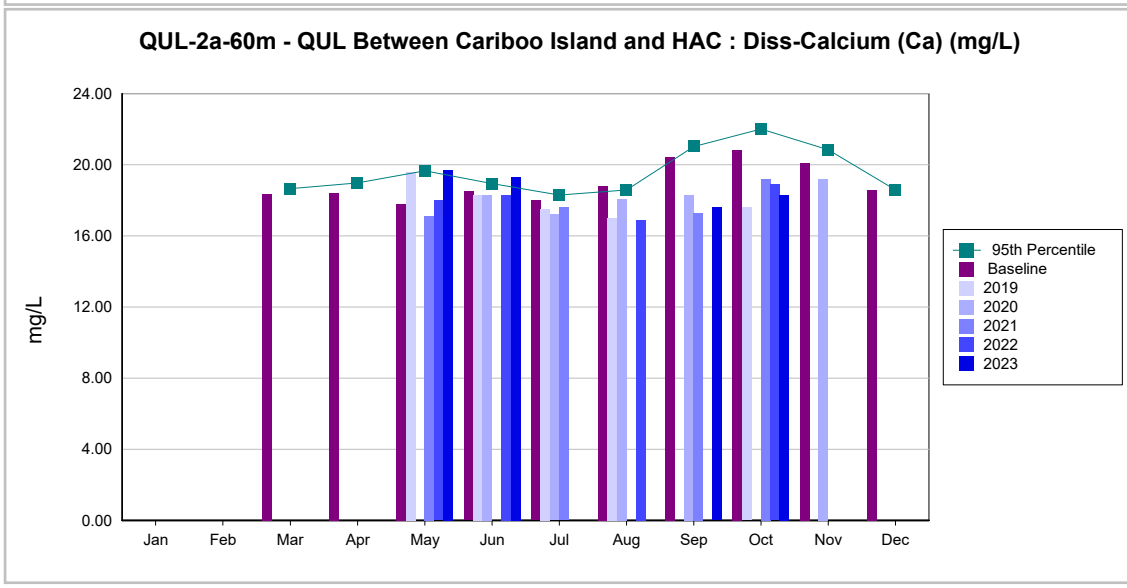

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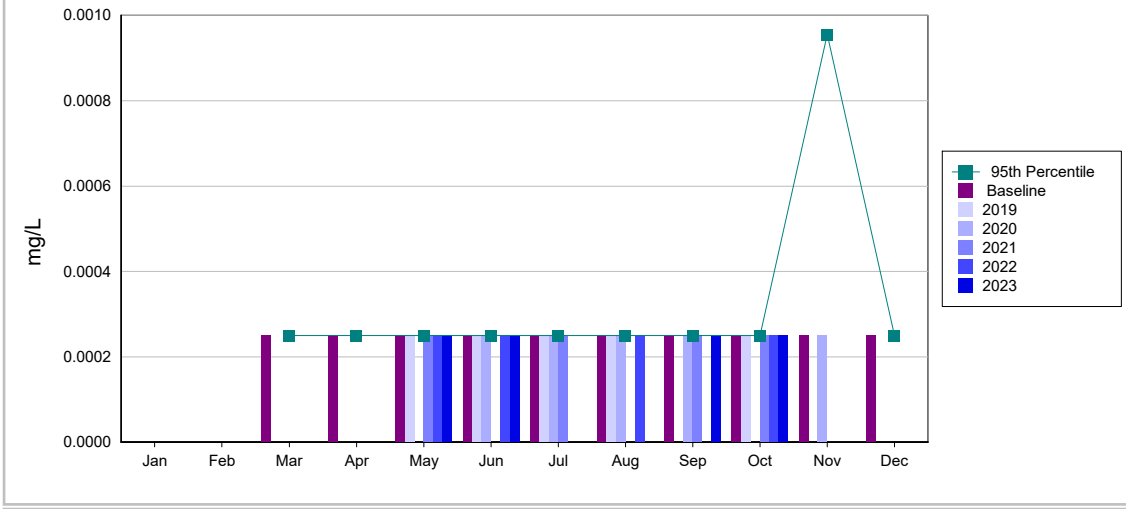

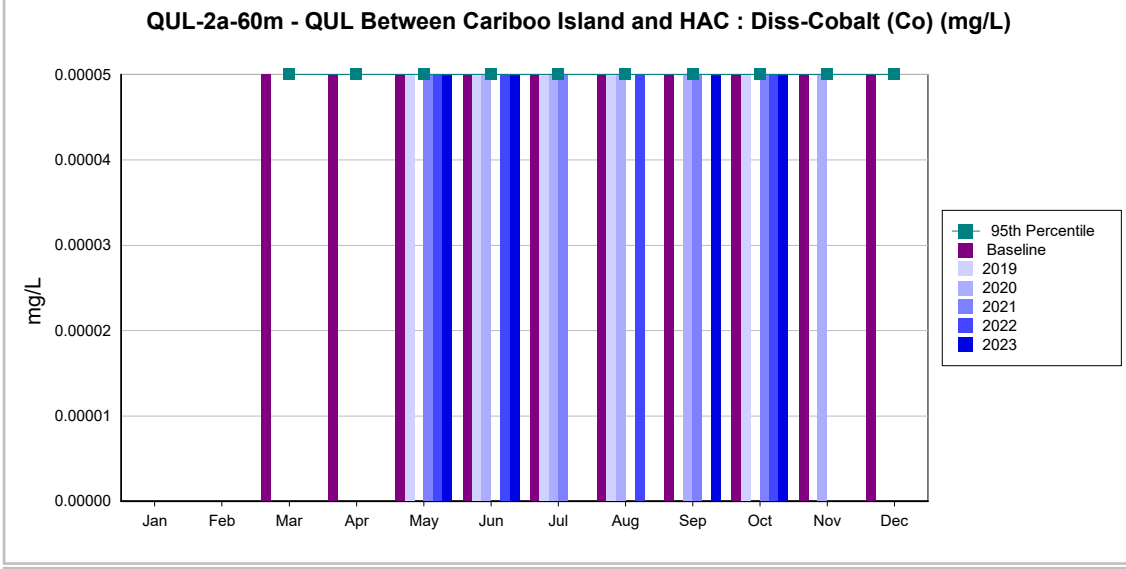

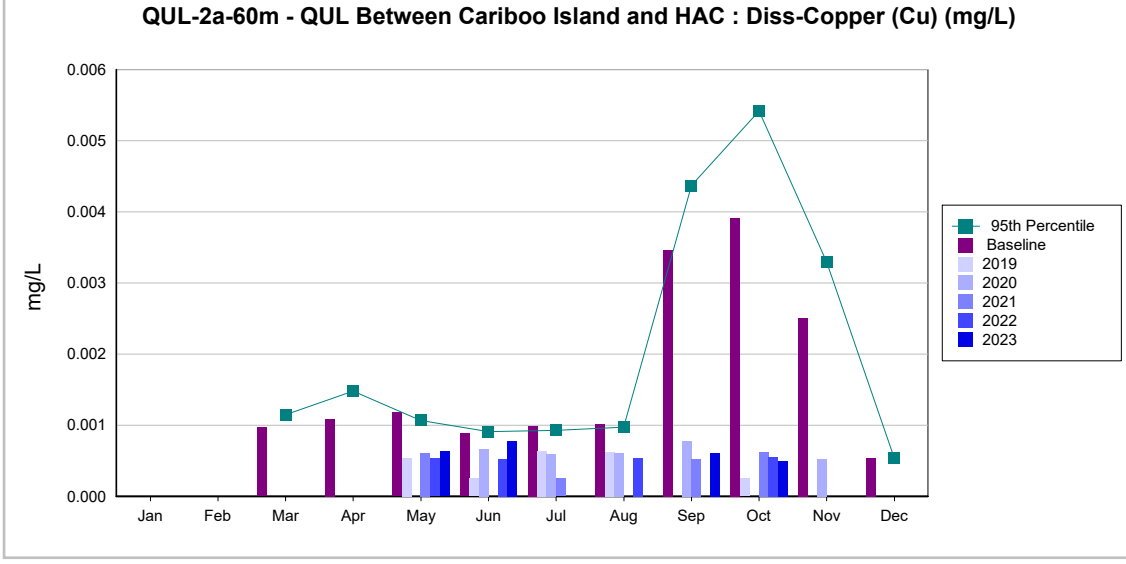

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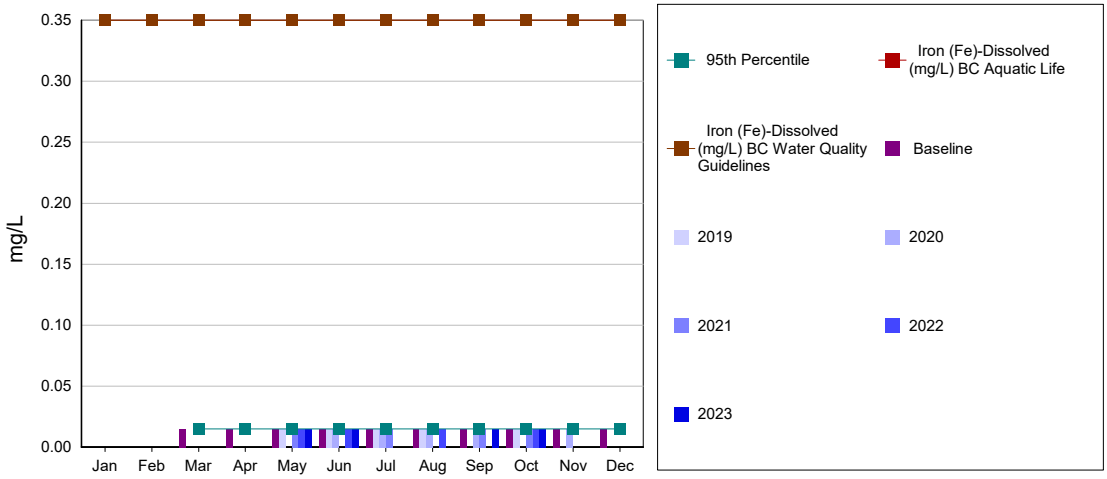

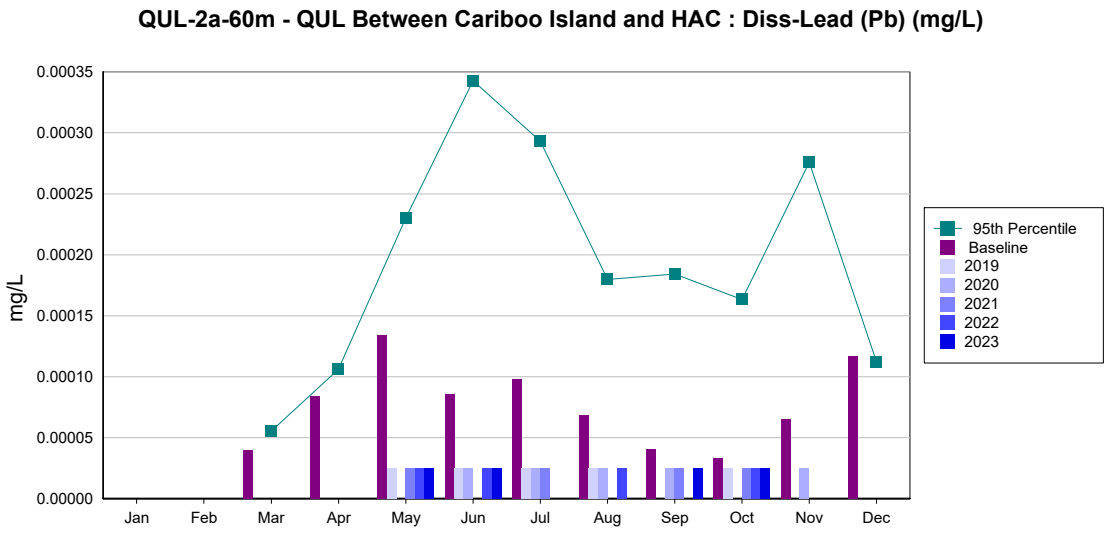

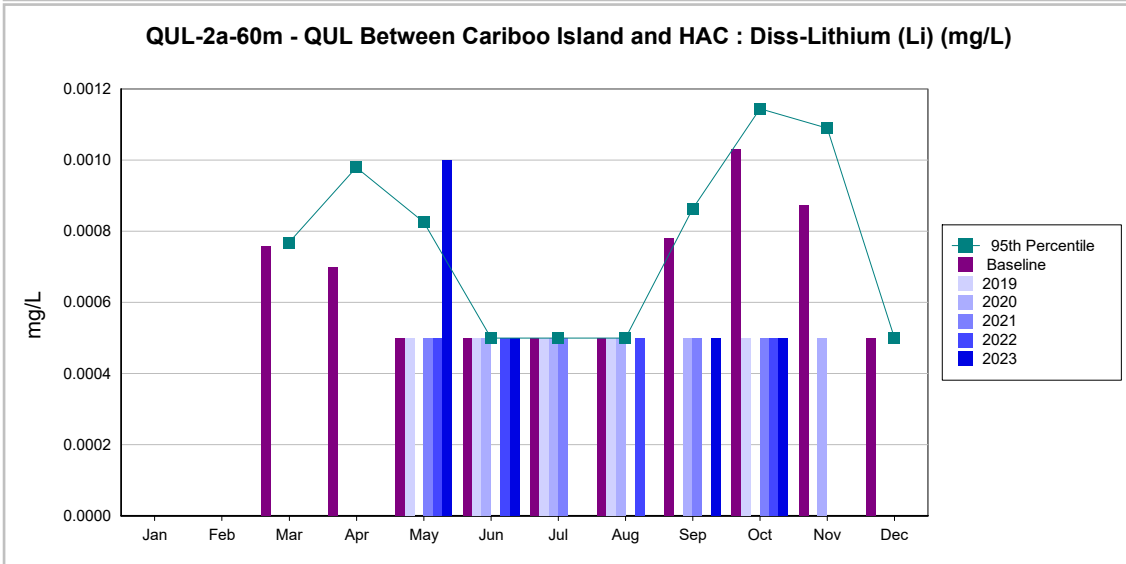

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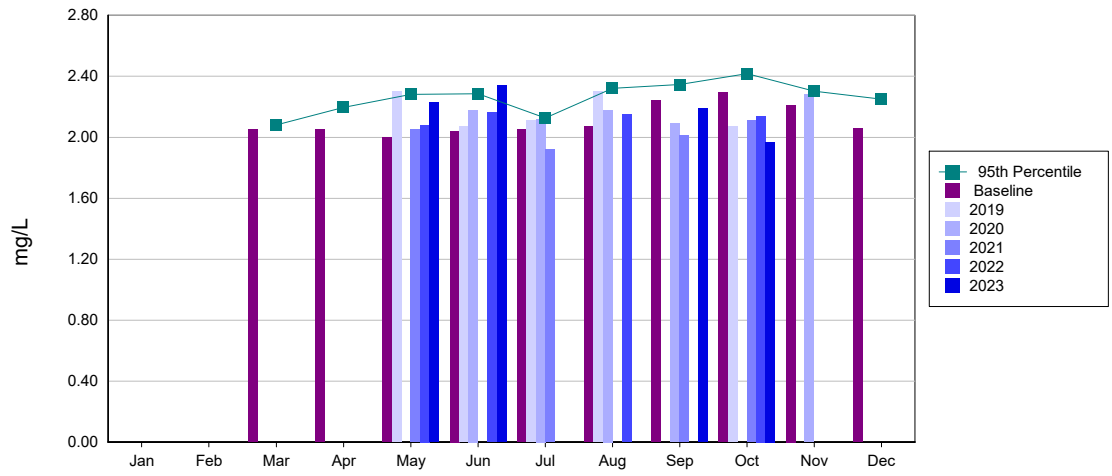
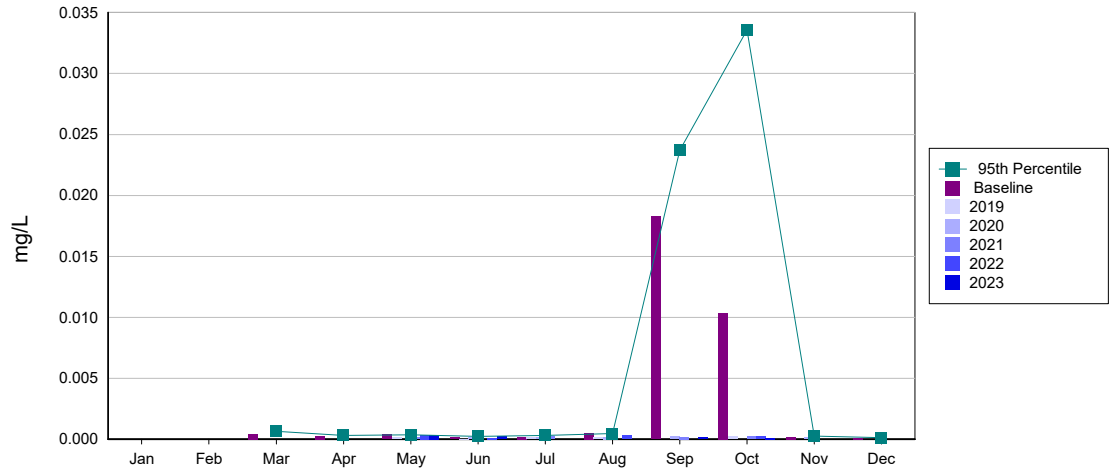
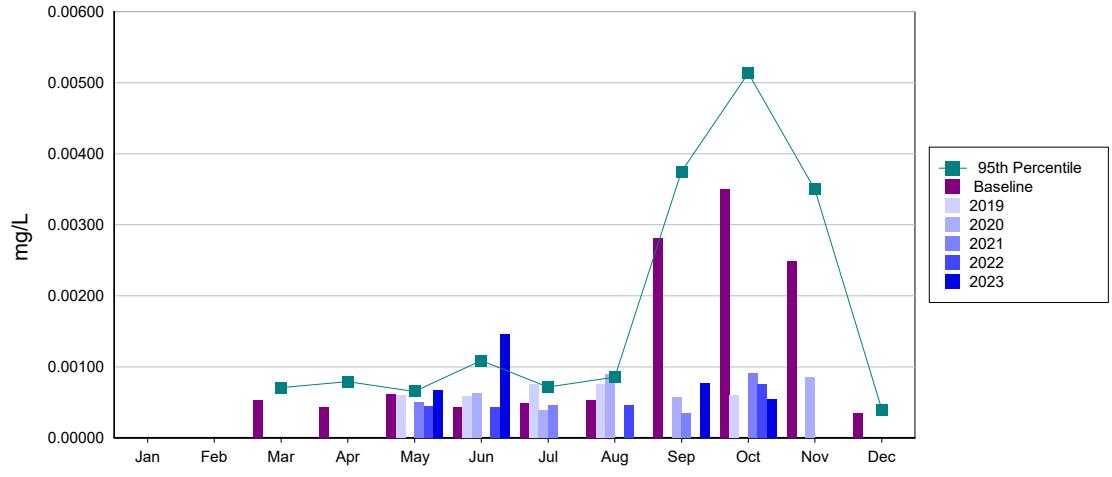
QUL-2a-60m - QUL Between Cariboo Island and HAC : Diss-Magnesium (Mg) (mg/L)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Diss-Manganese (Mn) (mg/L)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Diss-Molybdenum (Mo) (mg/L)



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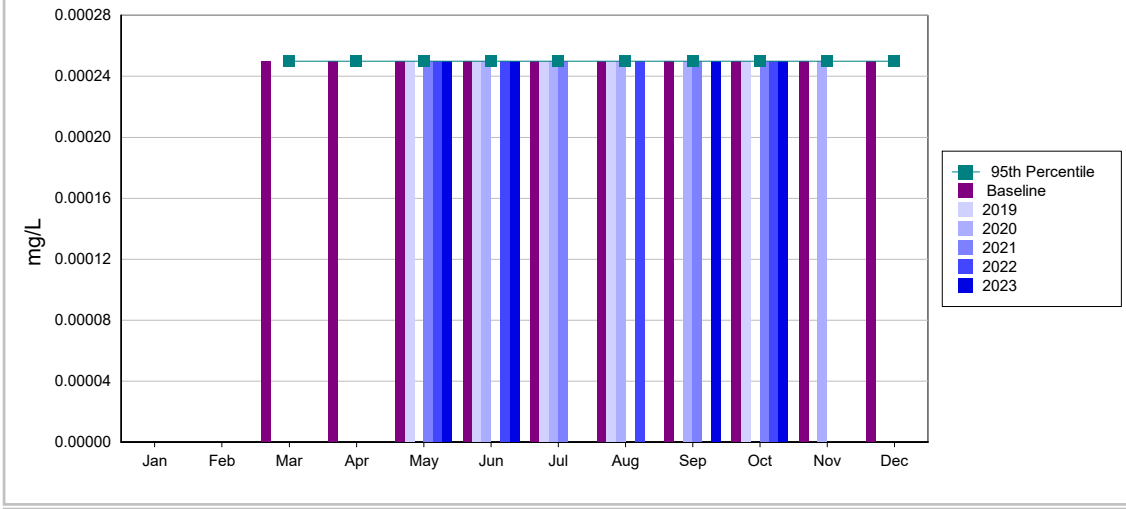

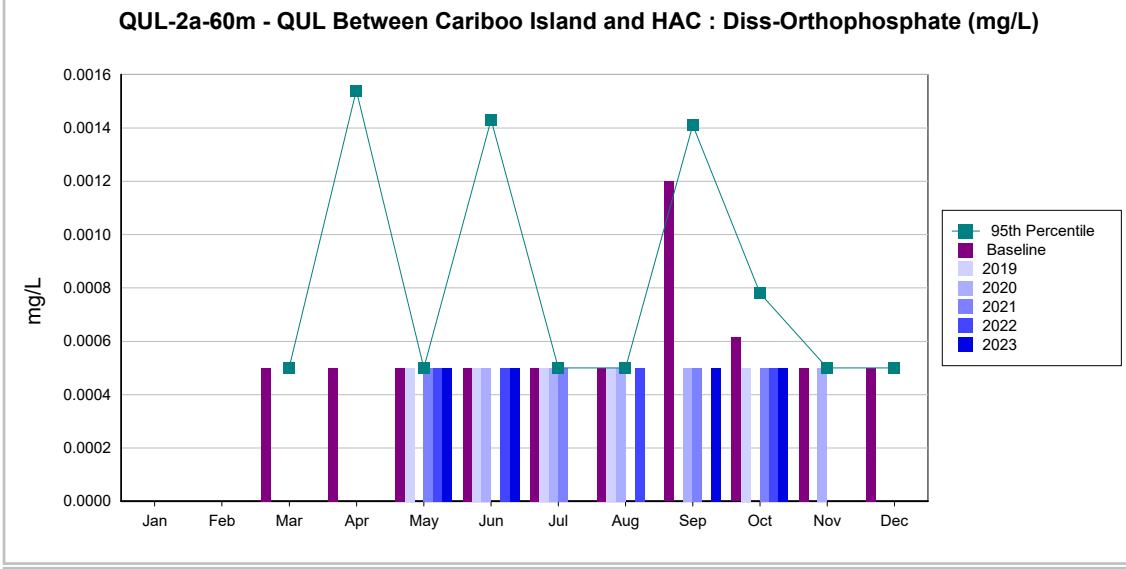

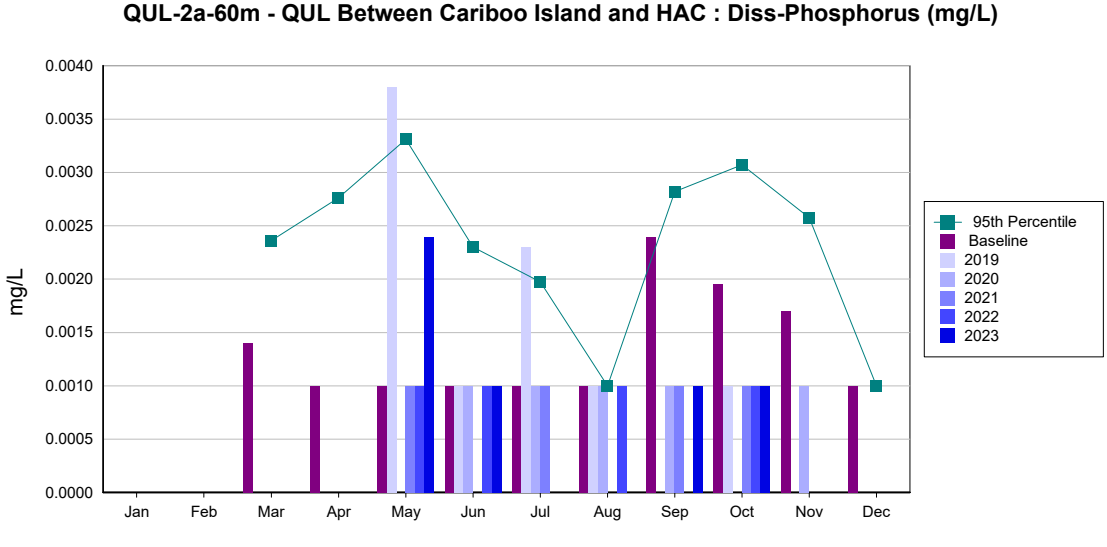

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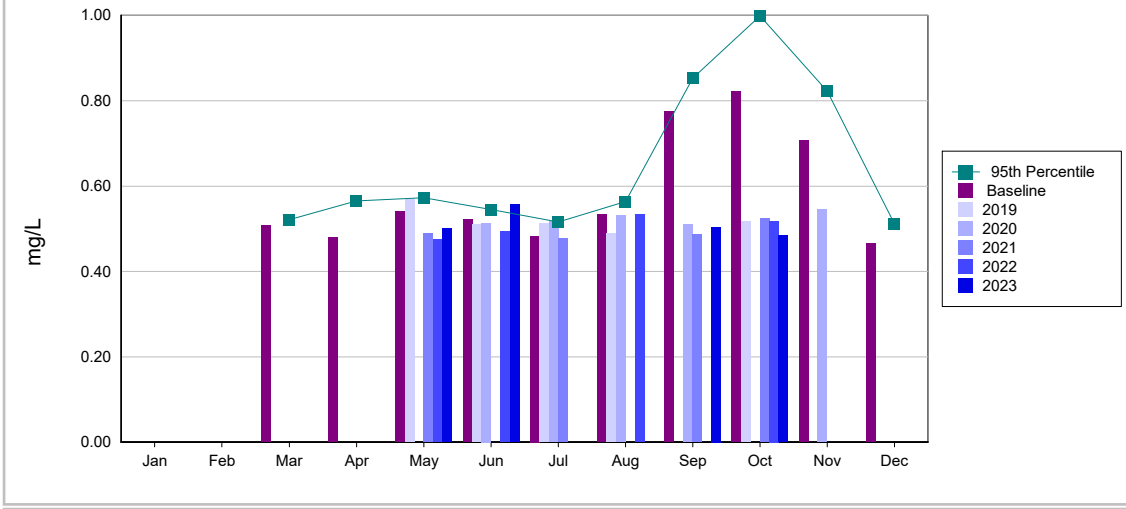

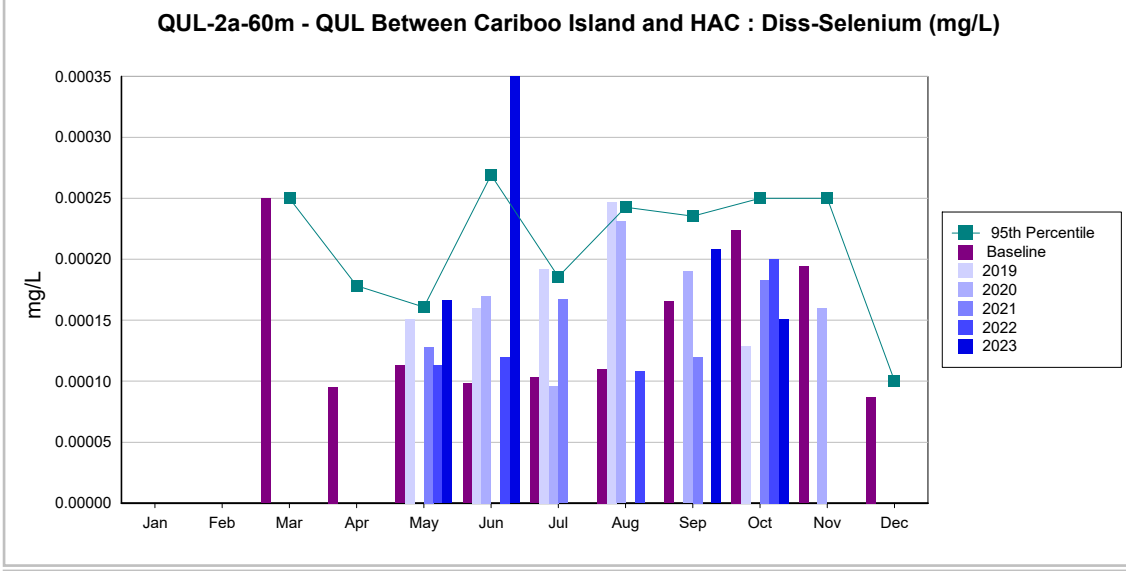

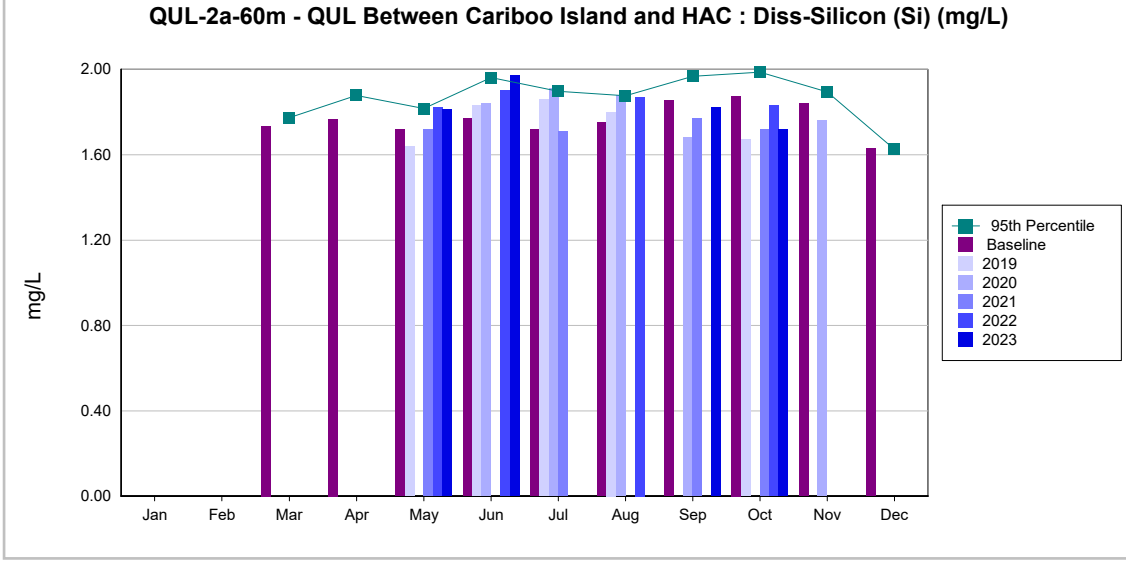

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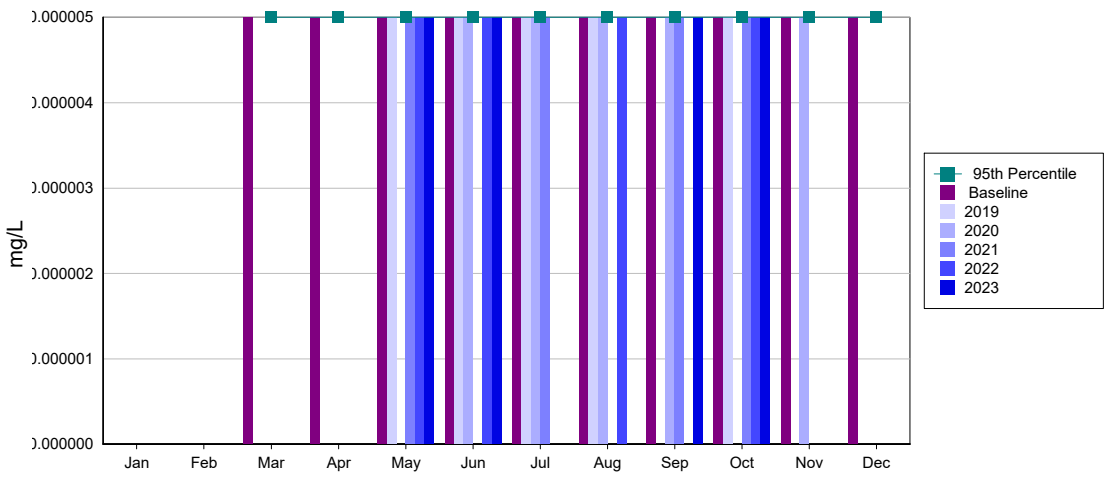
QUL-2a-60m - QUL Between Cariboo Island and HAC : Diss-Silver (Ag) (mg/L)



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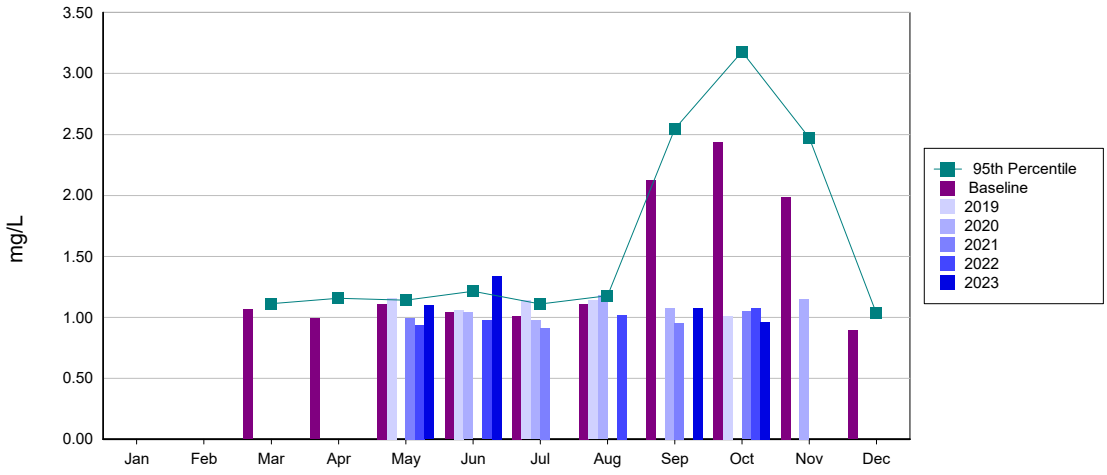
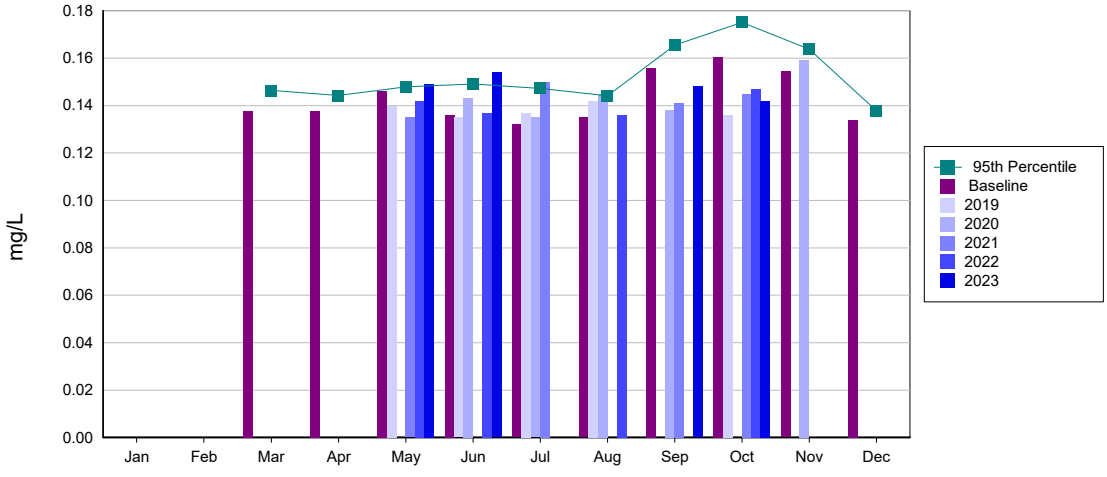


QUL-2a-60m - QUL Between Cariboo Island and HAC : Diss-Strontium (Sr) (mg/L)



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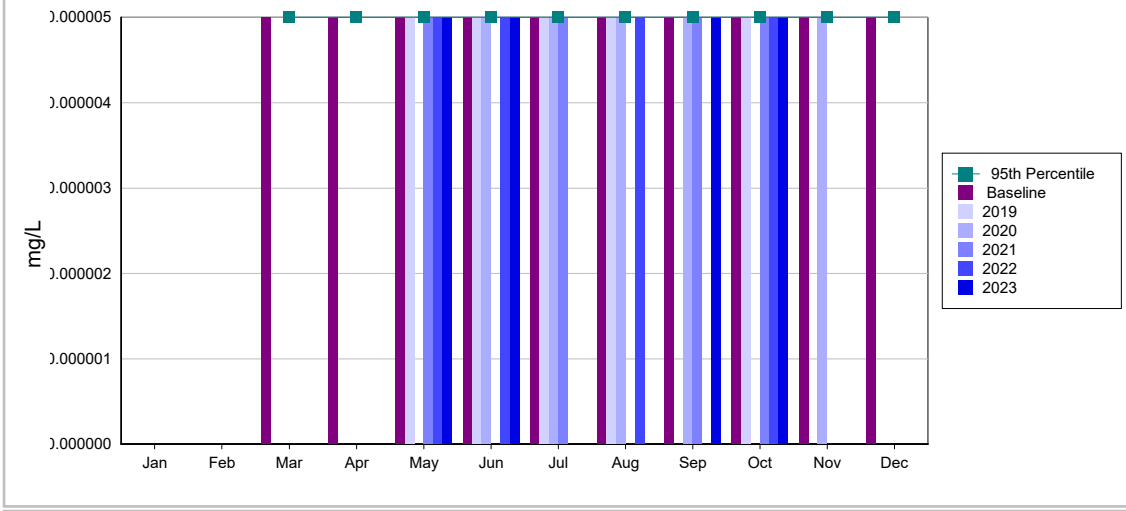

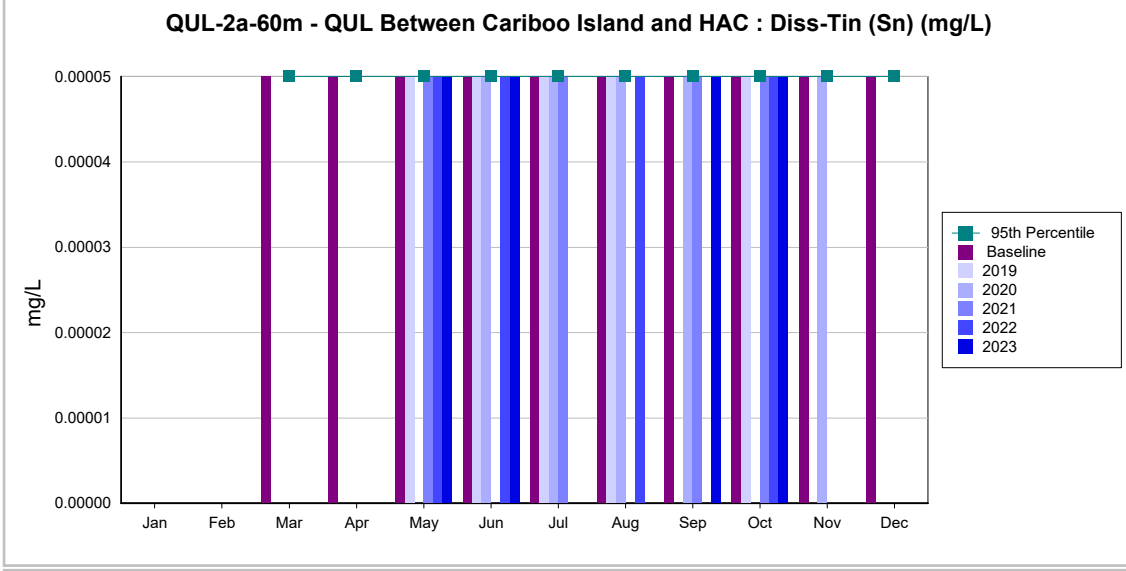

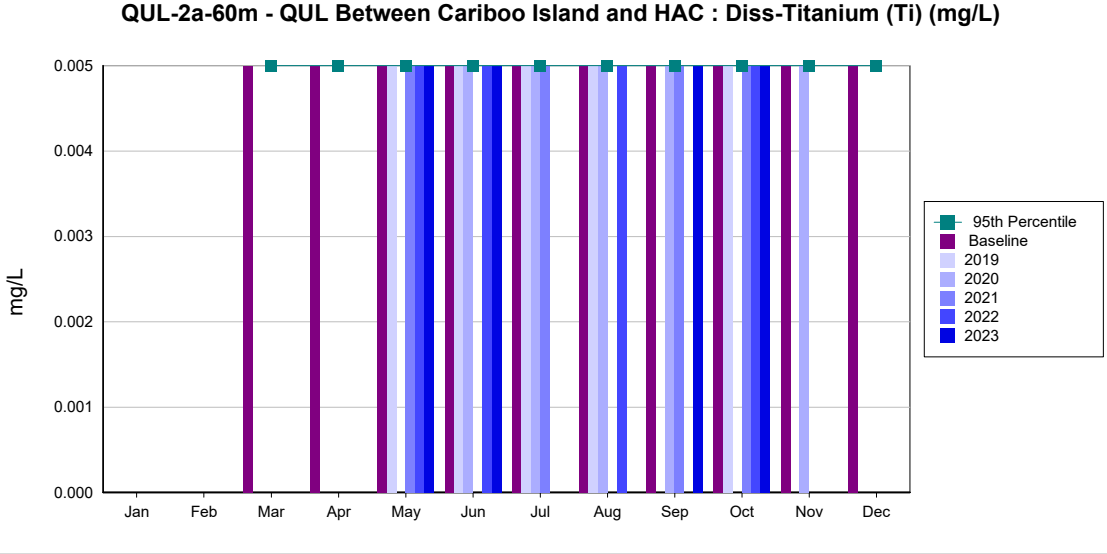

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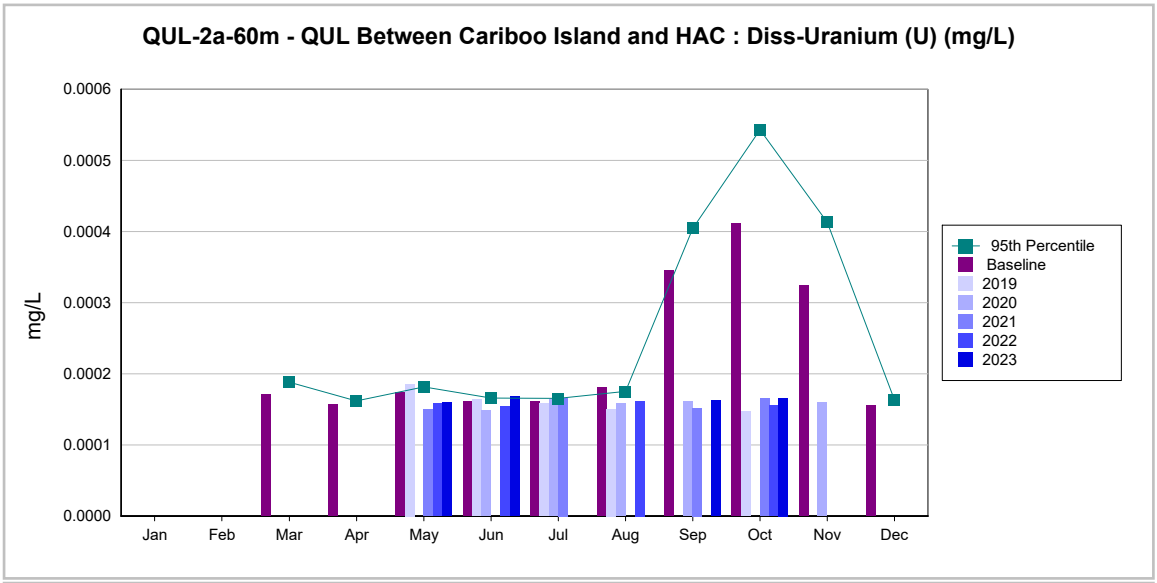

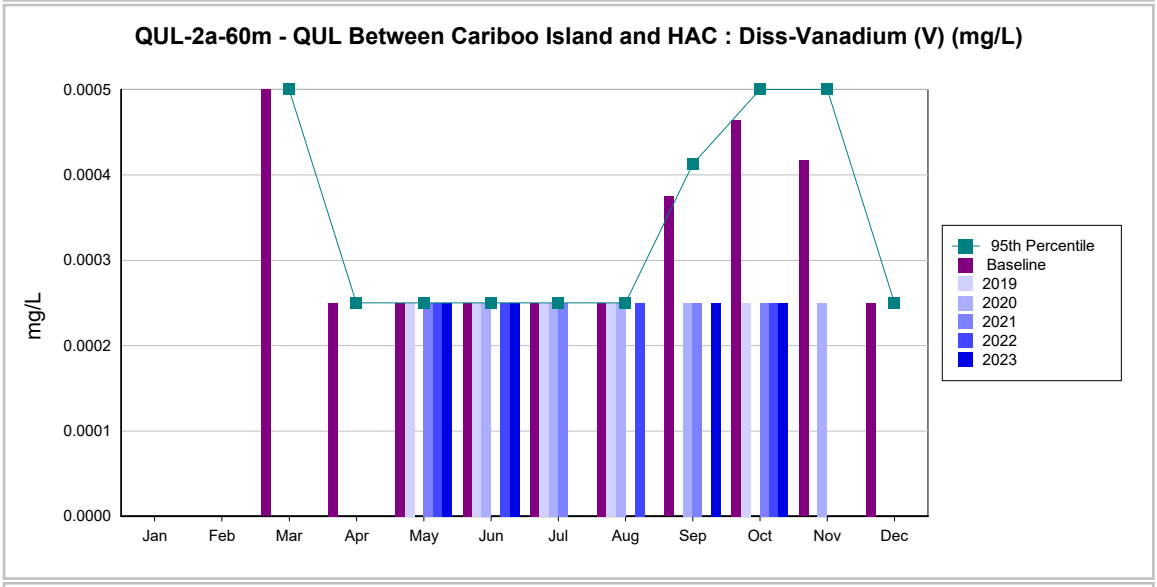

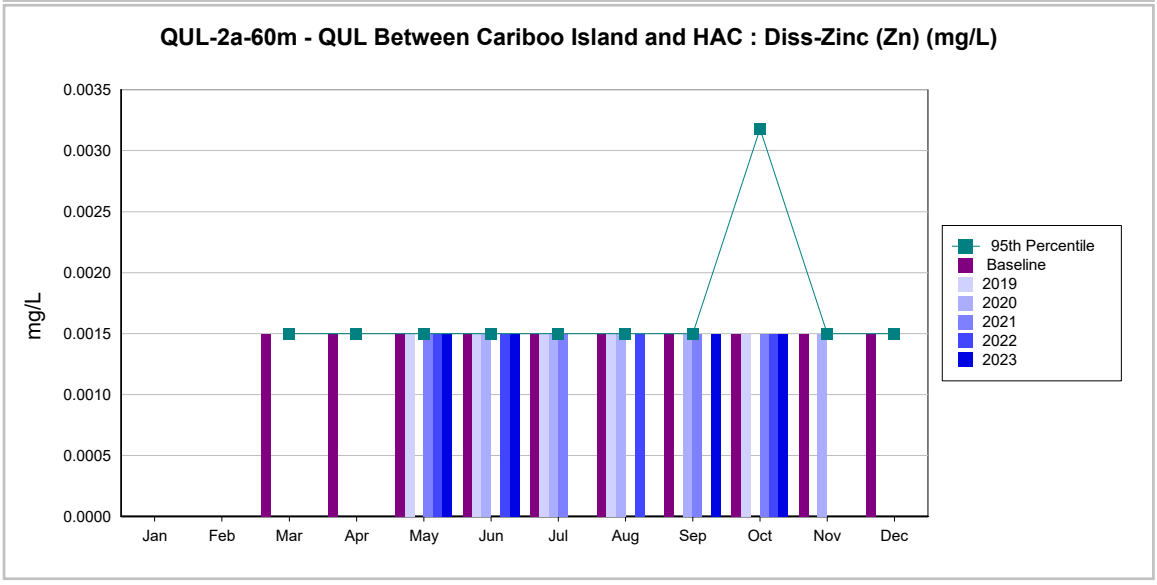

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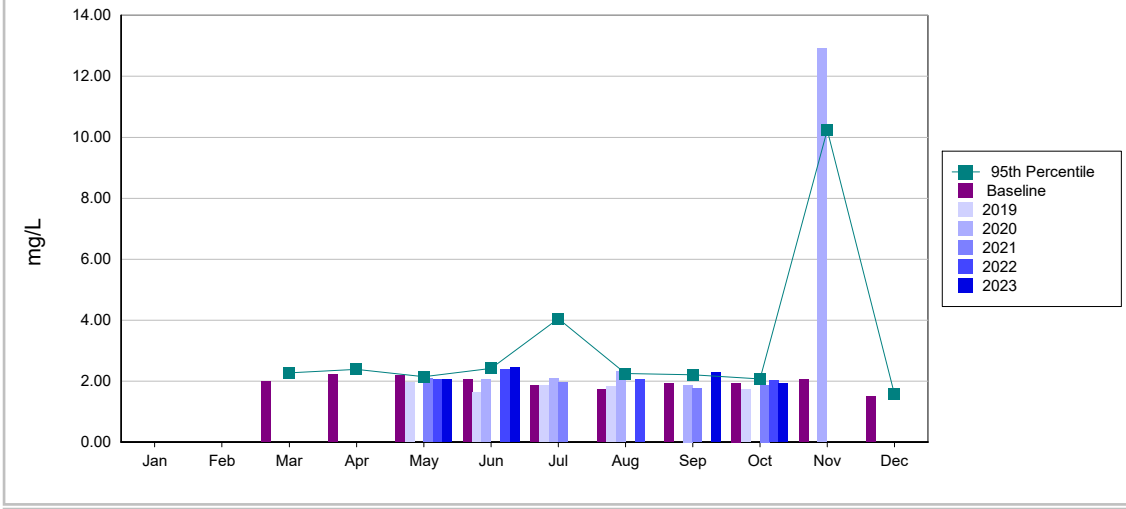

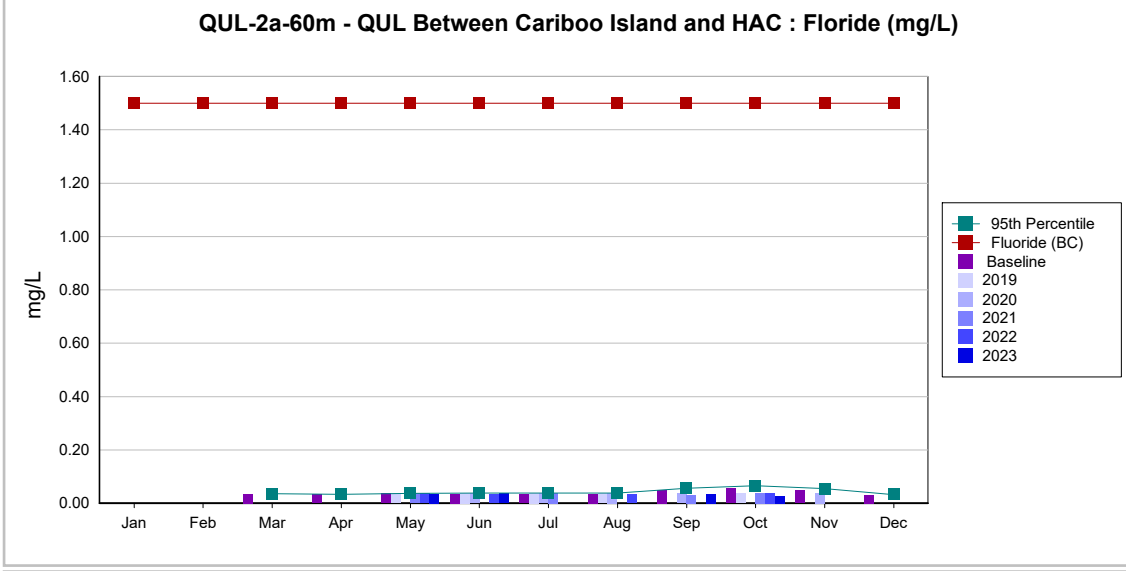

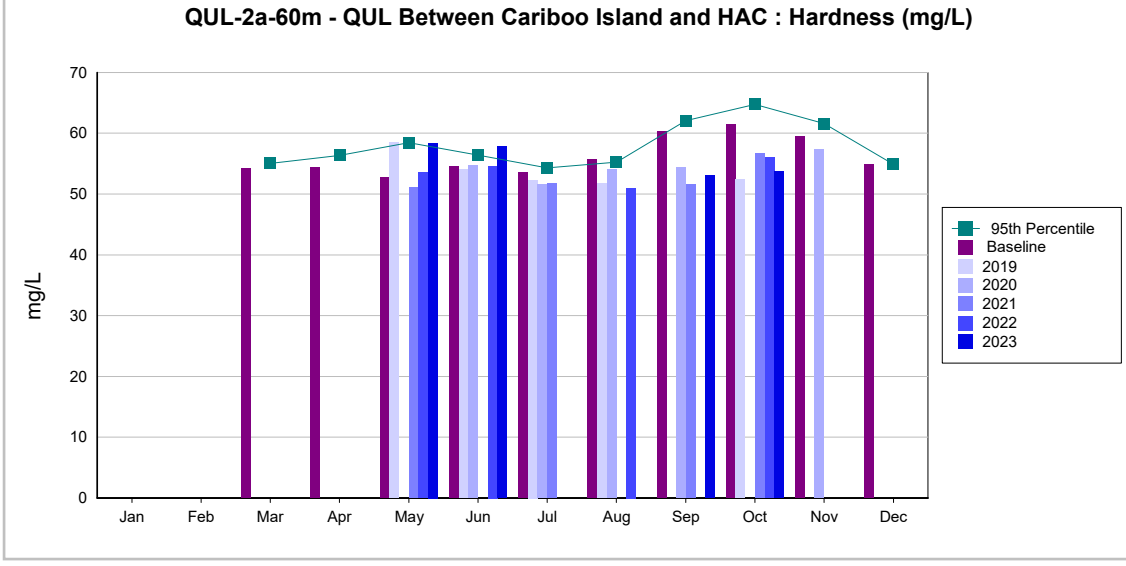

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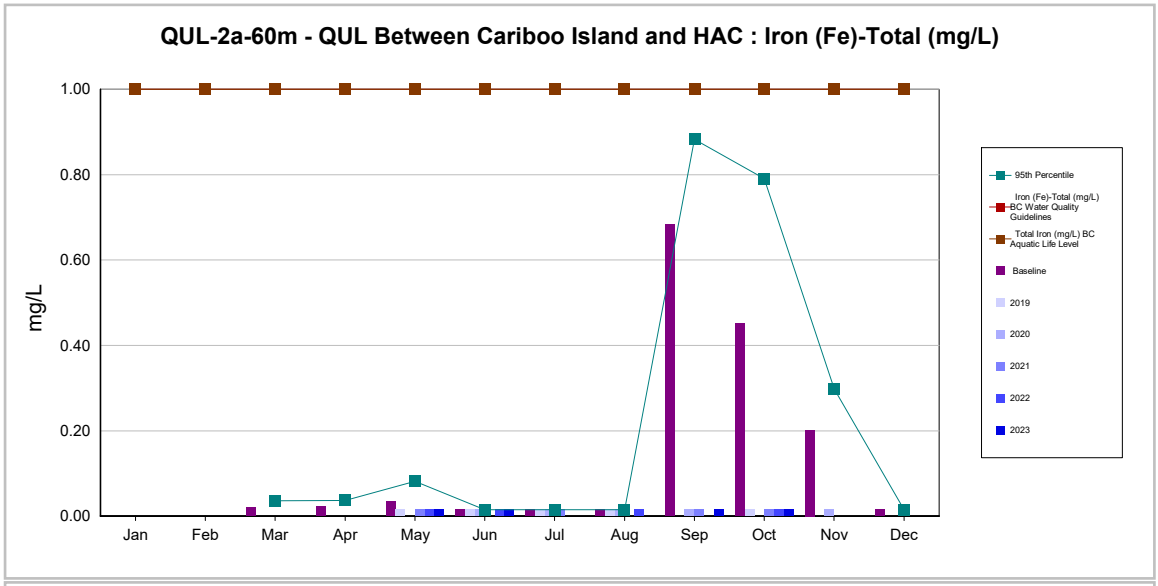

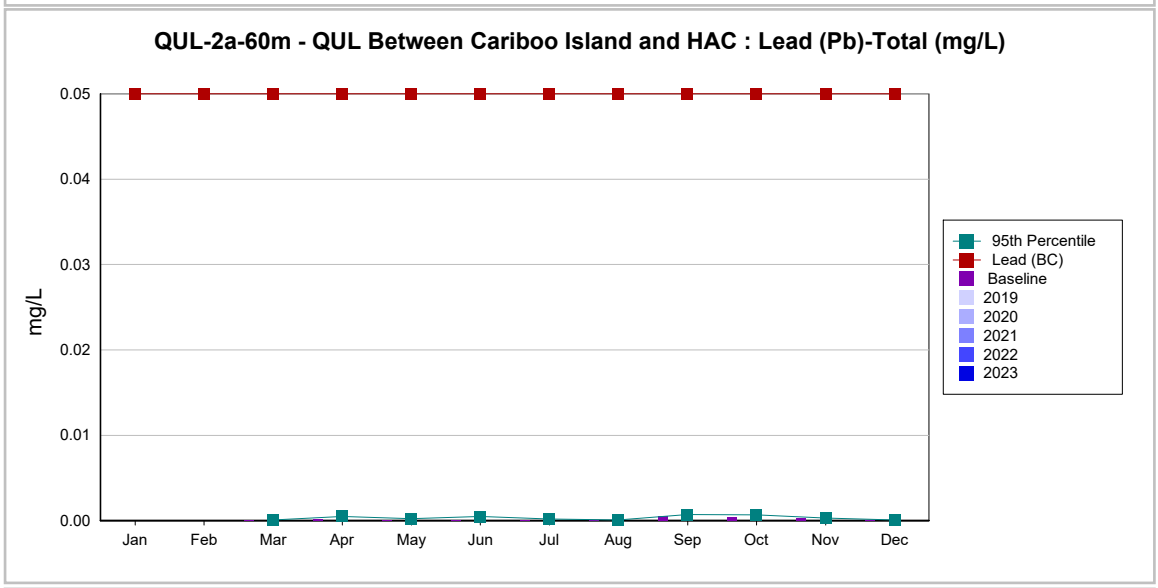

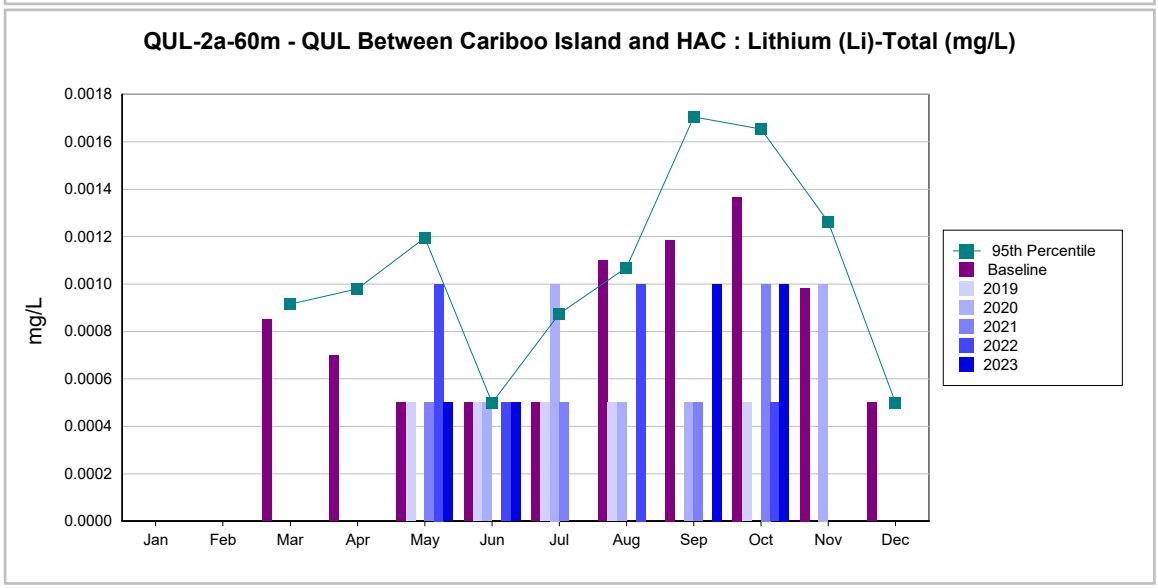

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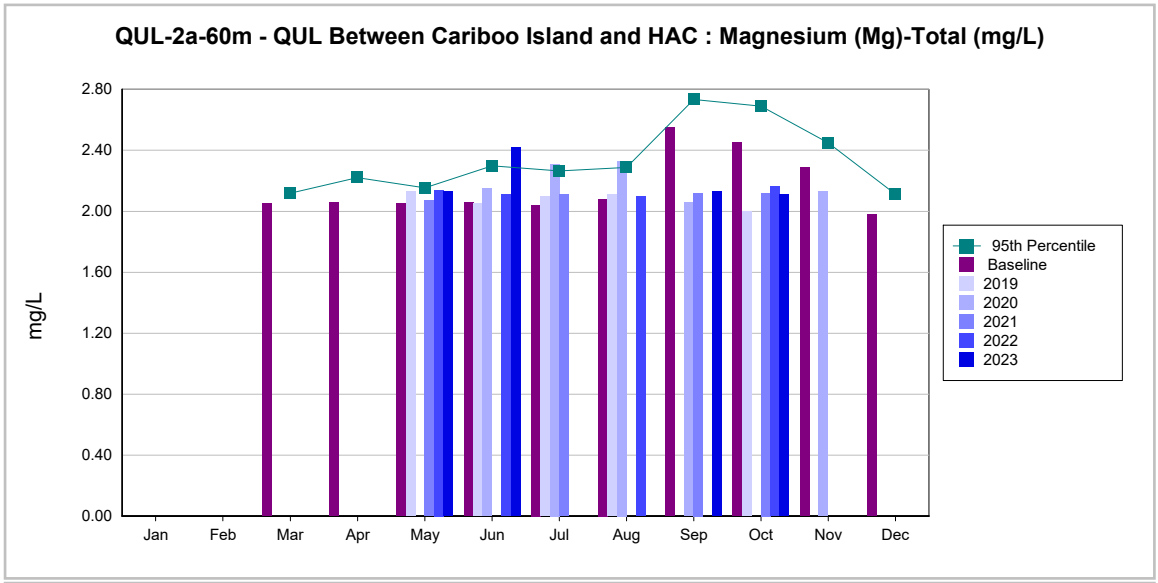

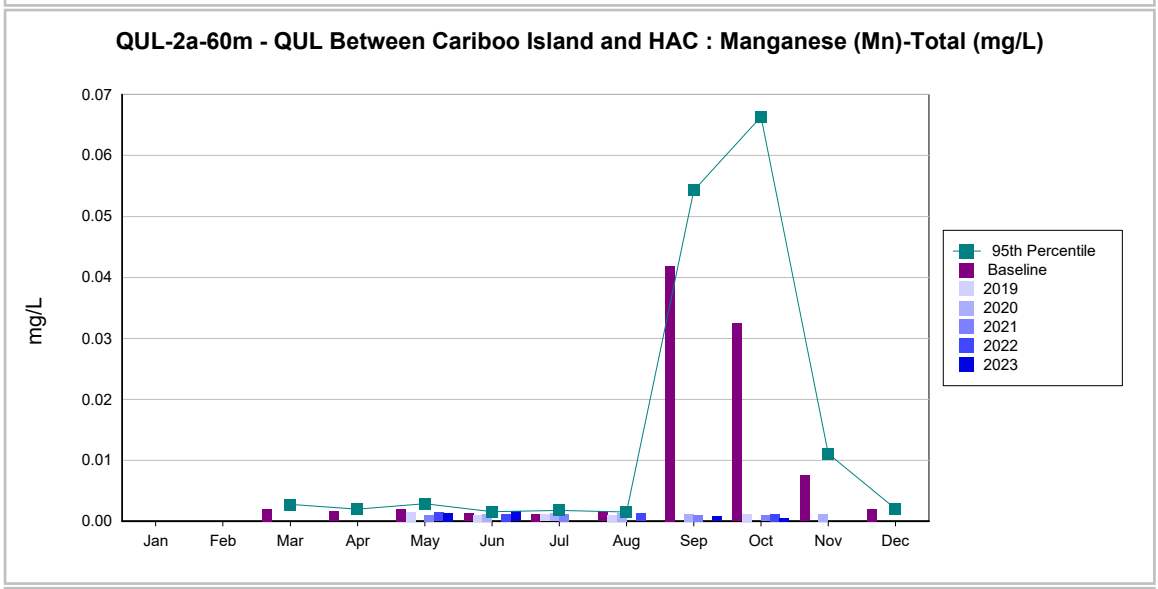

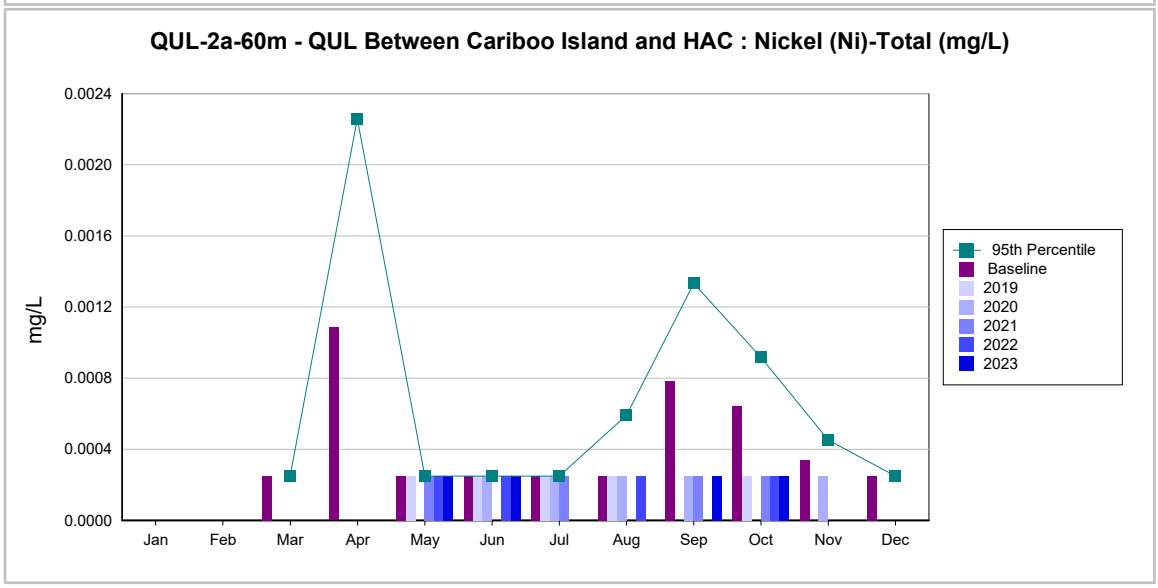

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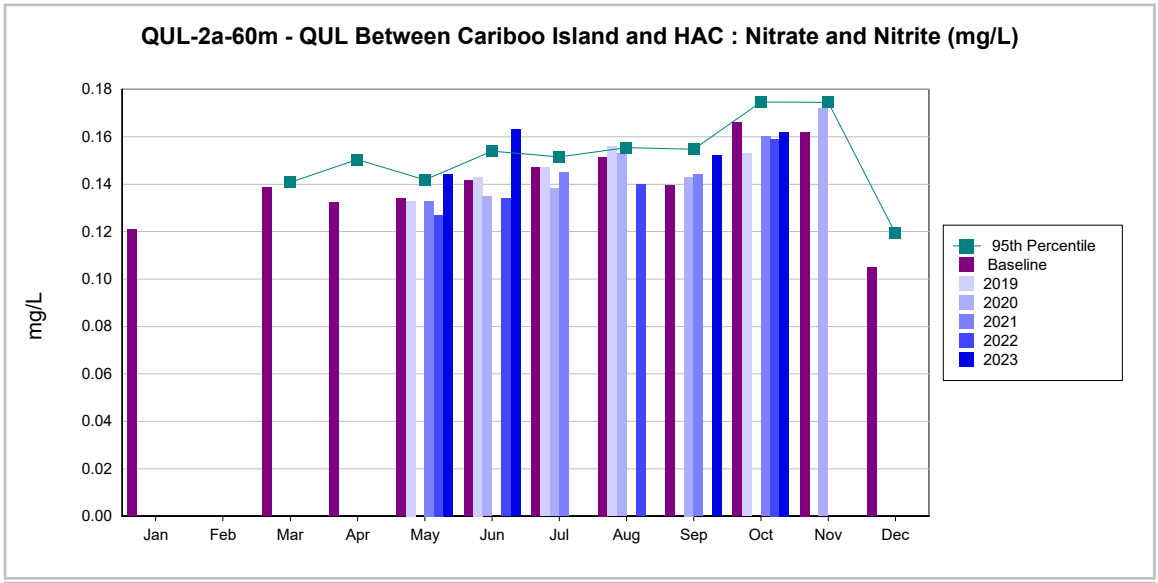

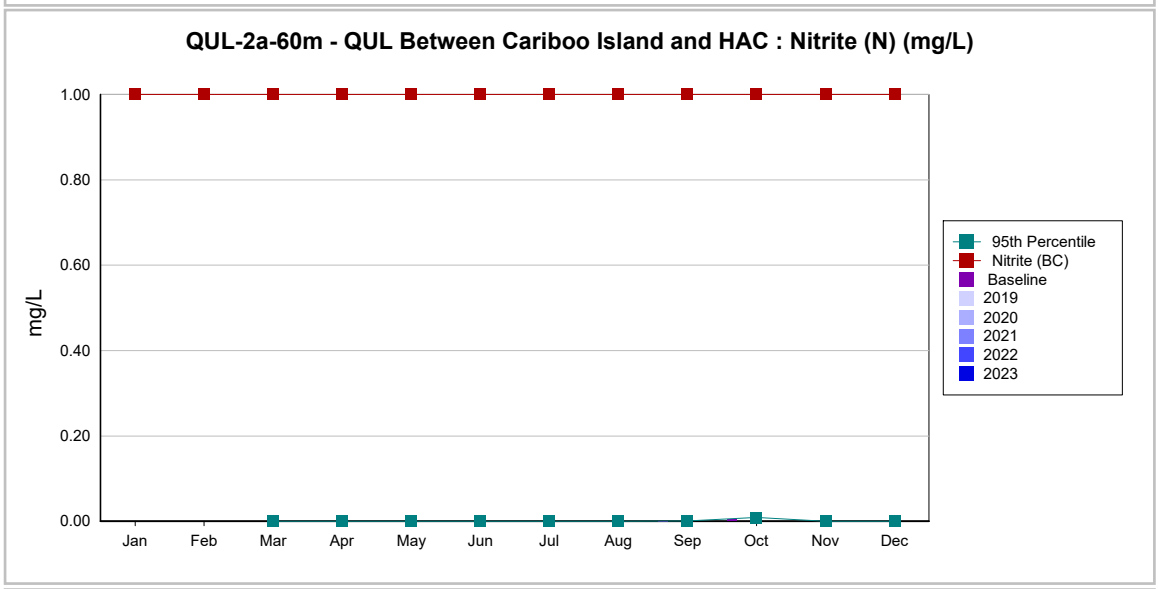

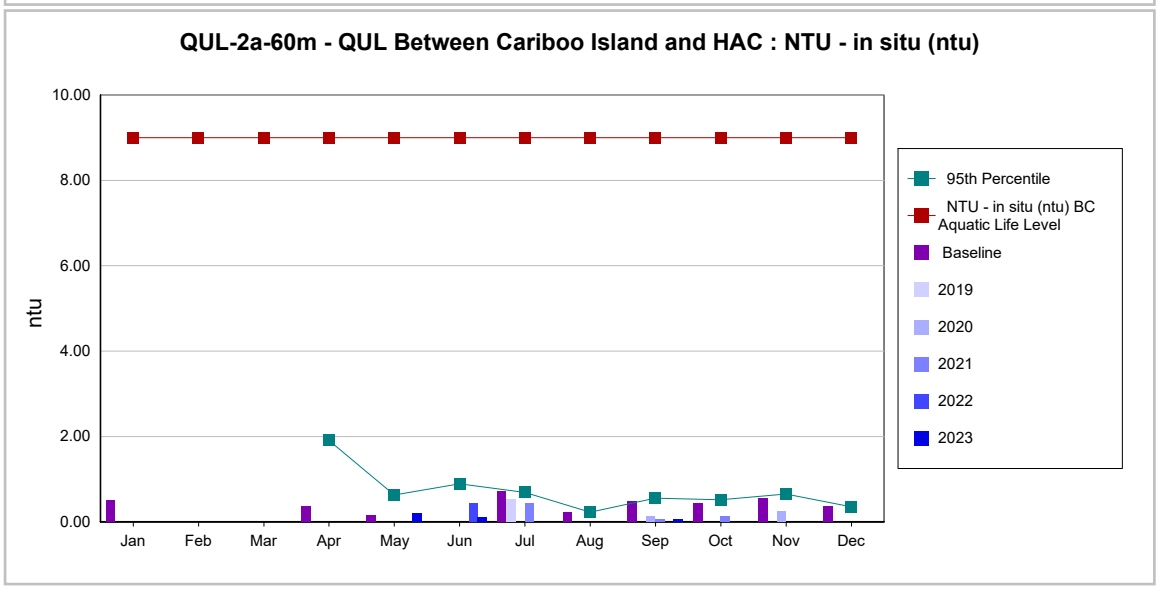

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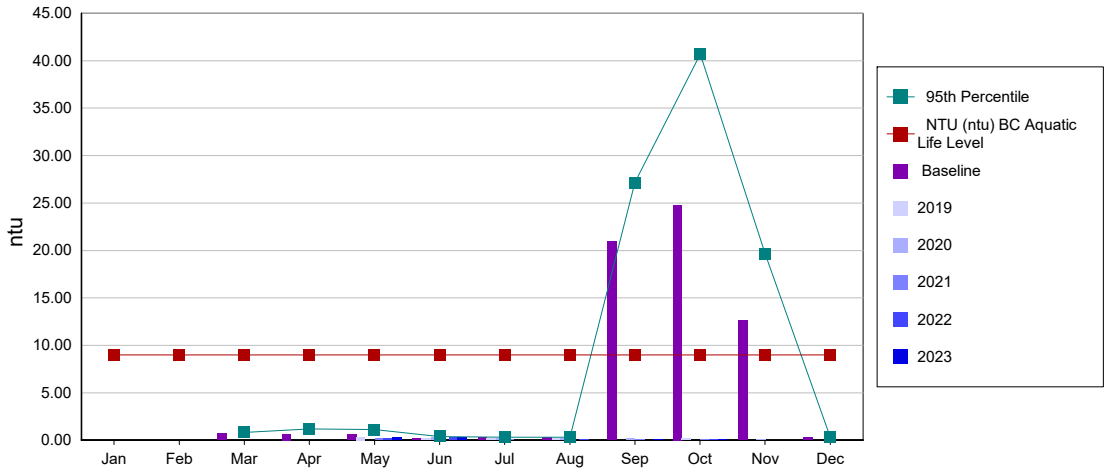
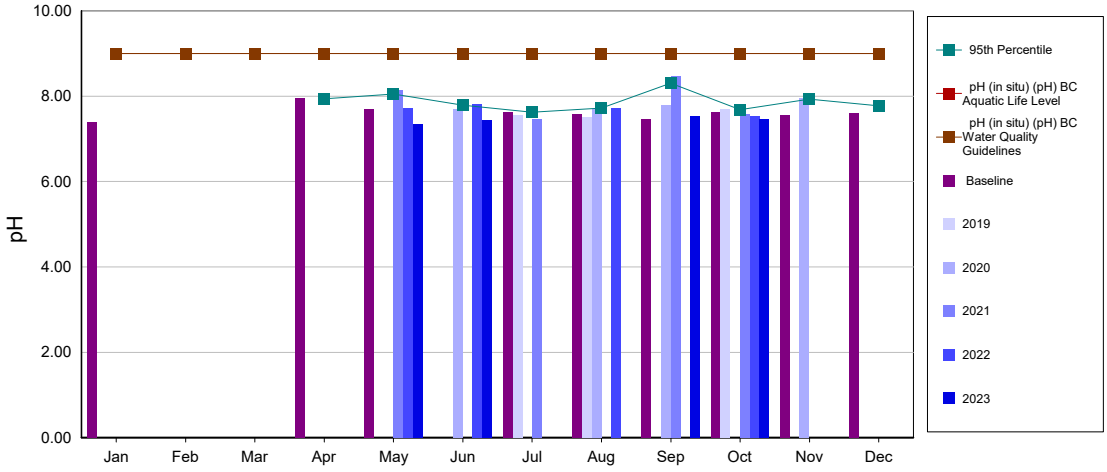
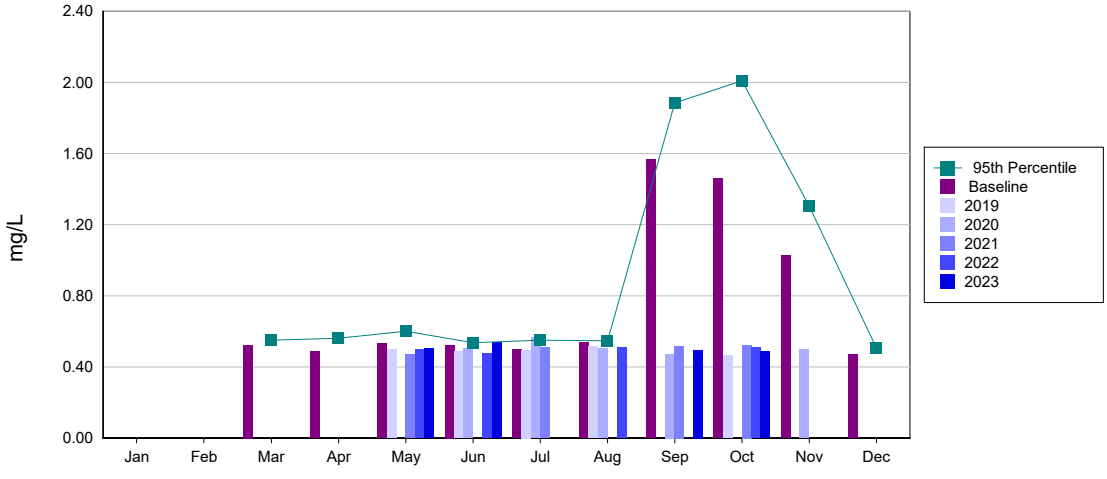
QUL-2a-60m - QUL Between Cariboo Island and HAC : NTU (ntu)



QUL-2a-60m - QUL Between Cariboo Island and HAC : pH (in situ) (pH)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Potassium (K)-Total (mg/L)



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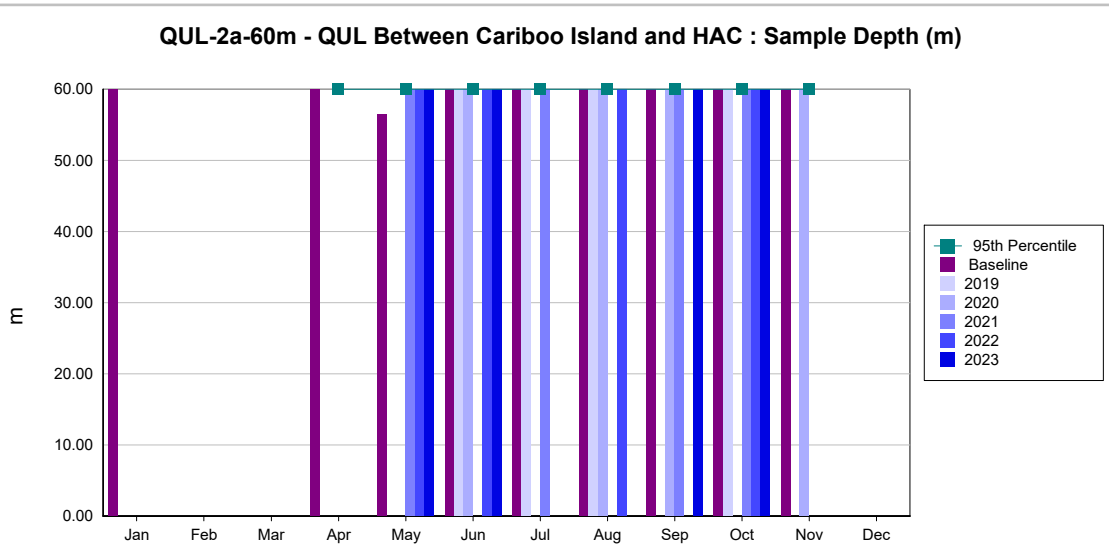

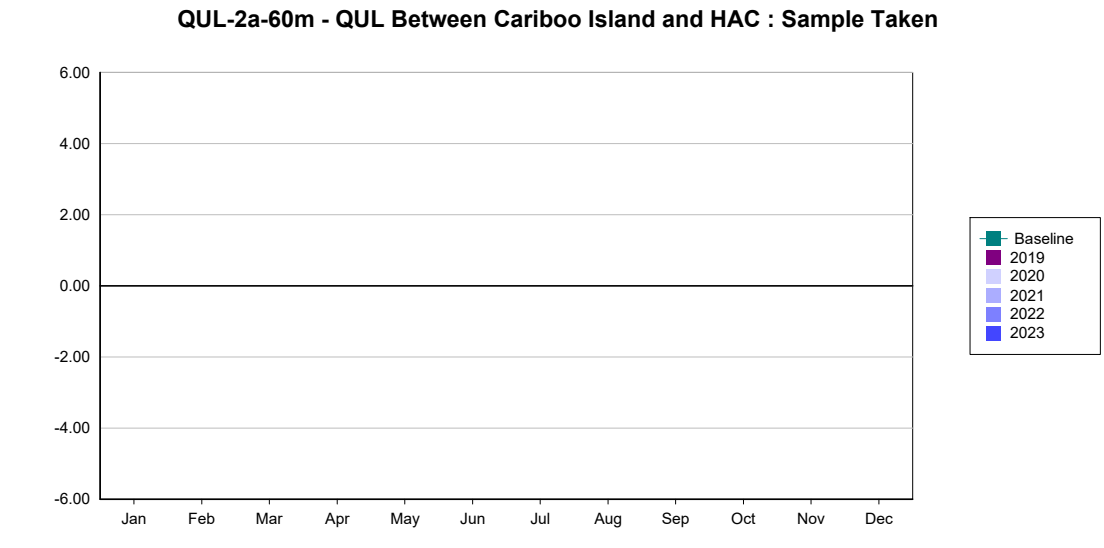

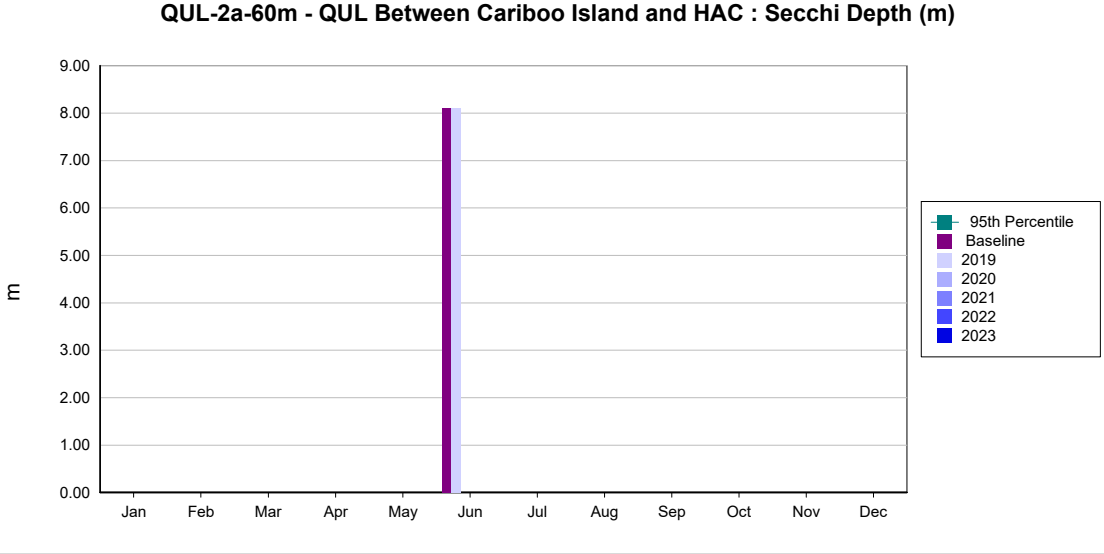

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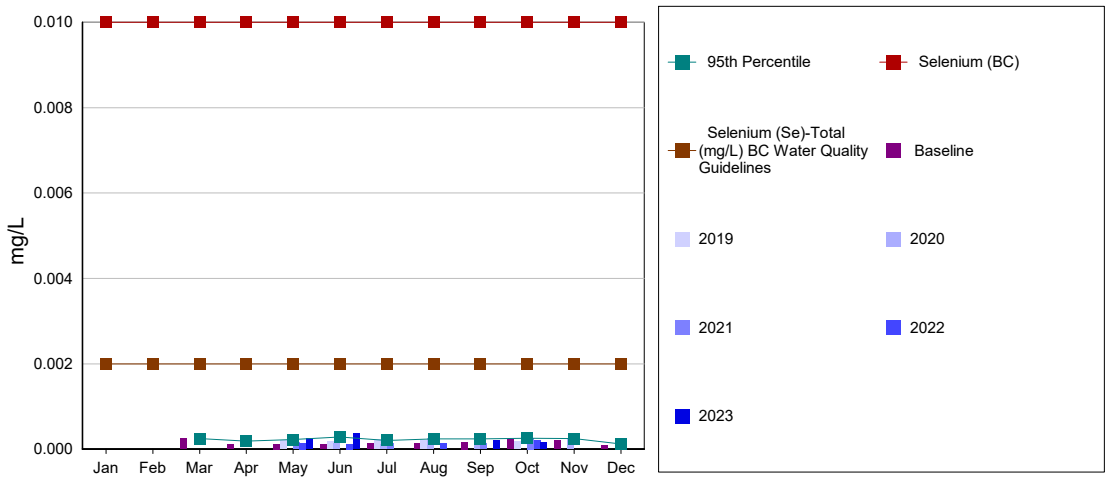

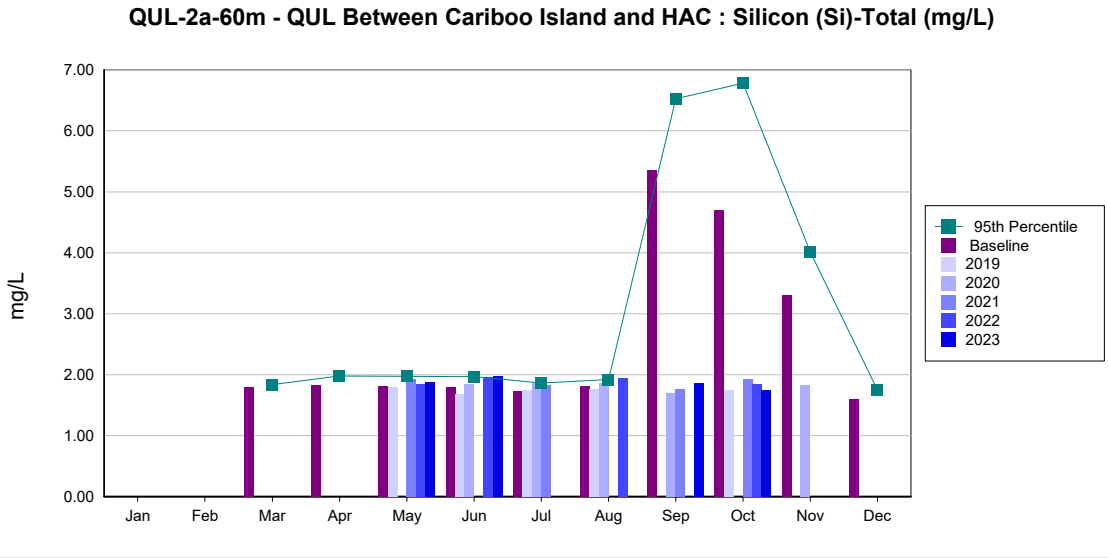

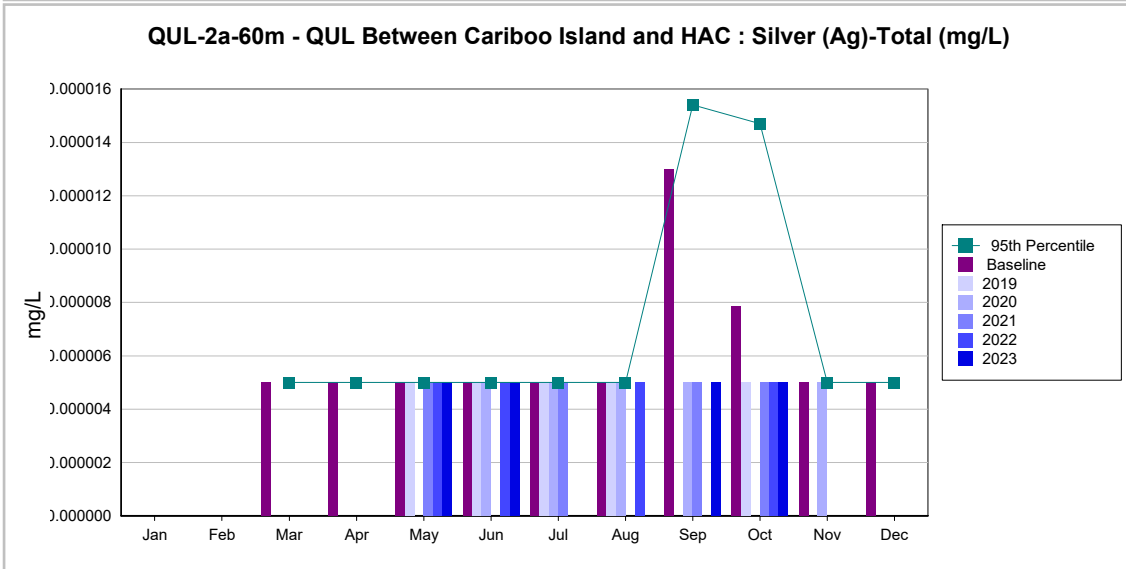

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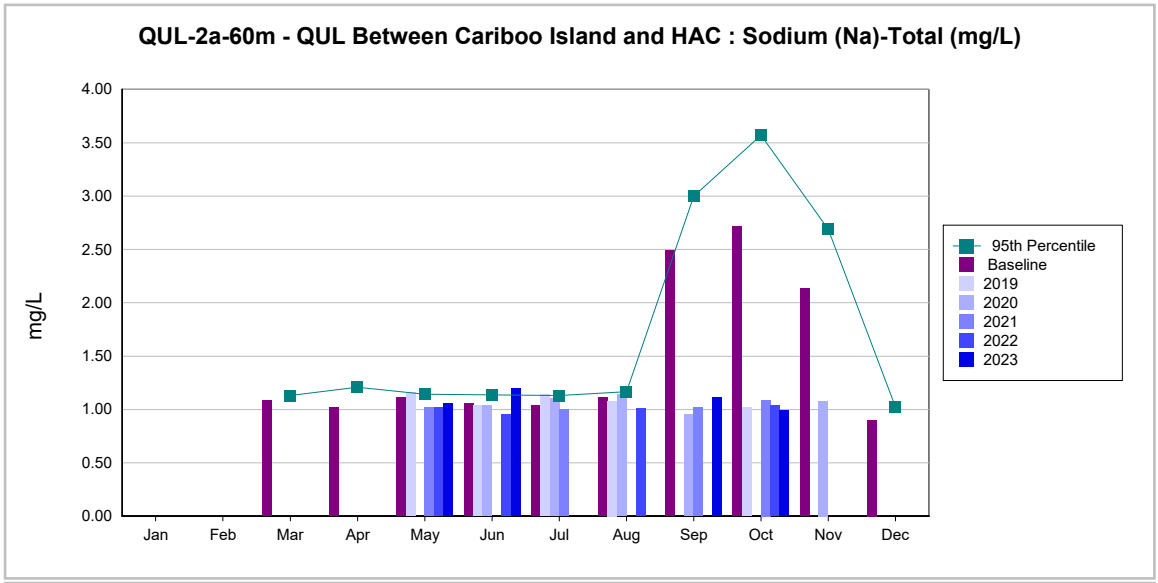

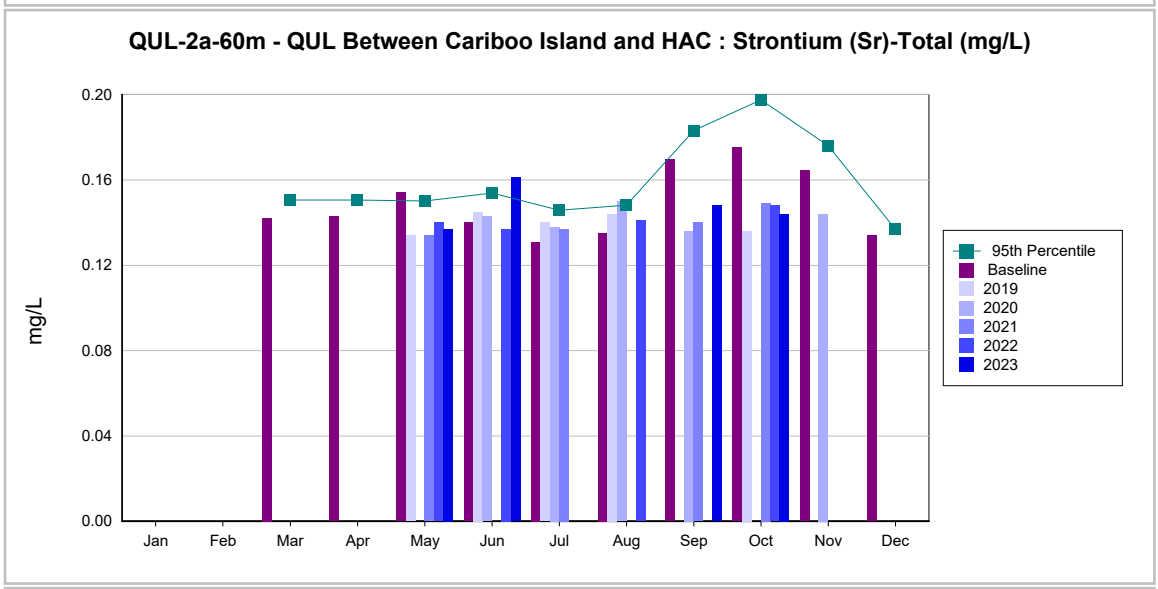

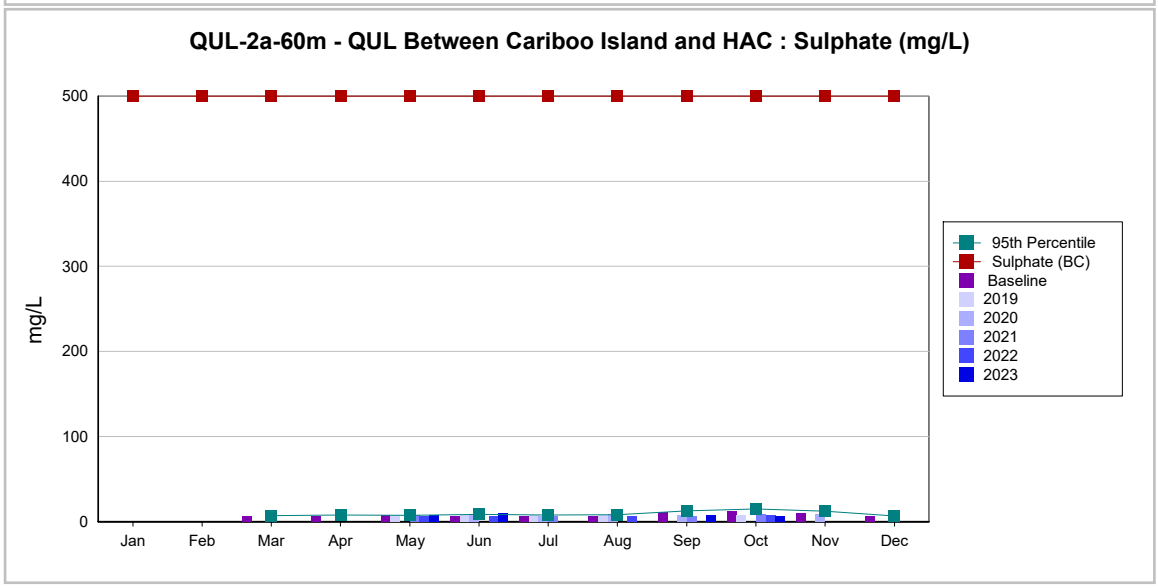

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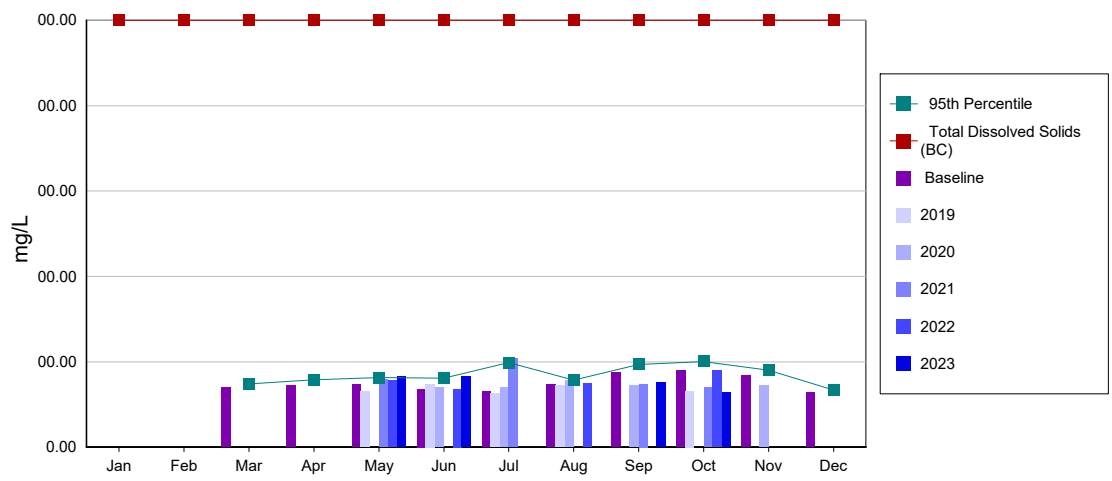
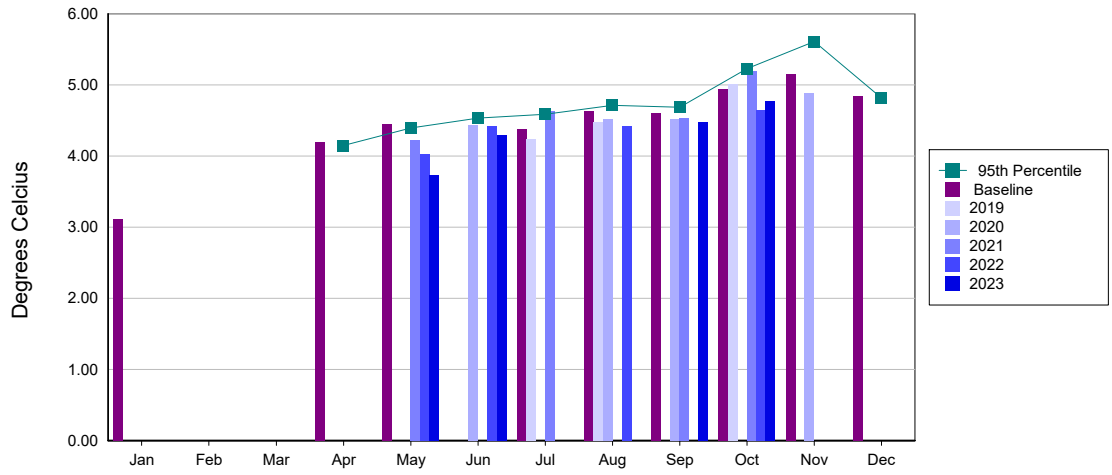
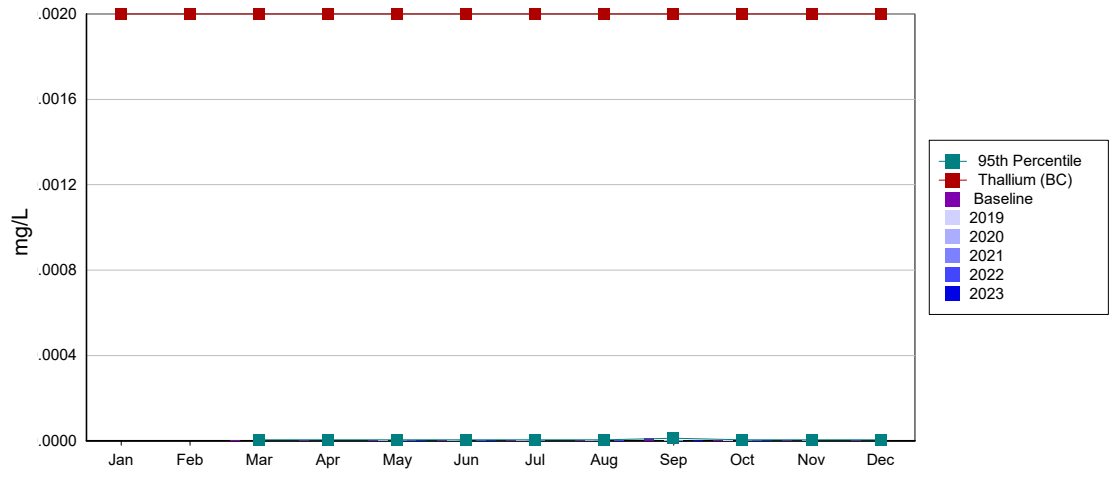
QUL-2a-60m - QUL Between Cariboo Island and HAC : TDS (mg/L)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Temp (in situ) (Degrees Celcius)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Thallium (Tl)-Total (mg/L)



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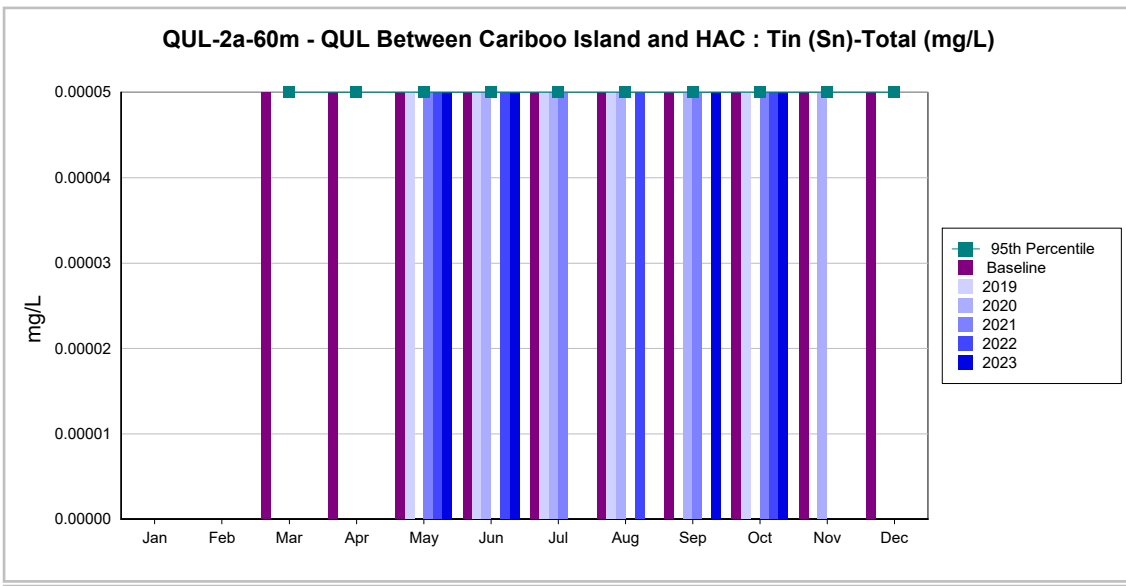

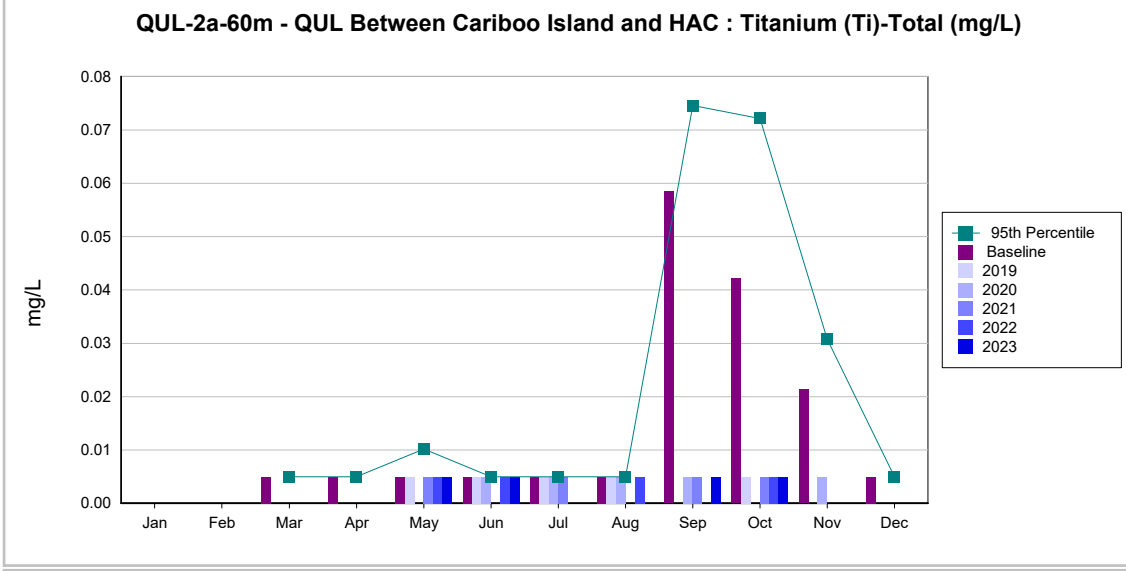

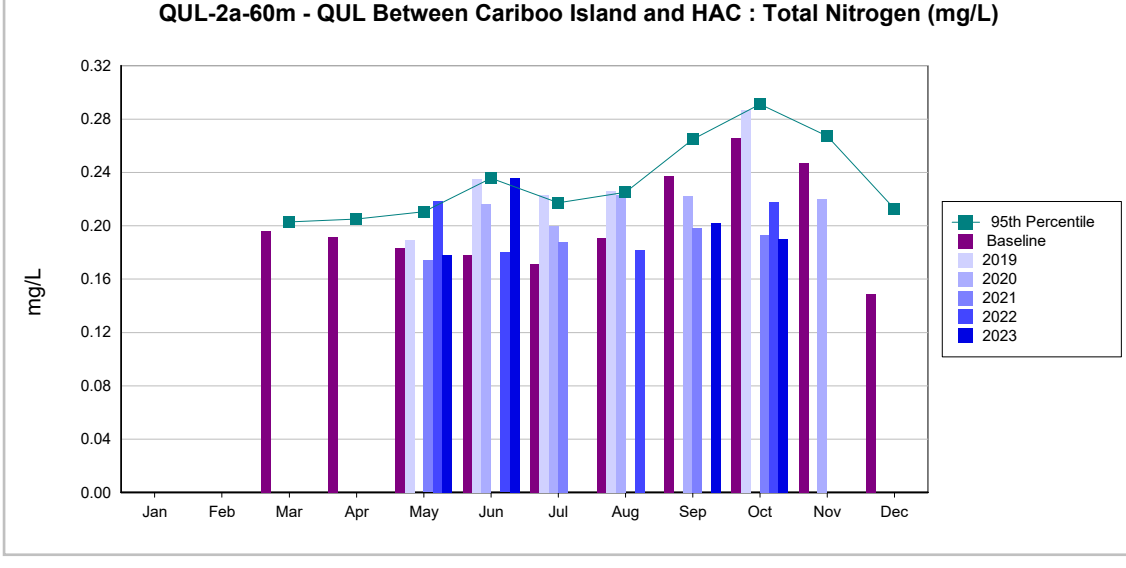

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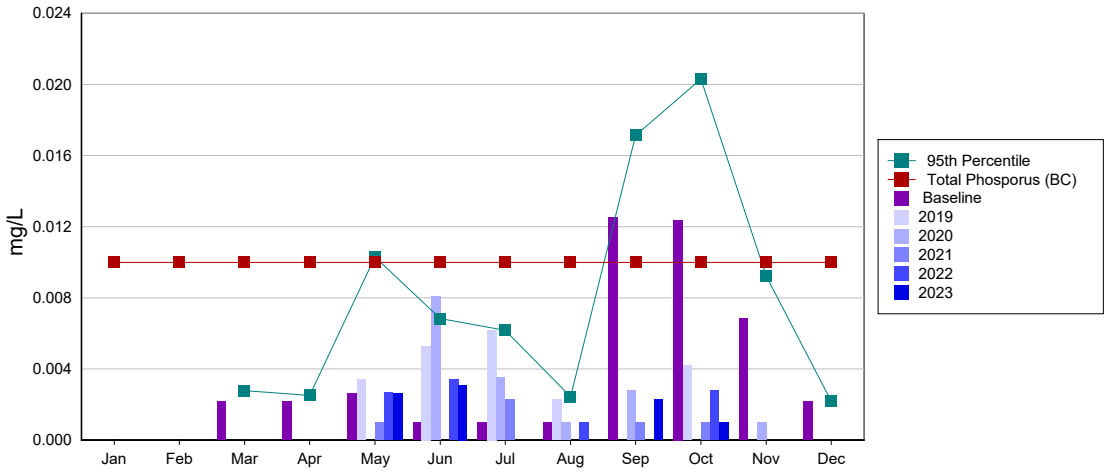
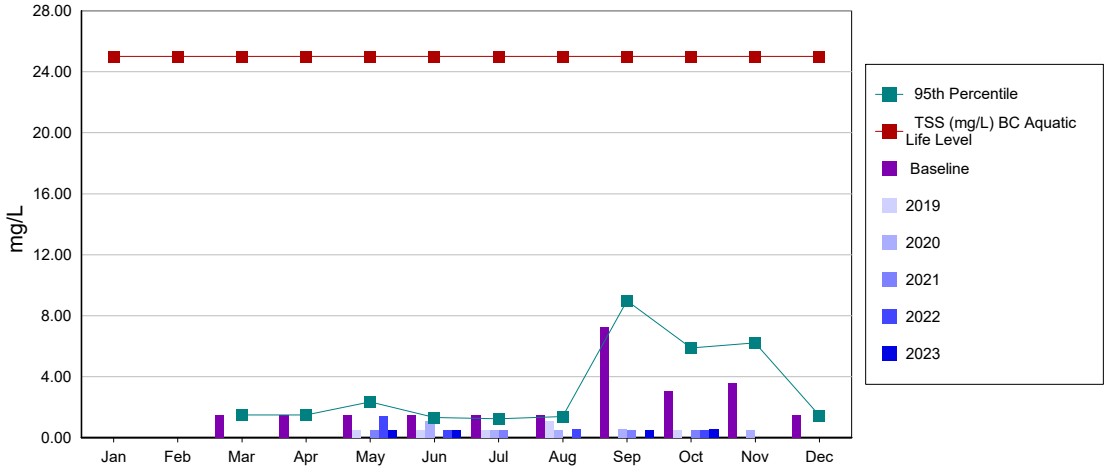
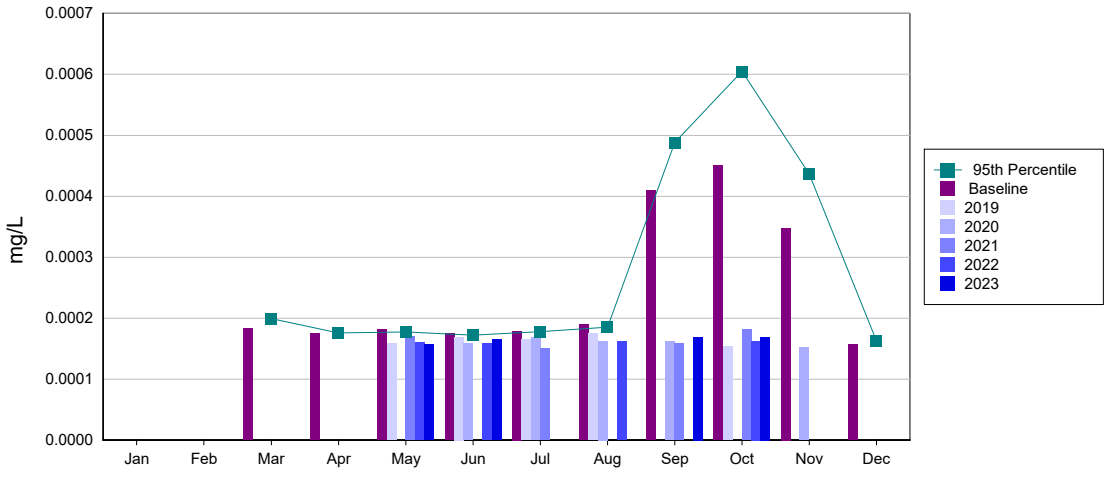
QUL-2a-60m - QUL Between Cariboo Island and HAC : Total Phosphorus (mg/L)



QUL-2a-60m - QUL Between Cariboo Island and HAC : TSS (mg/L)



QUL-2a-60m - QUL Between Cariboo Island and HAC : Uranium (U)-Total (mg/L)



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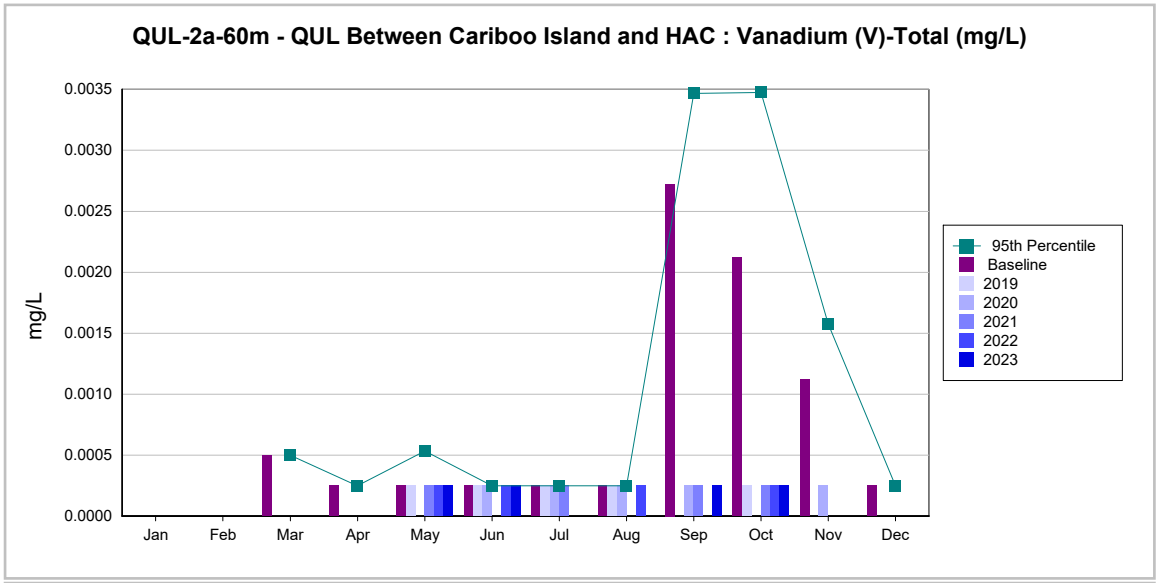

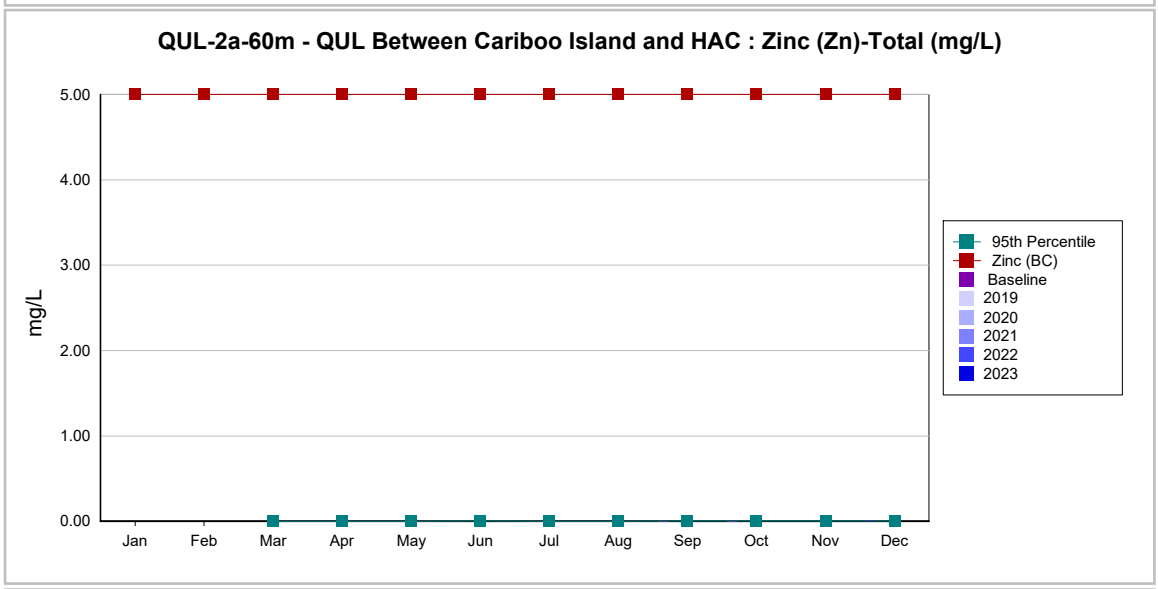

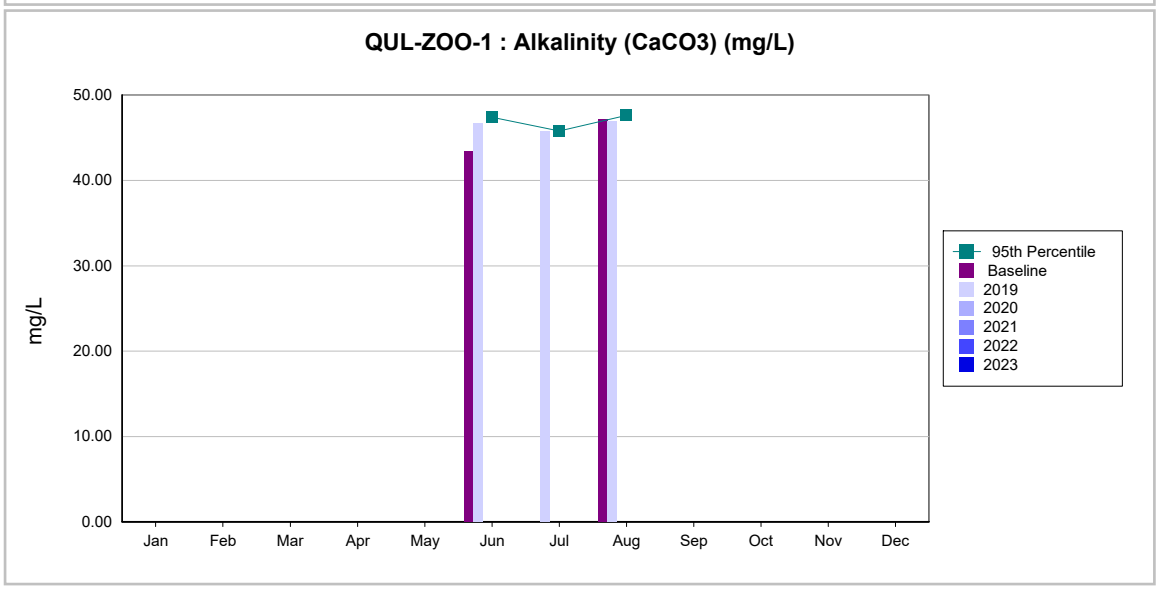

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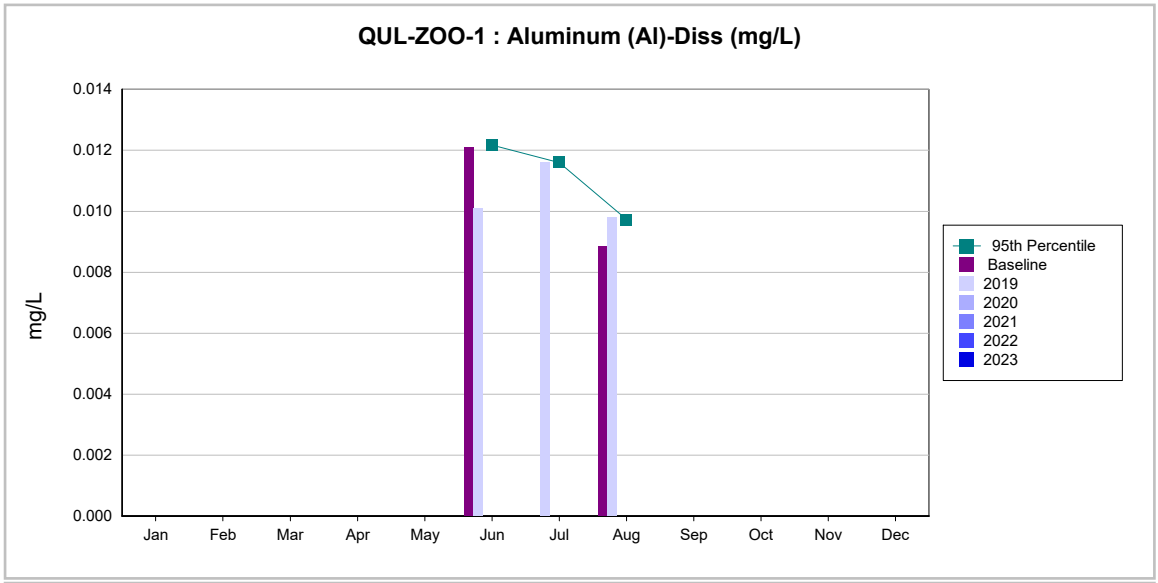

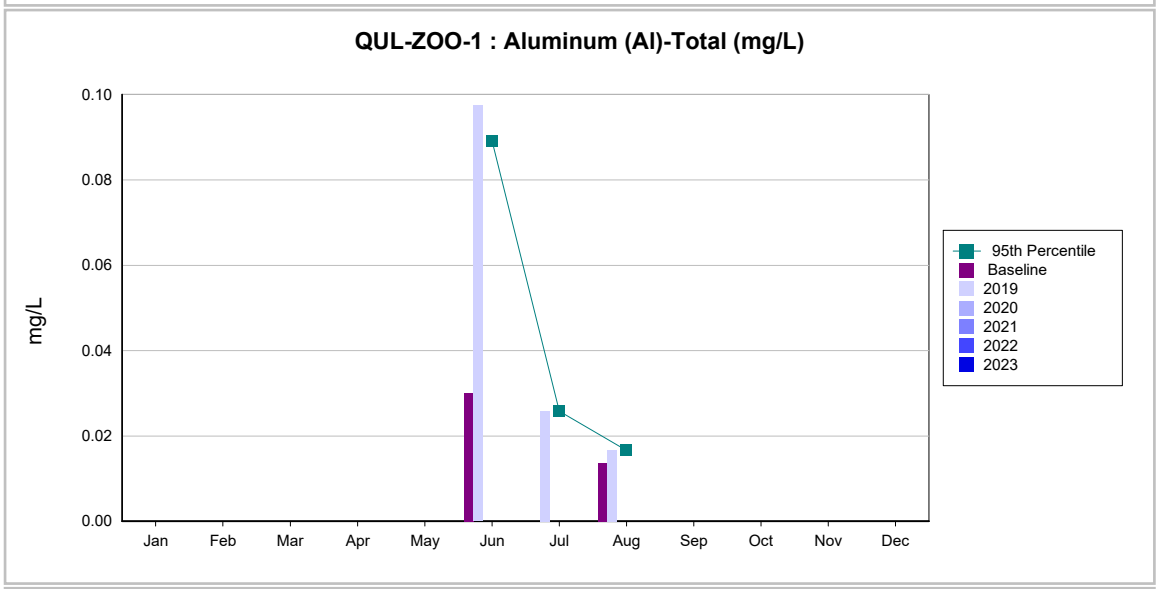

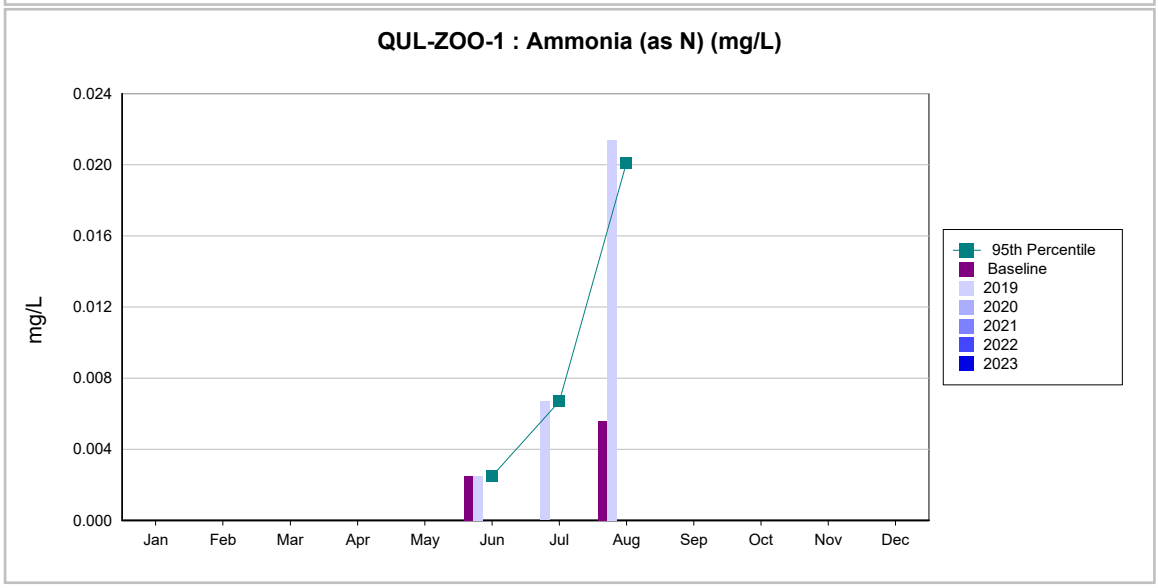

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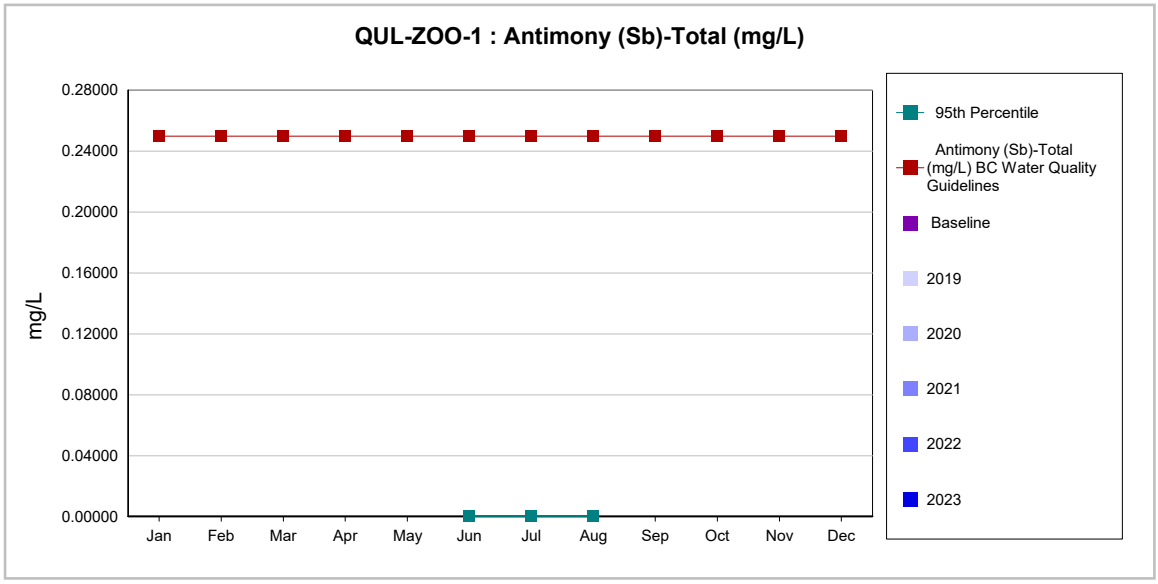

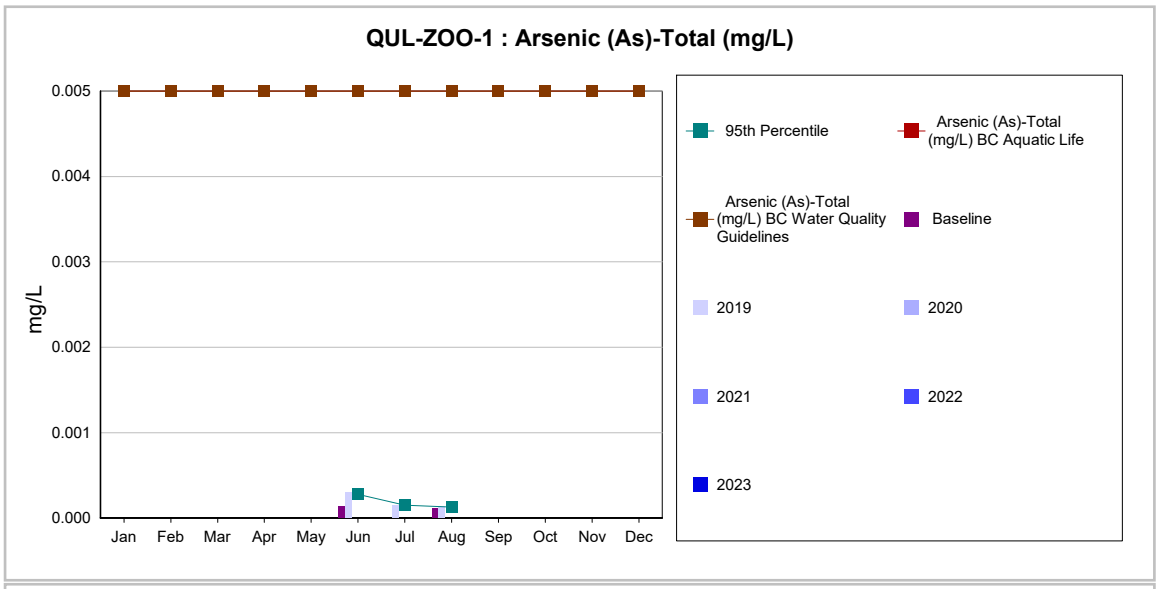

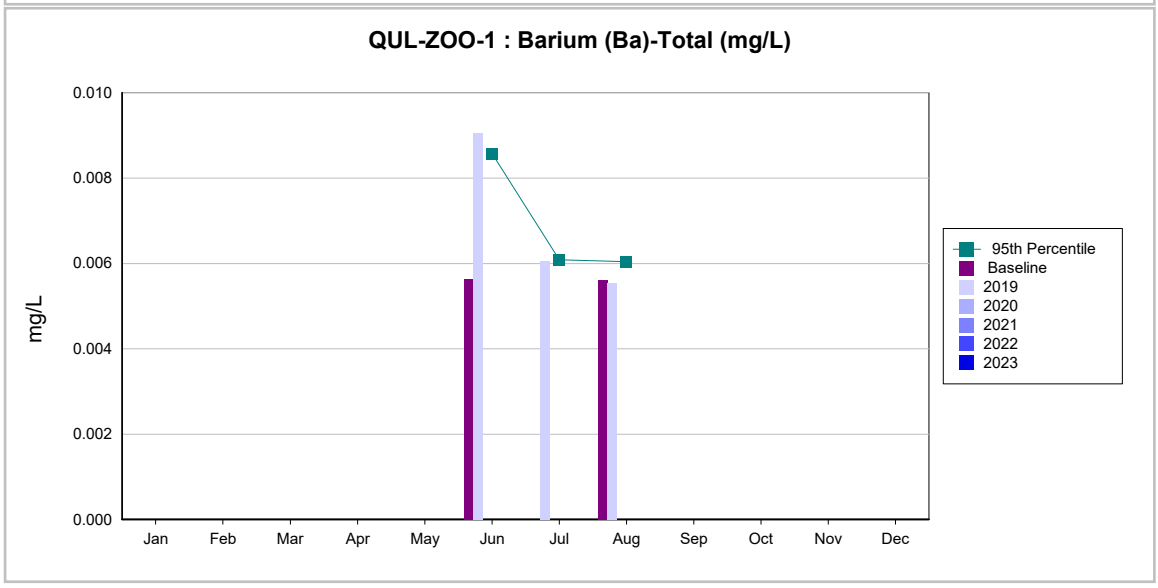

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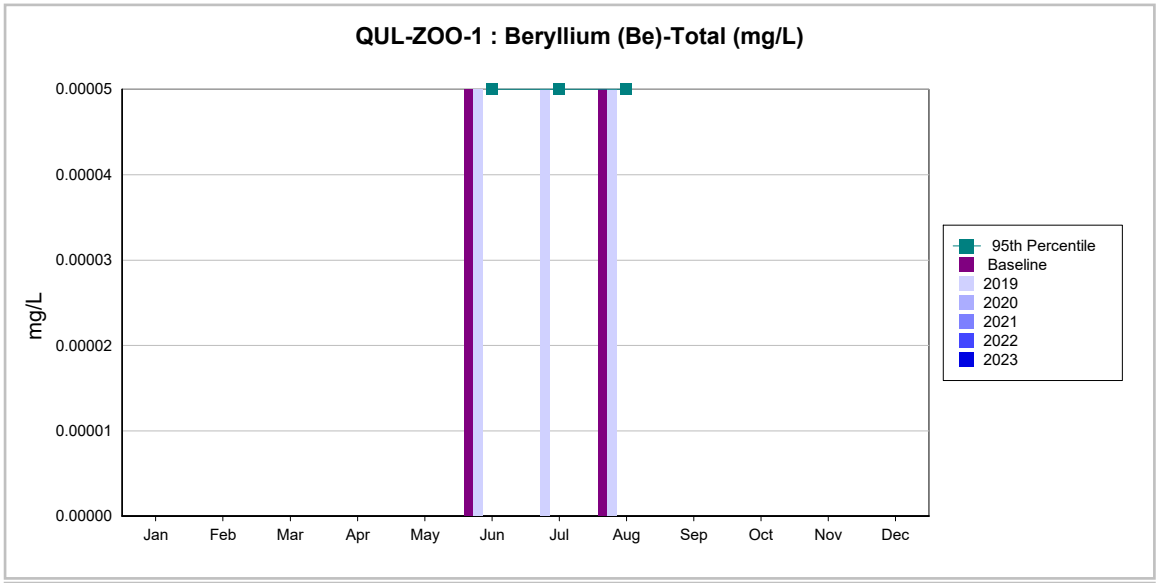

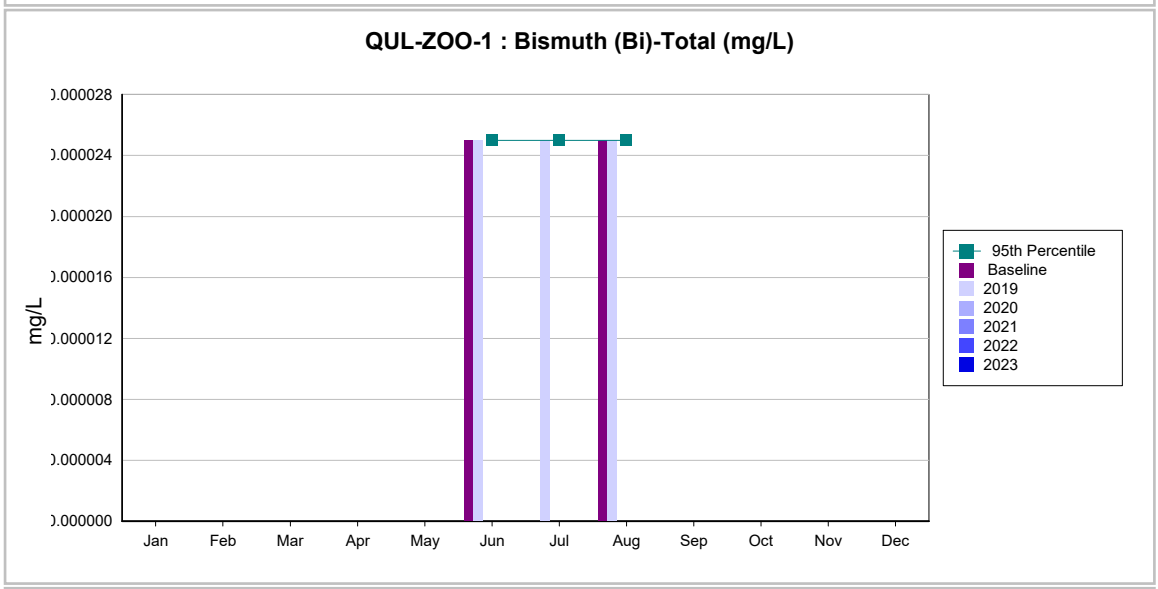

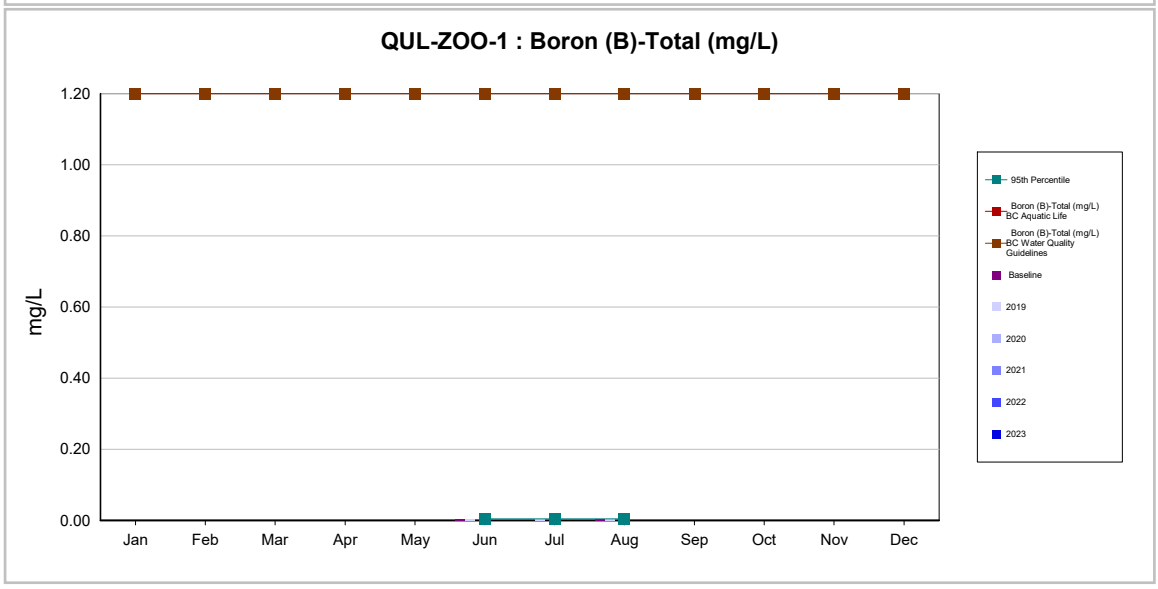

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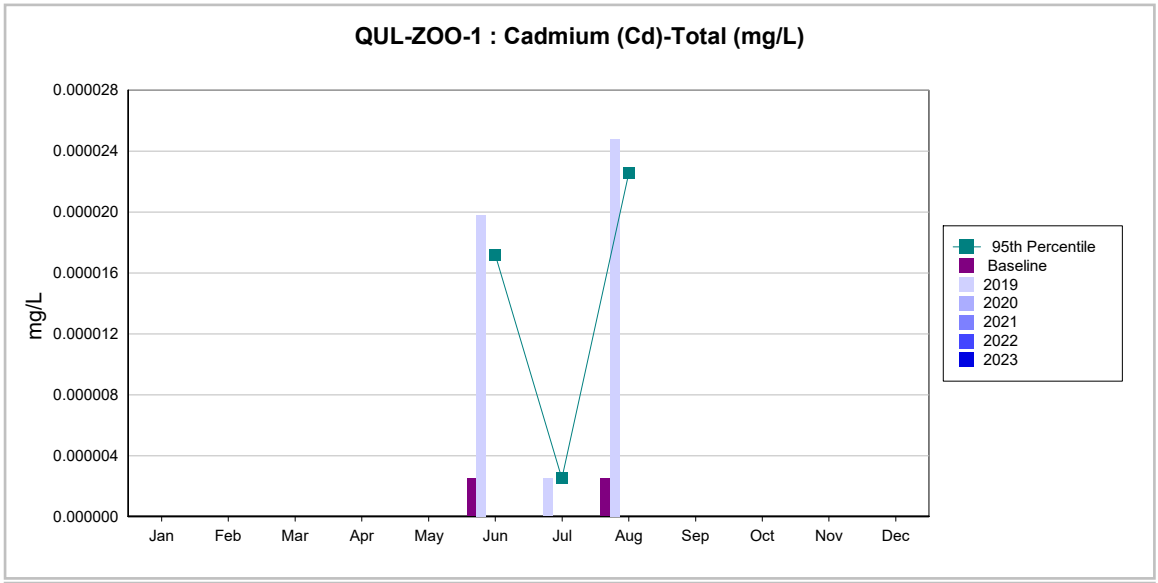

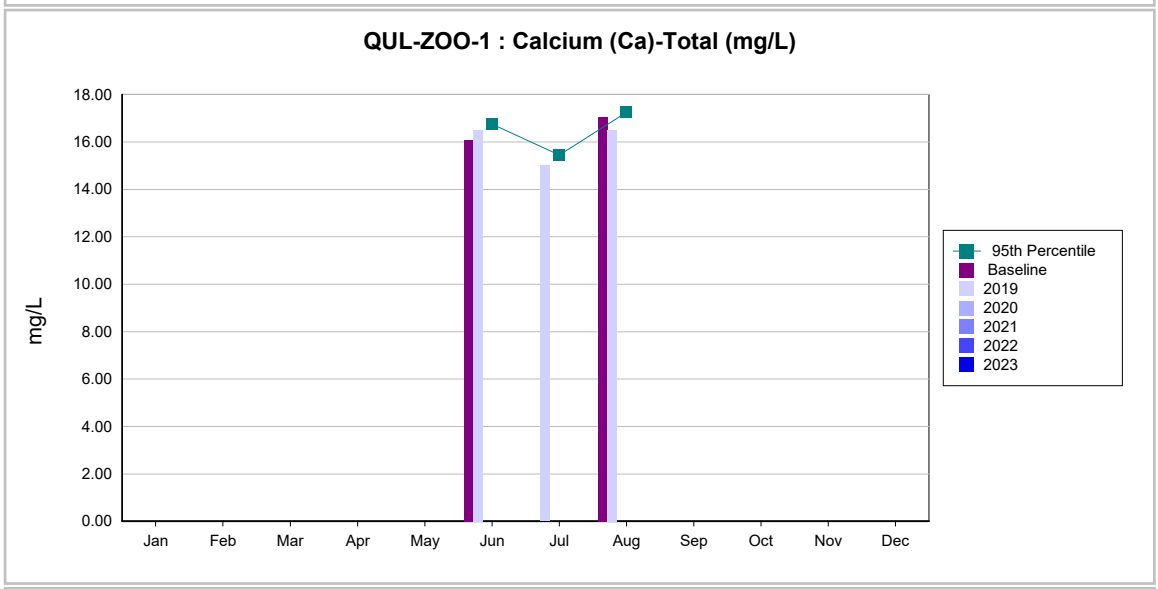

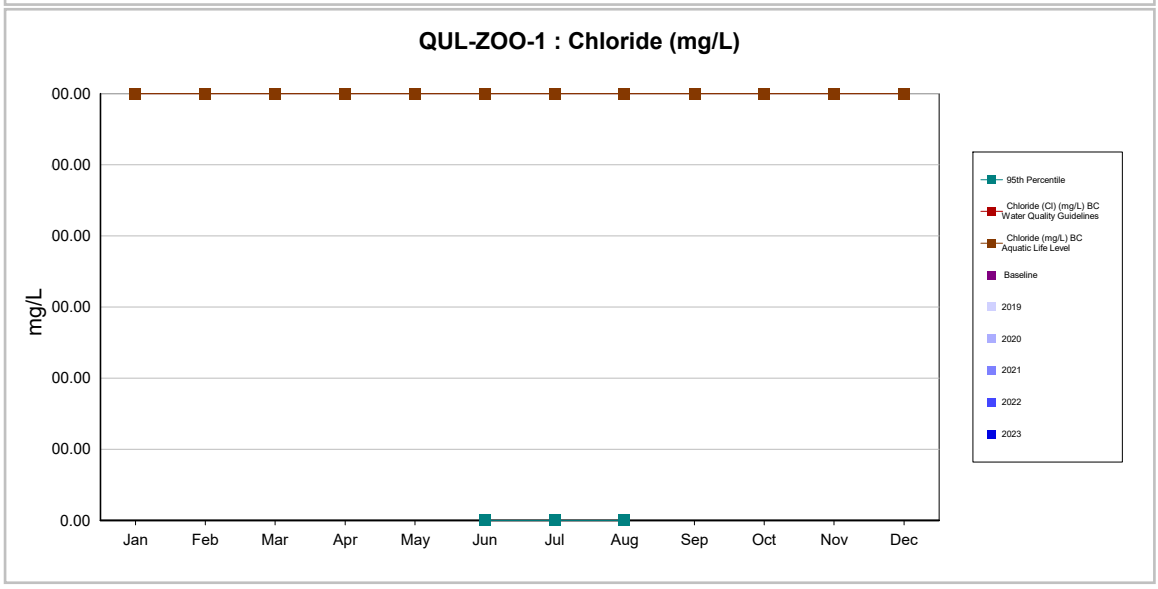

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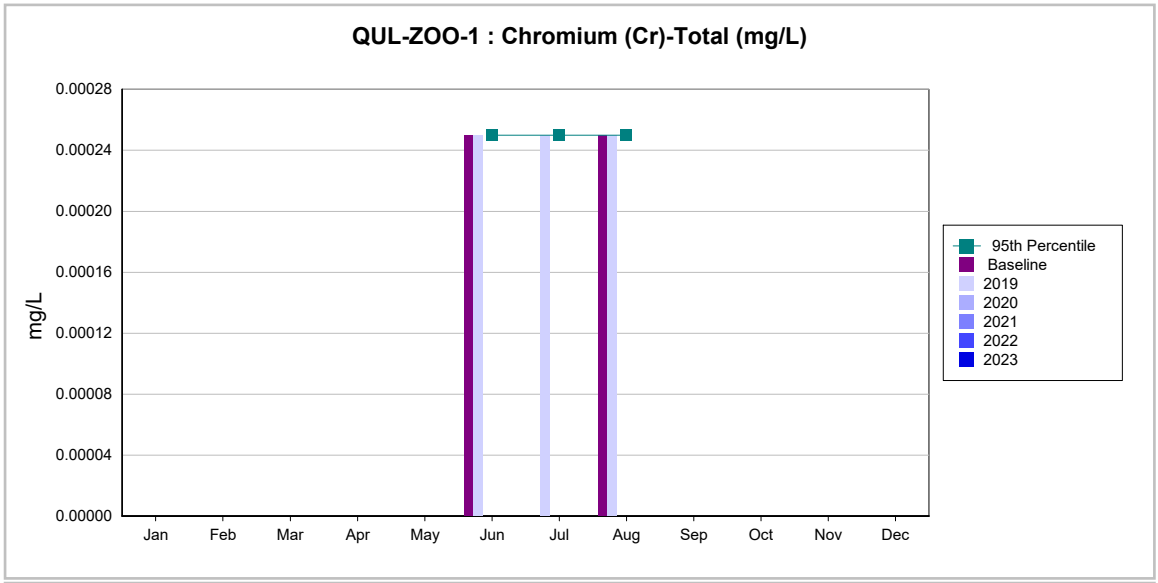

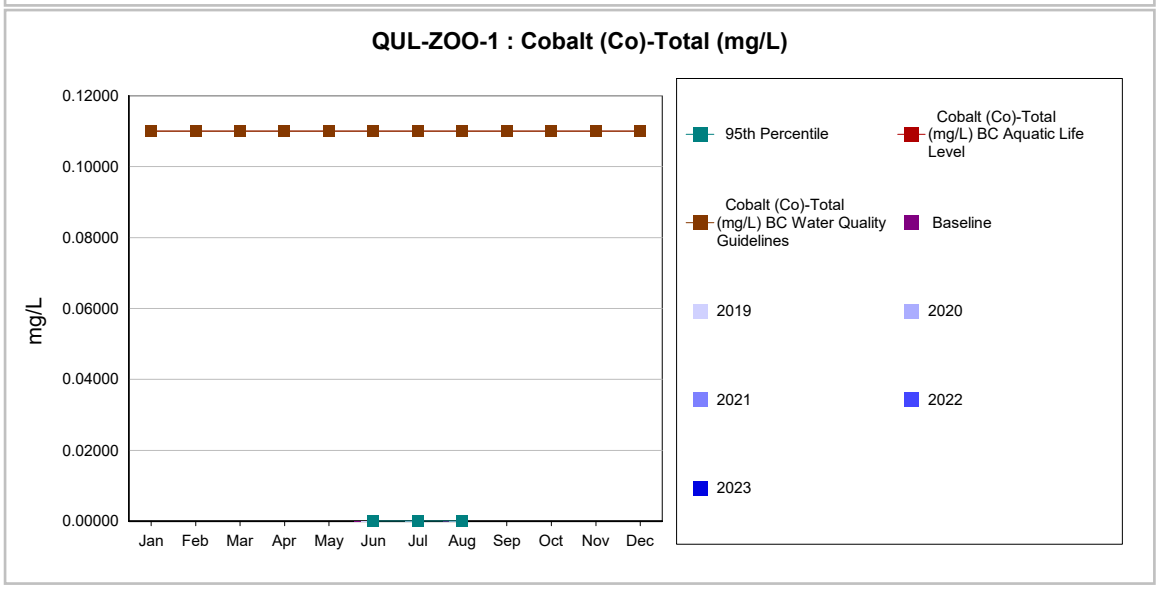

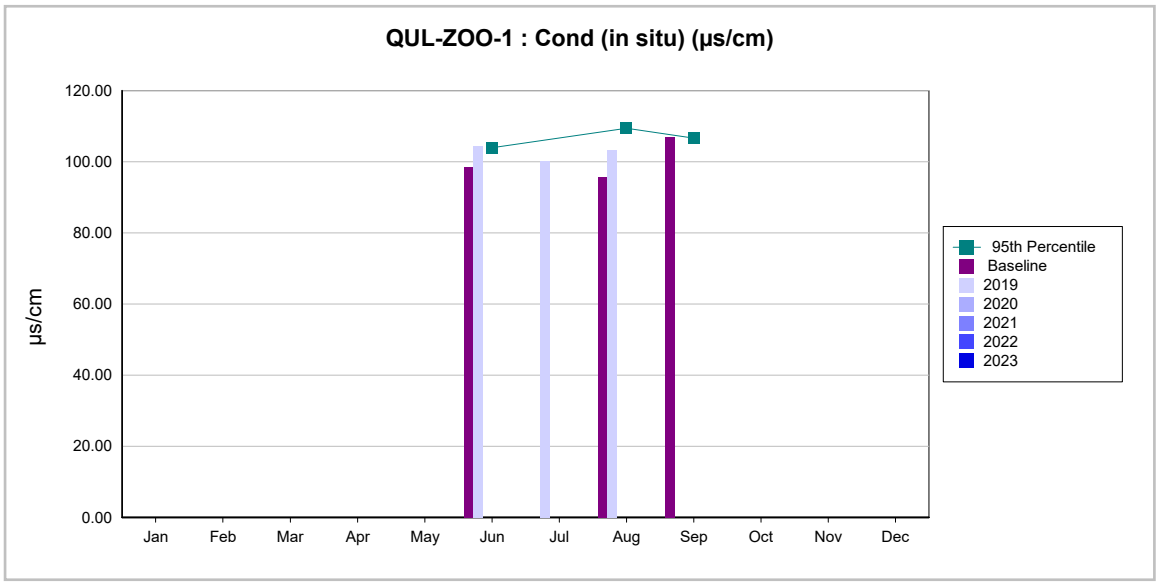

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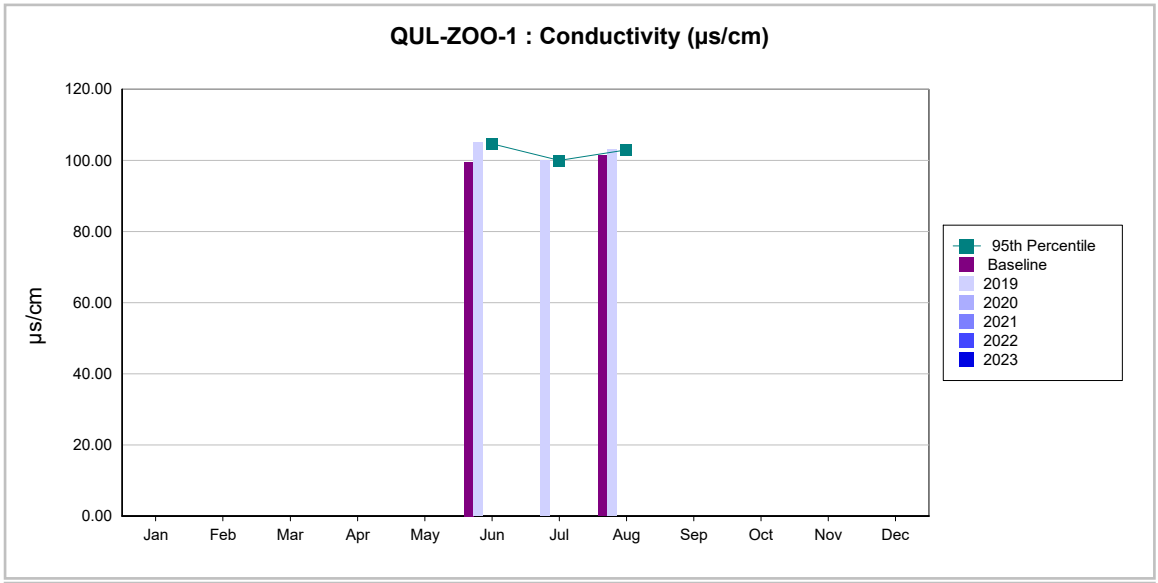

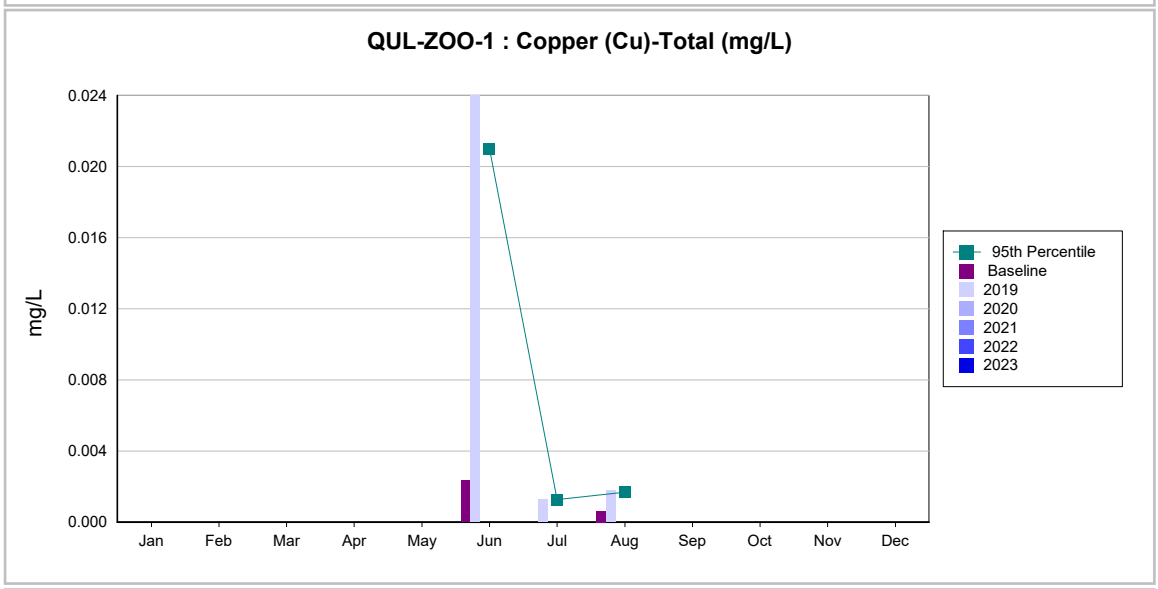

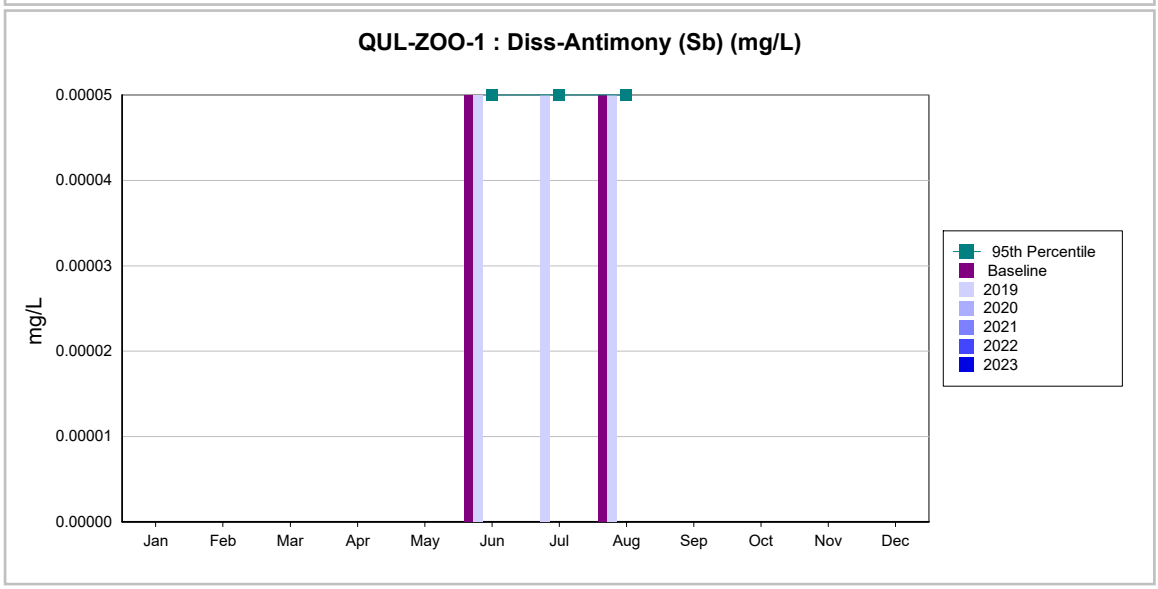

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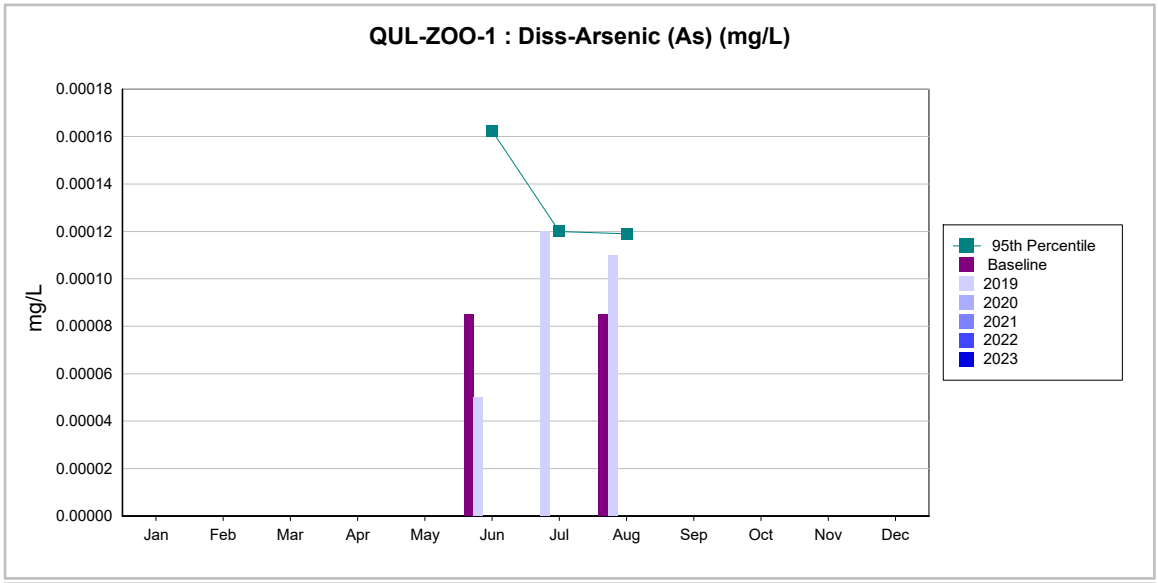

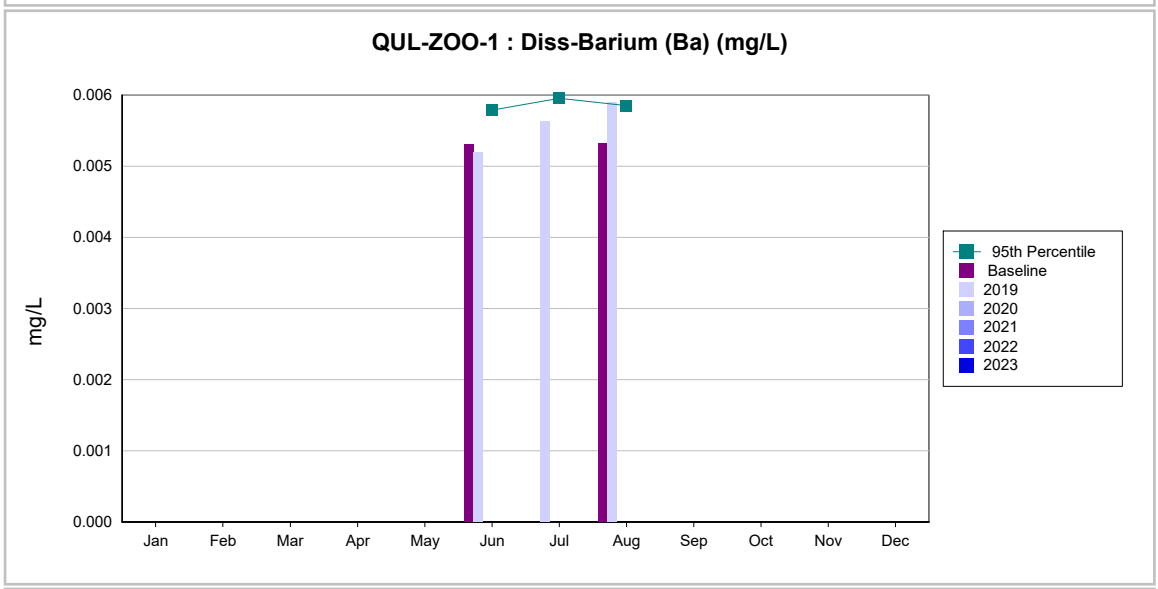

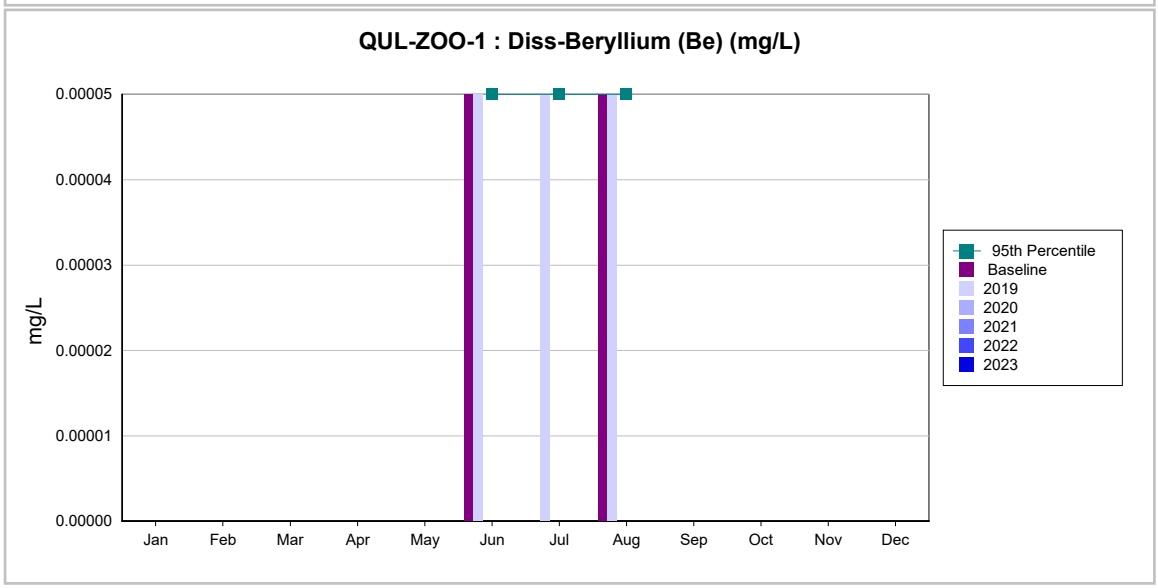

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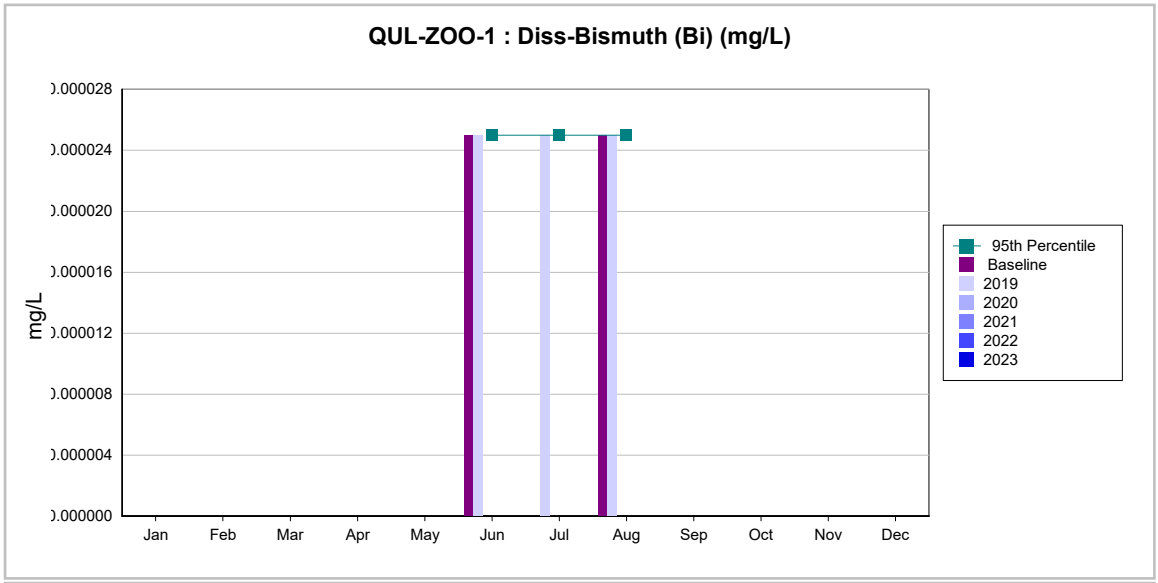

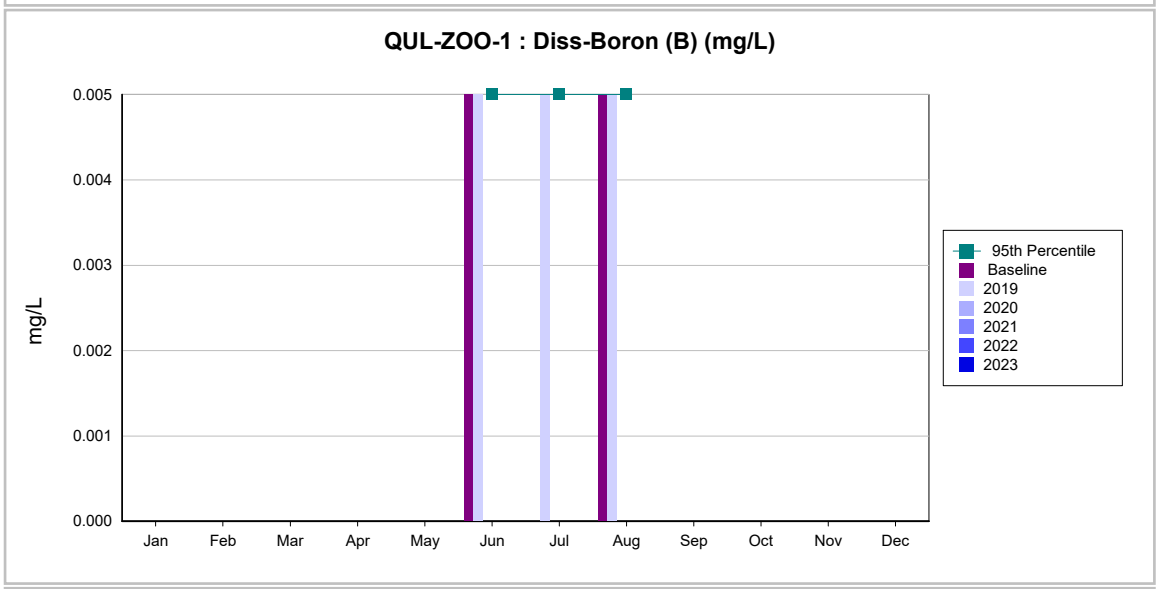

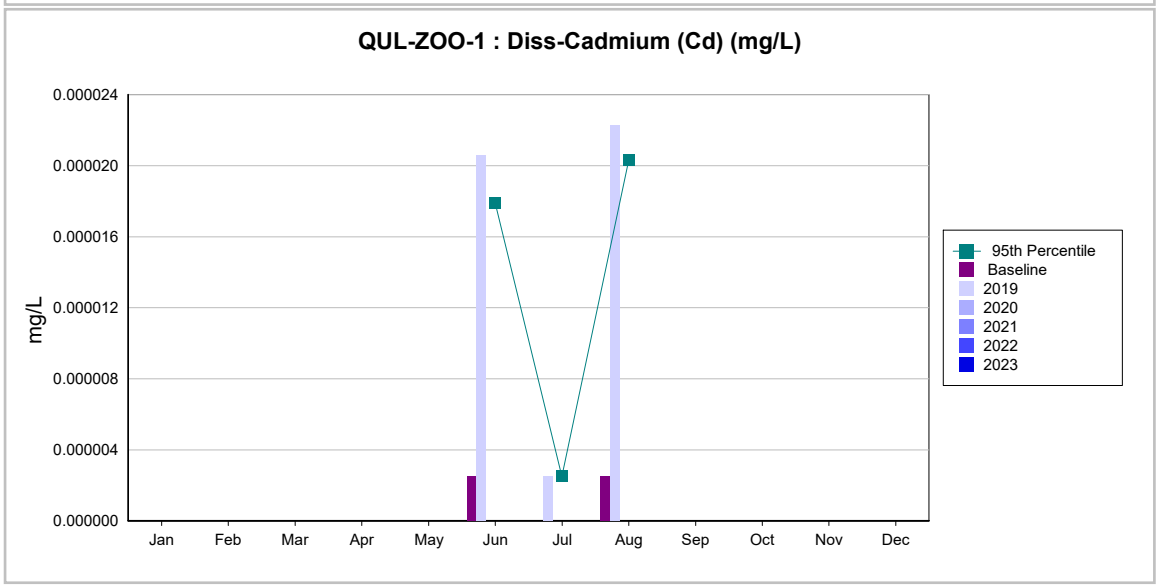

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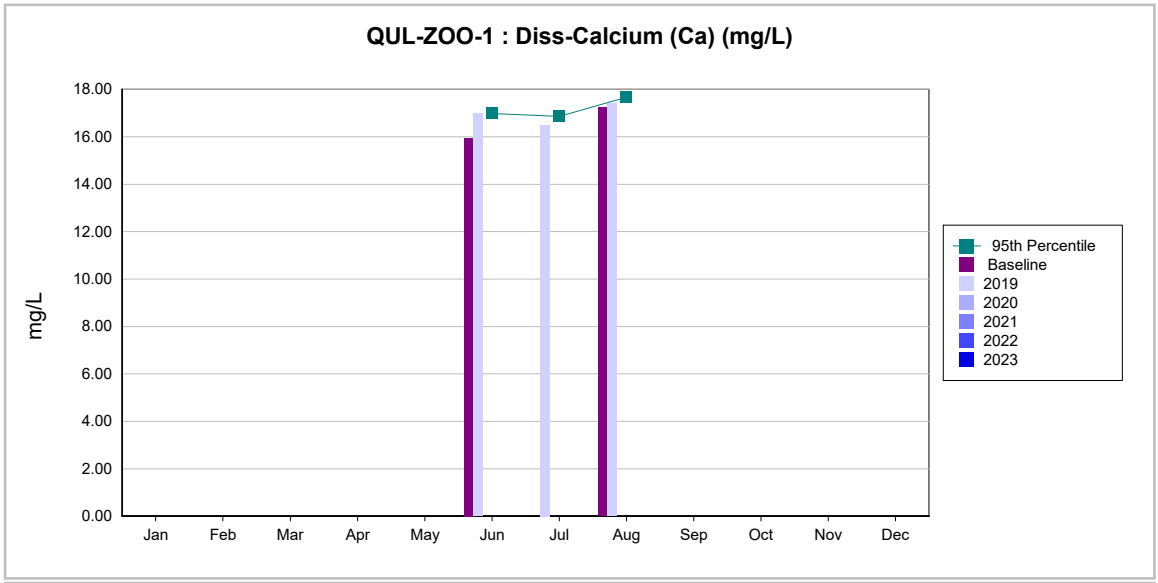

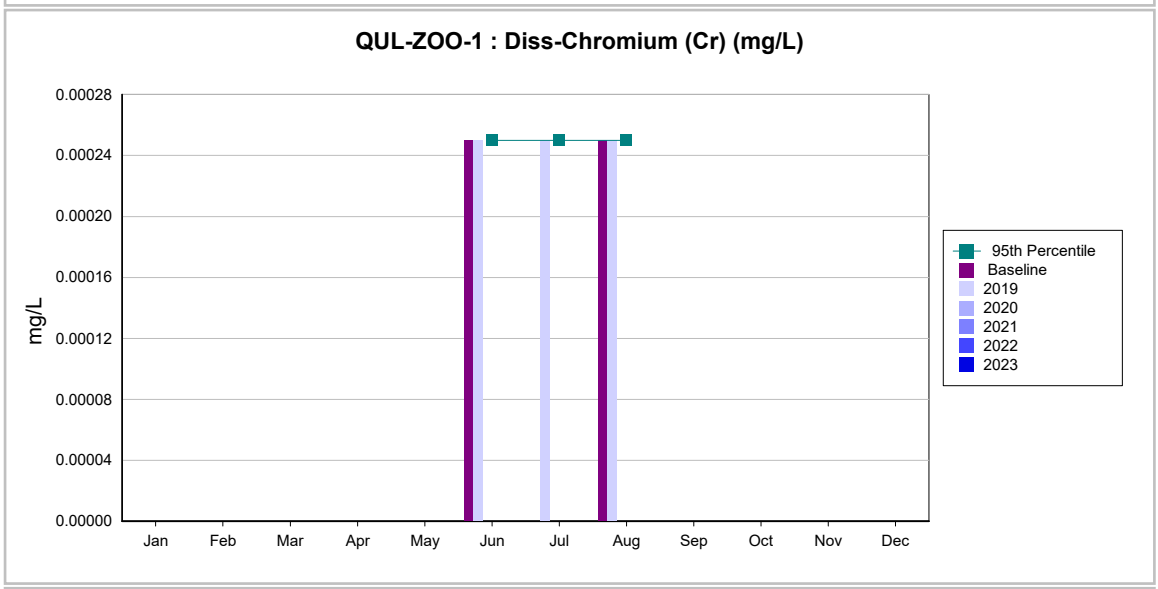

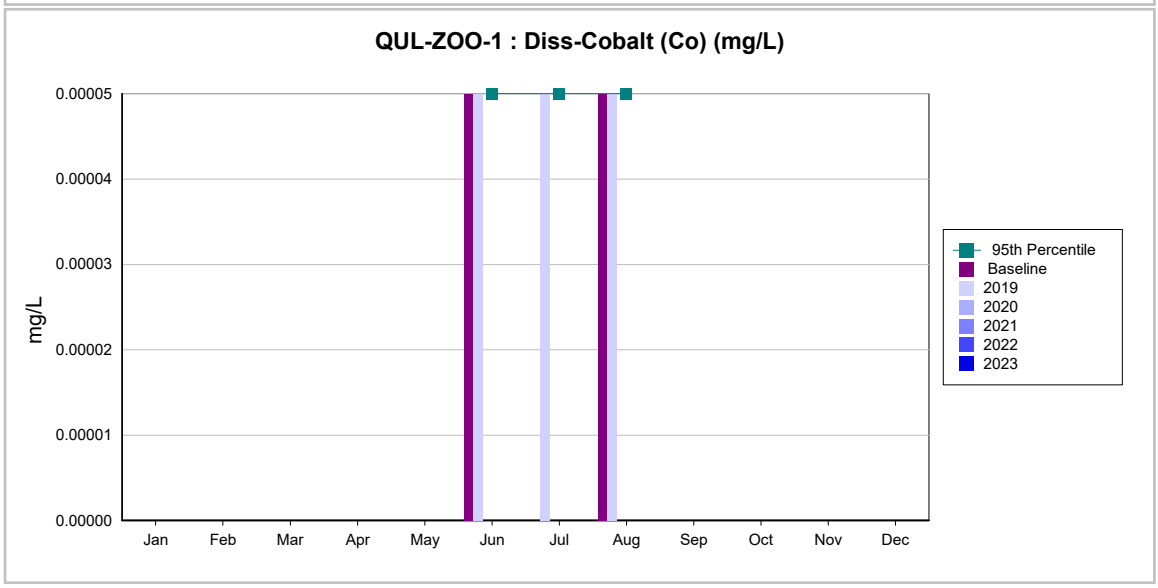

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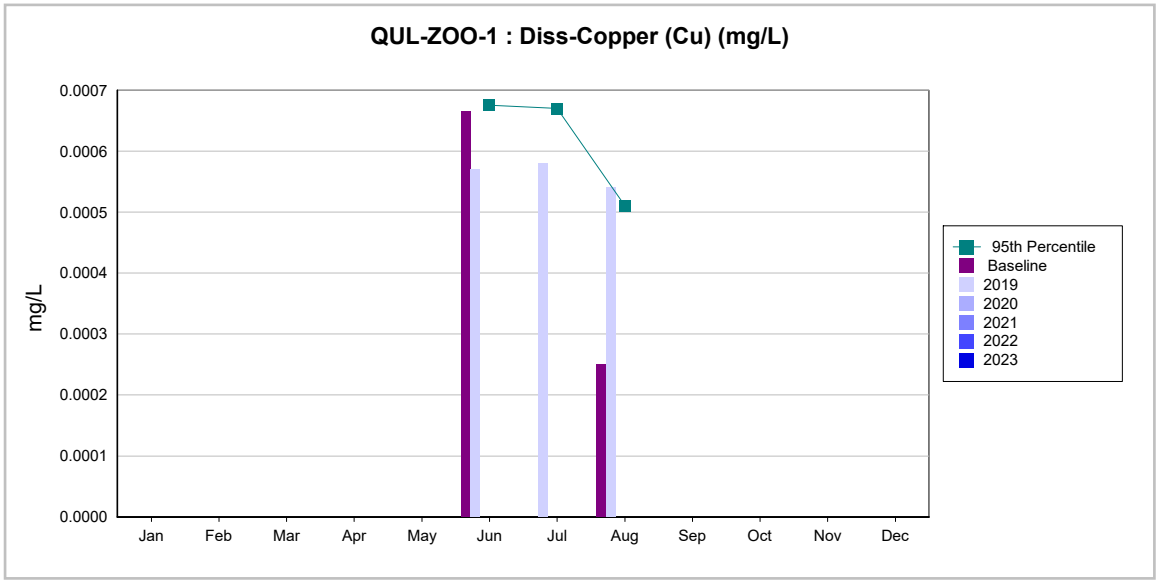

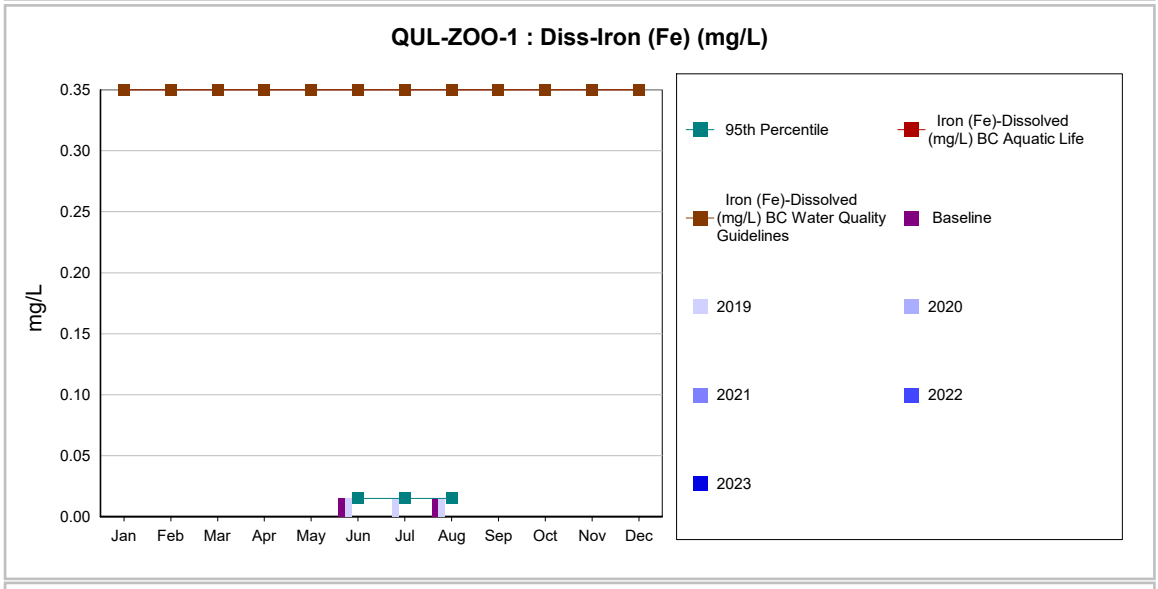

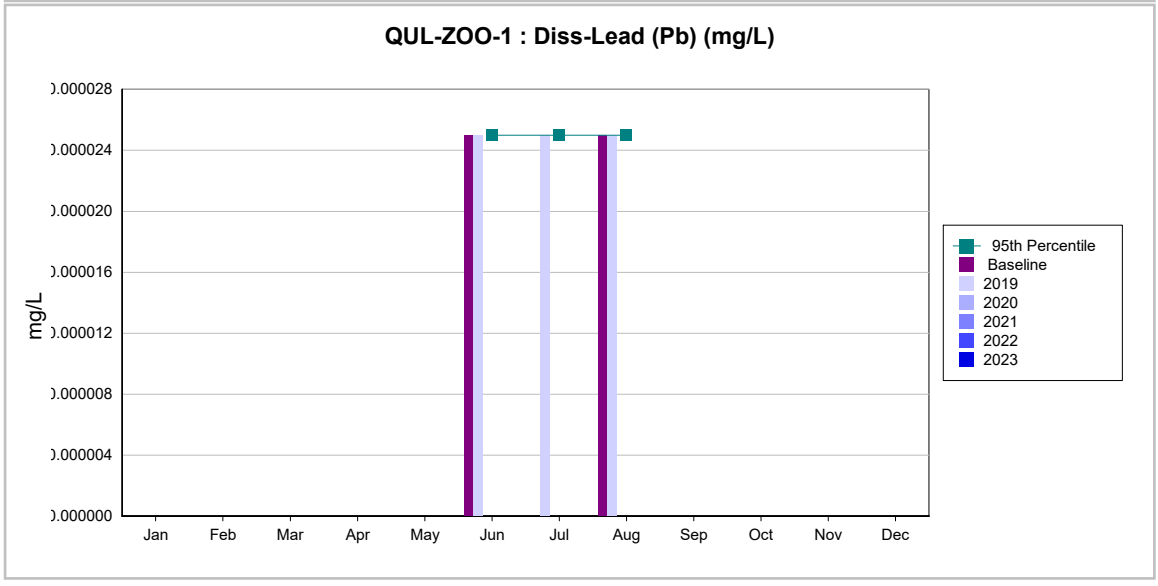

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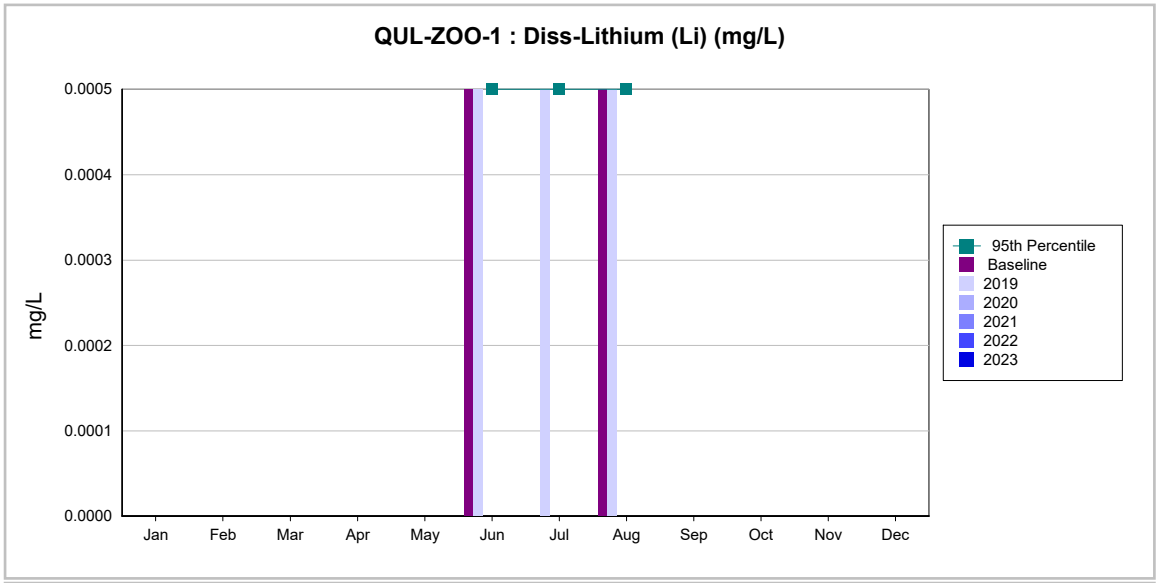

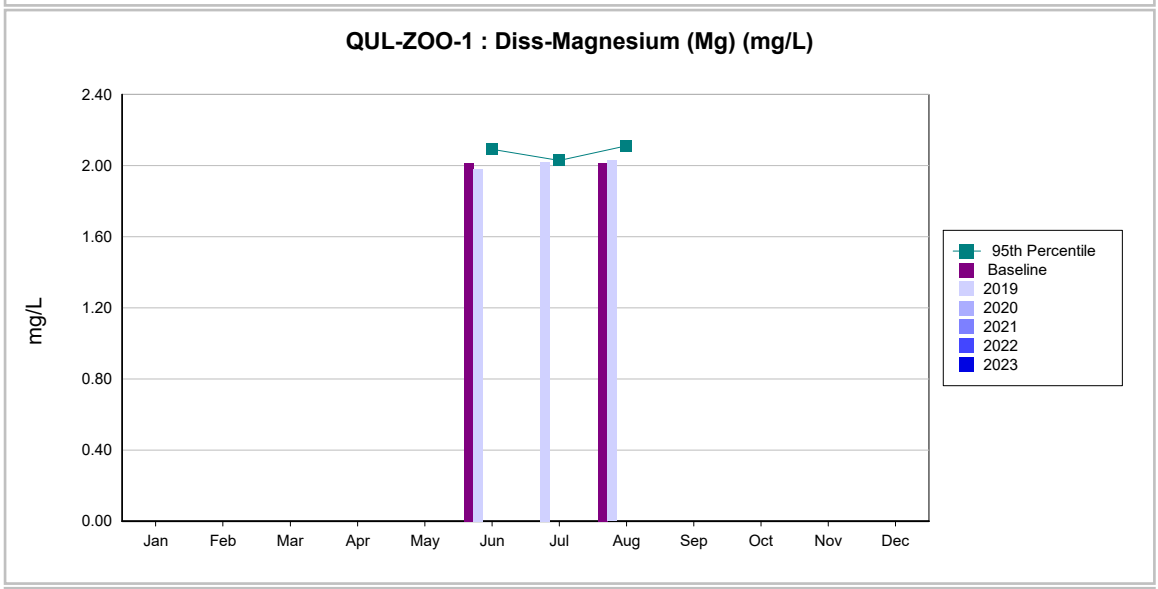

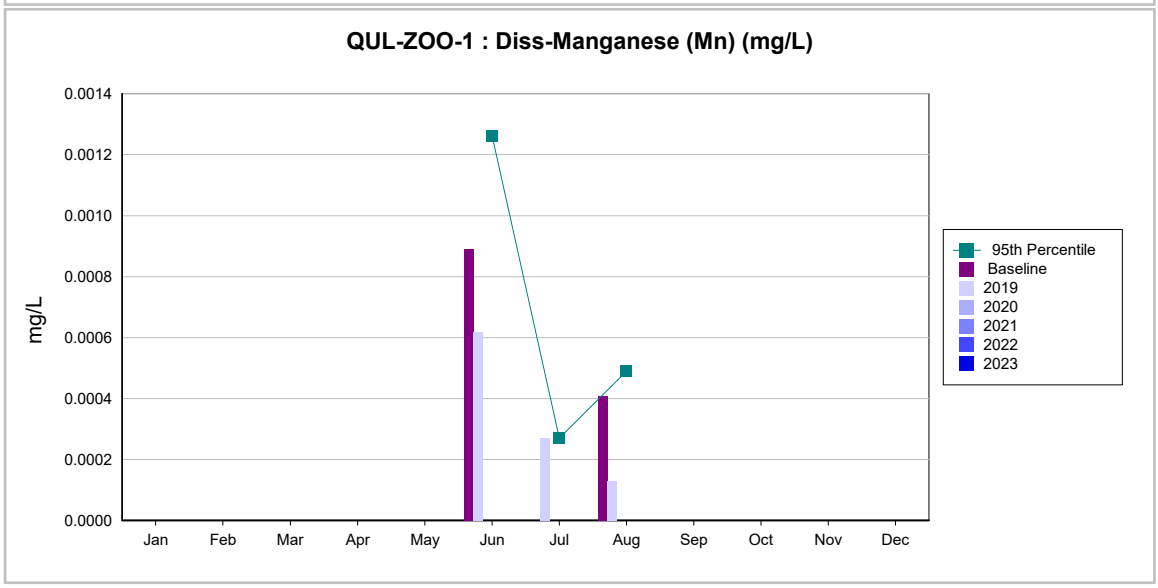

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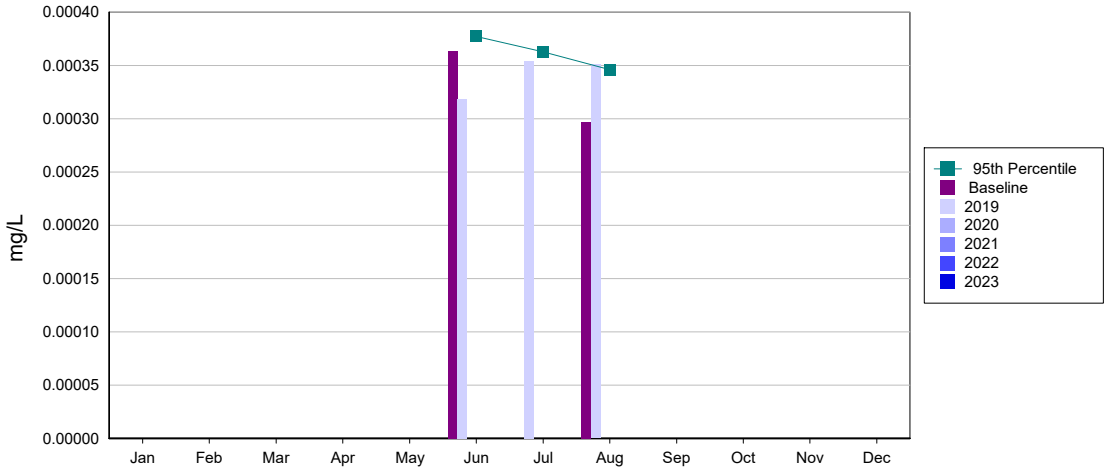

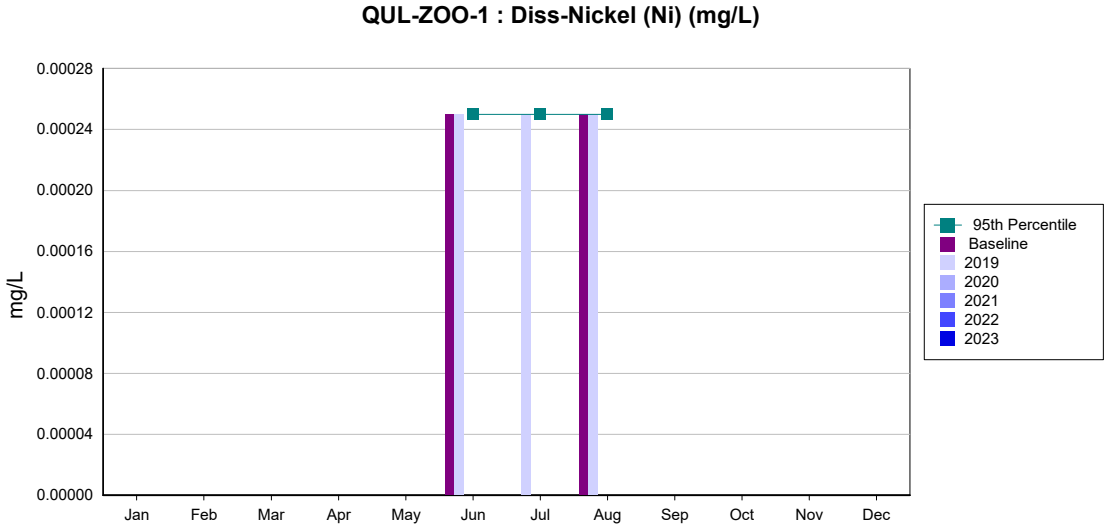

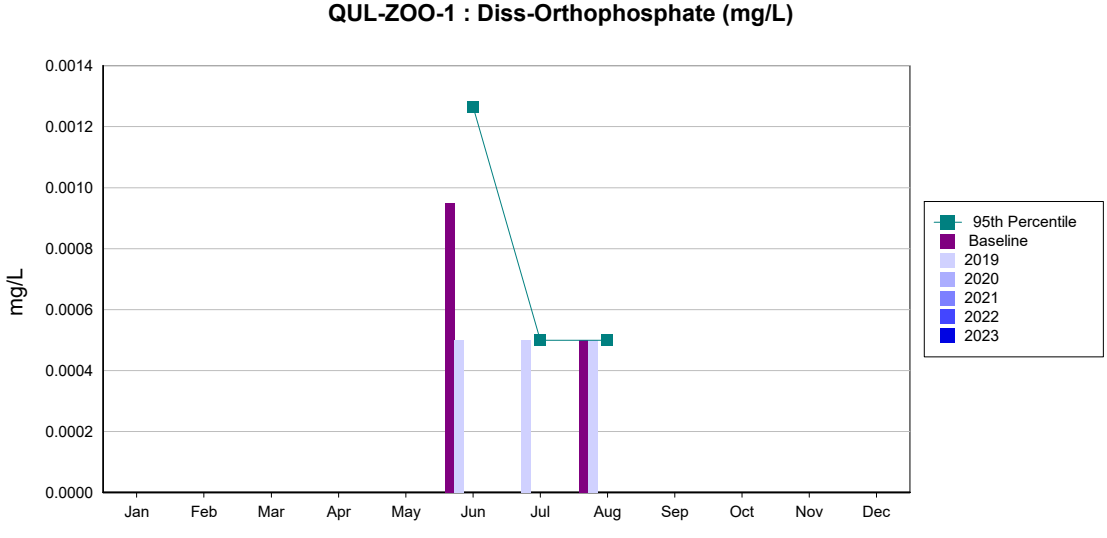

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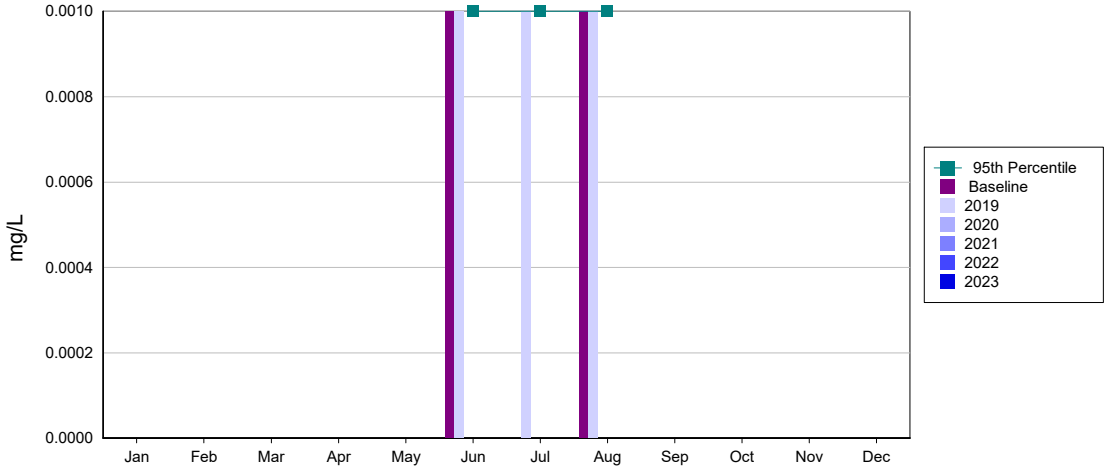

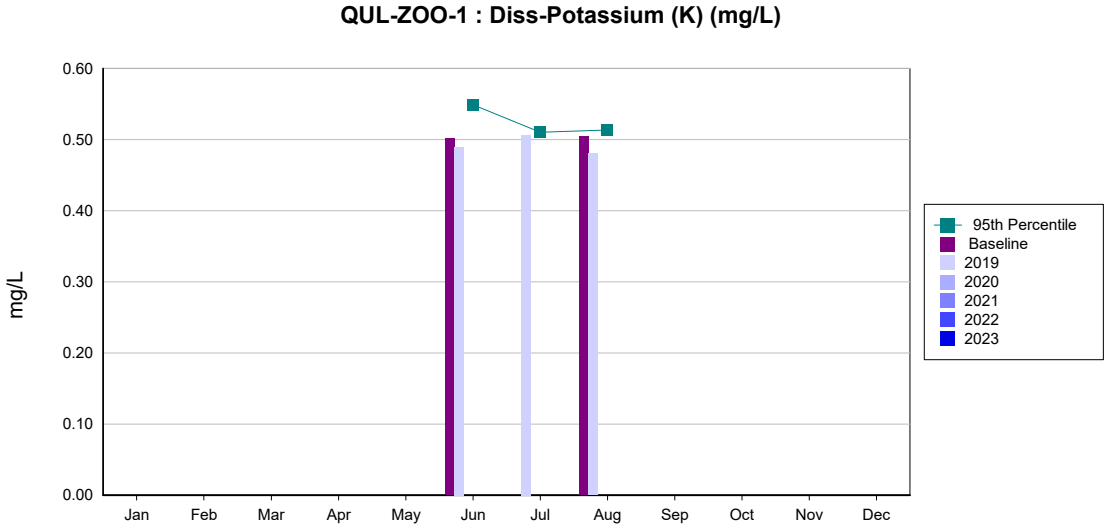

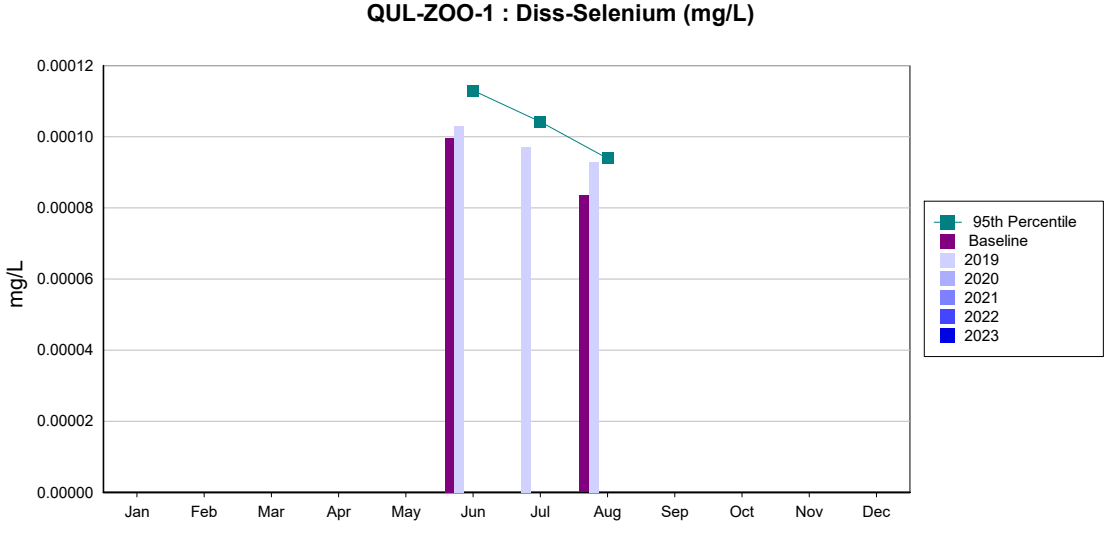

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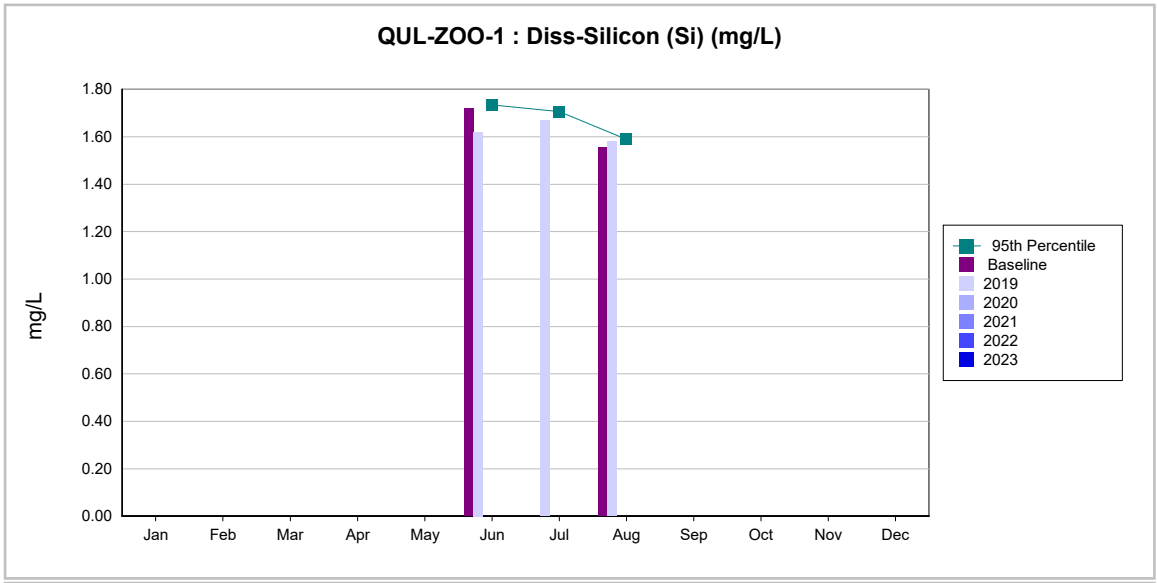

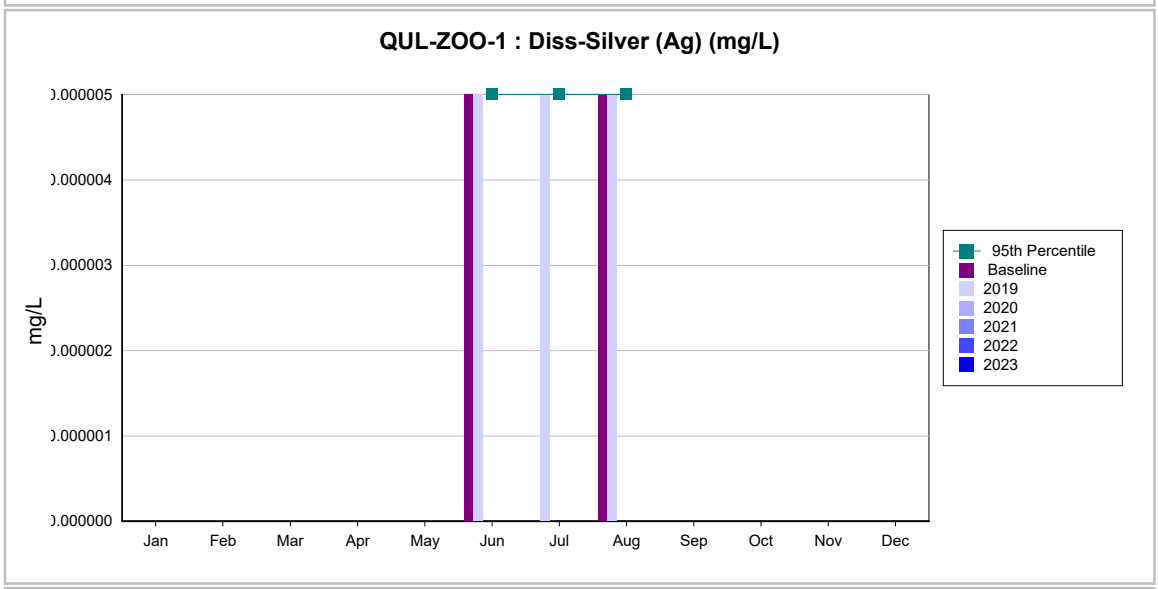

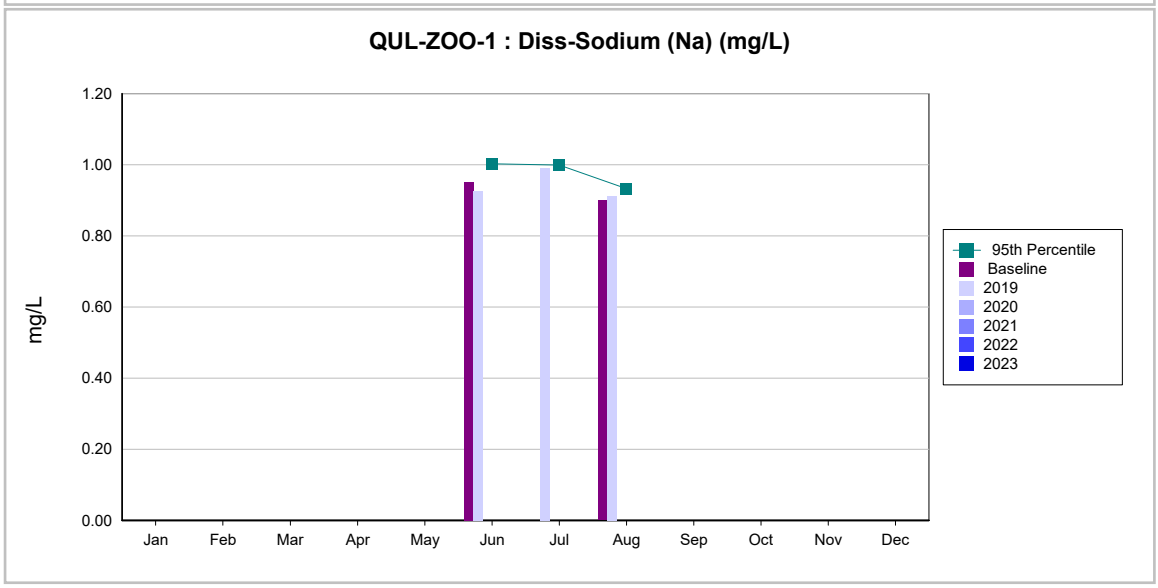

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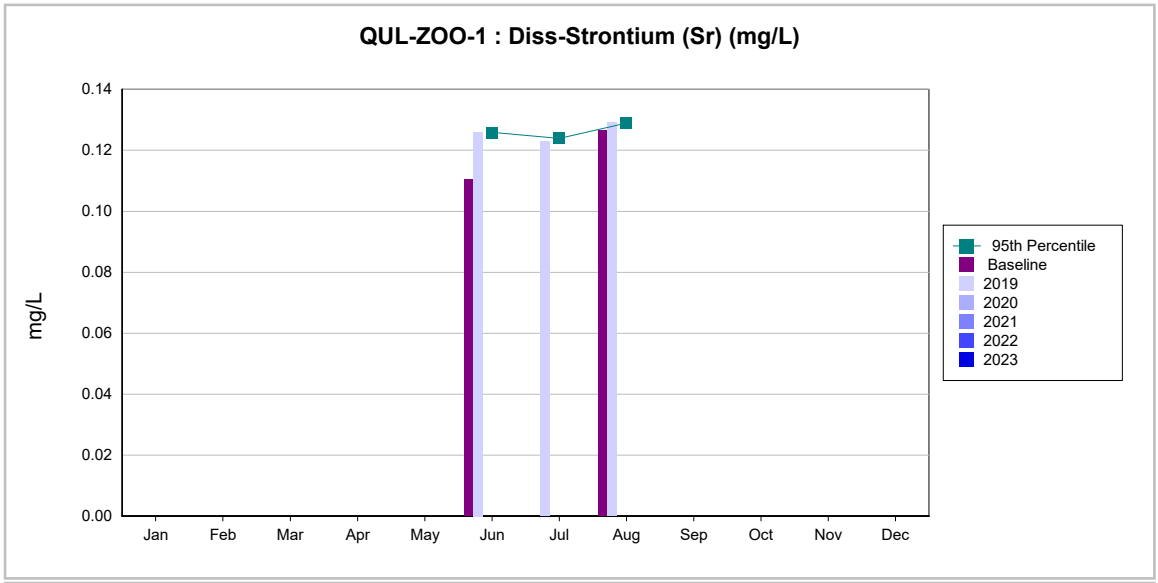

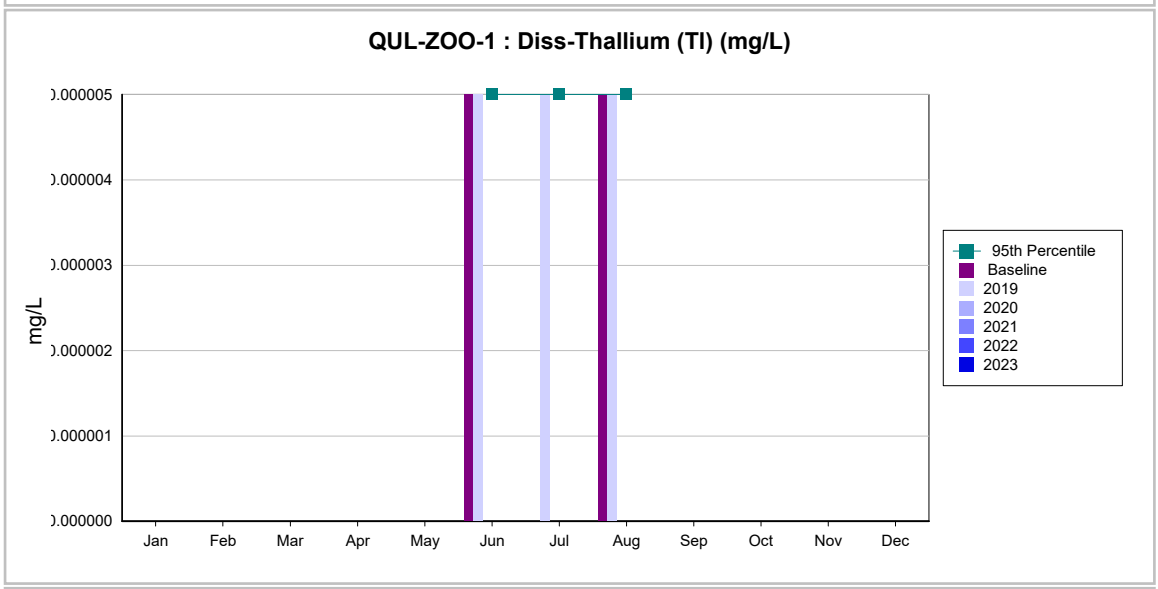

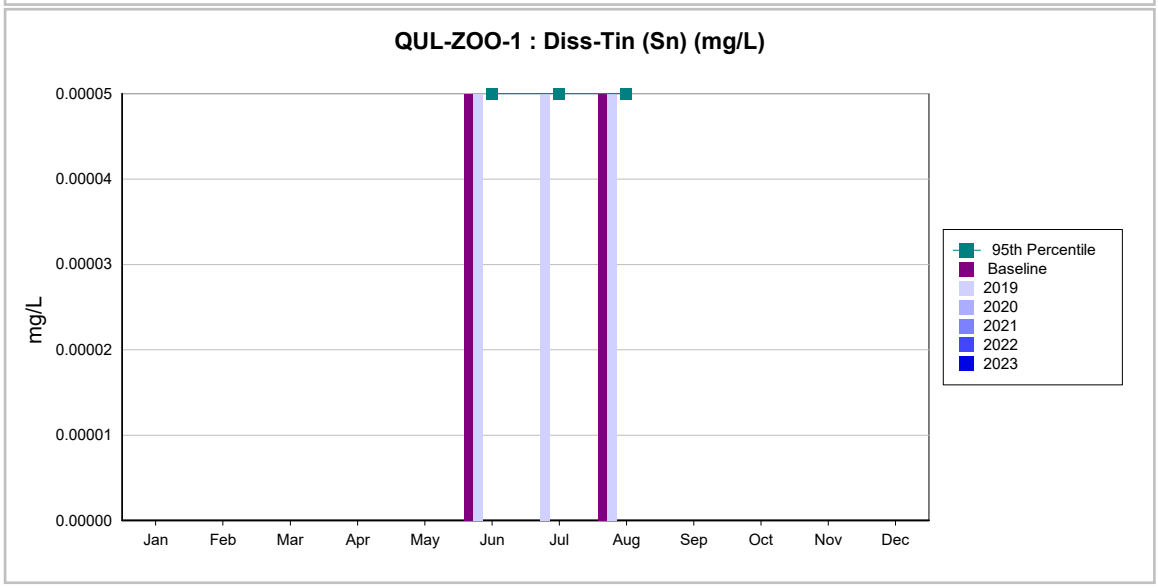

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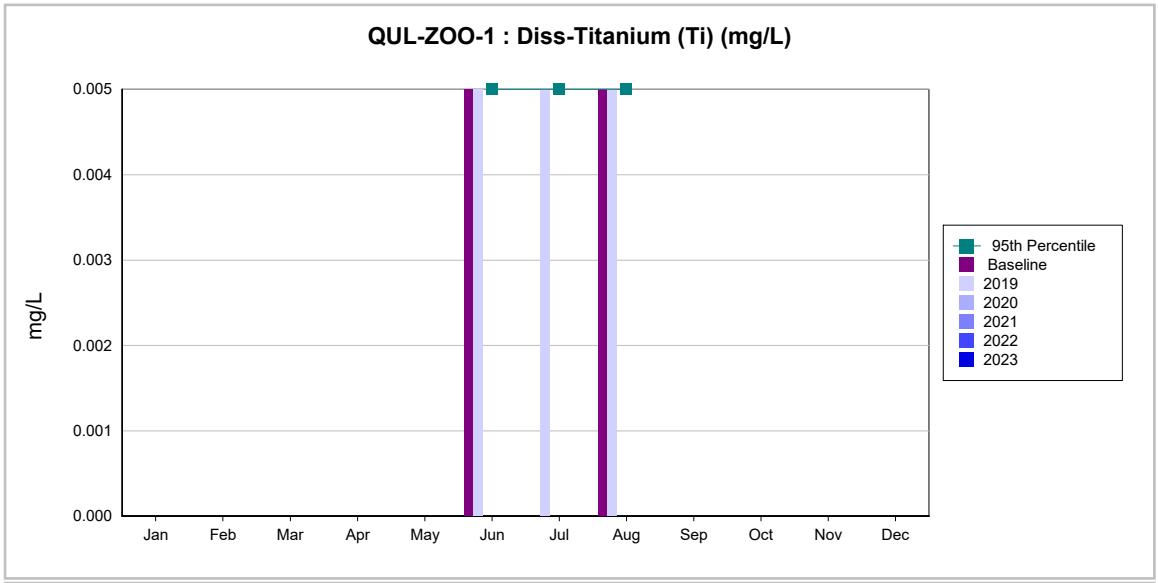

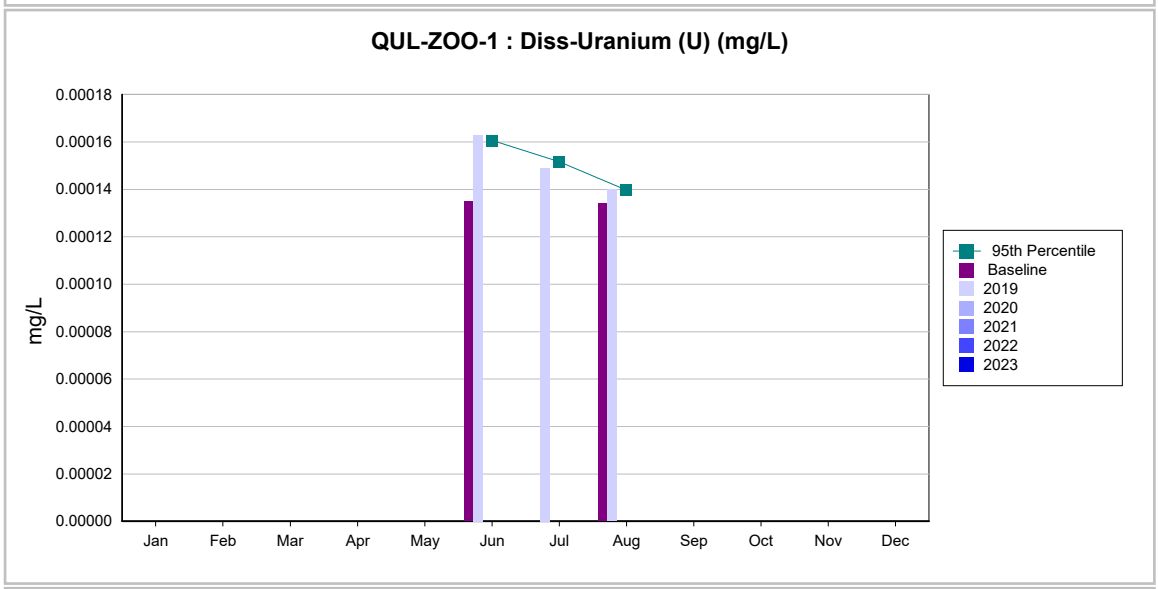

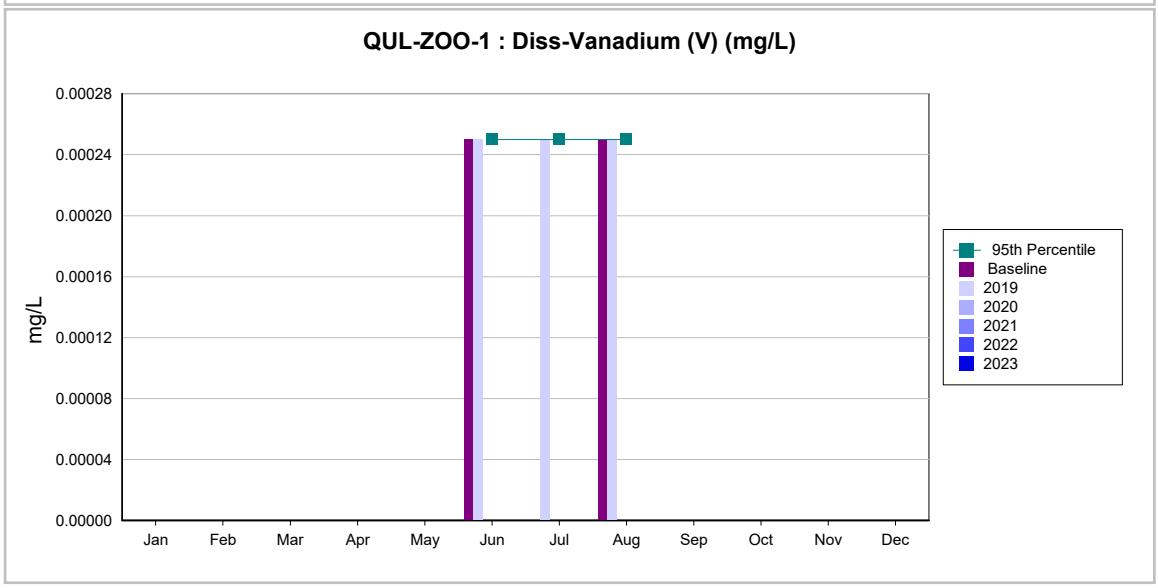

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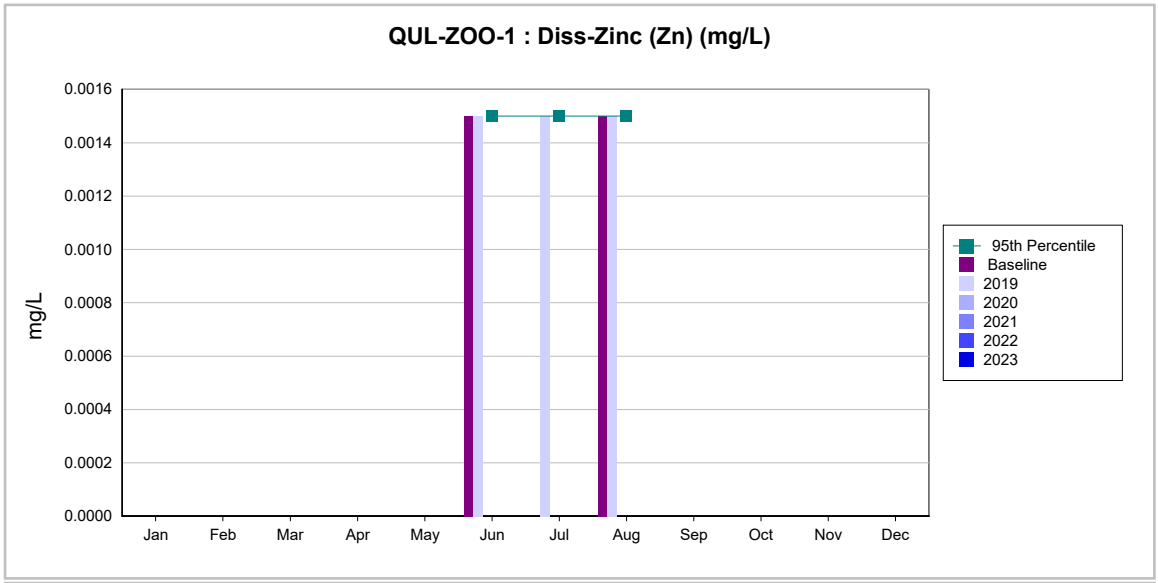

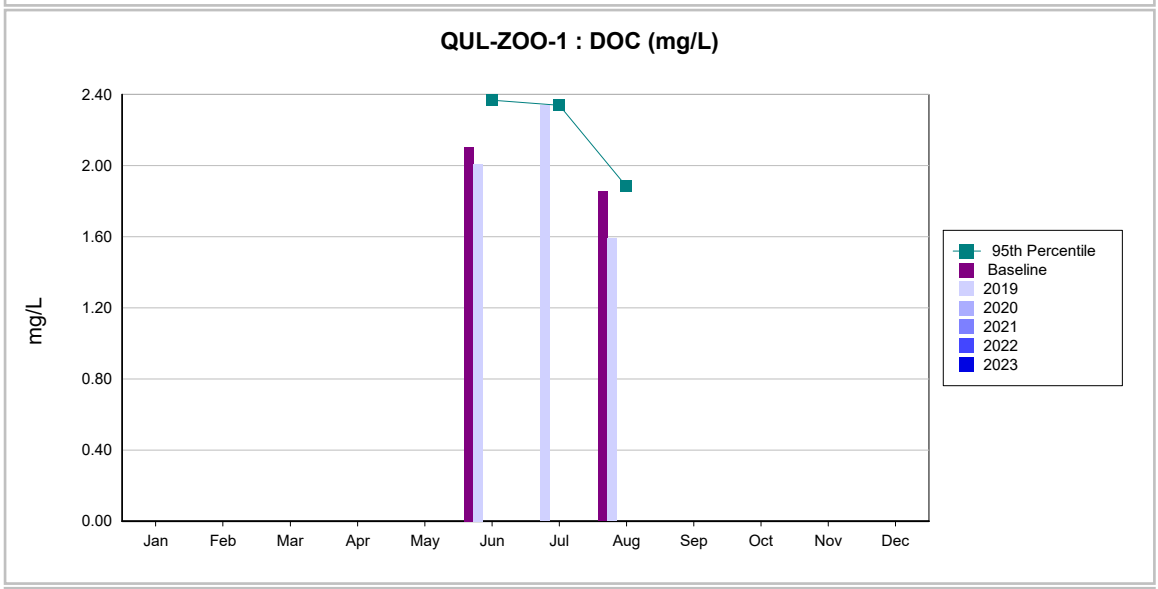

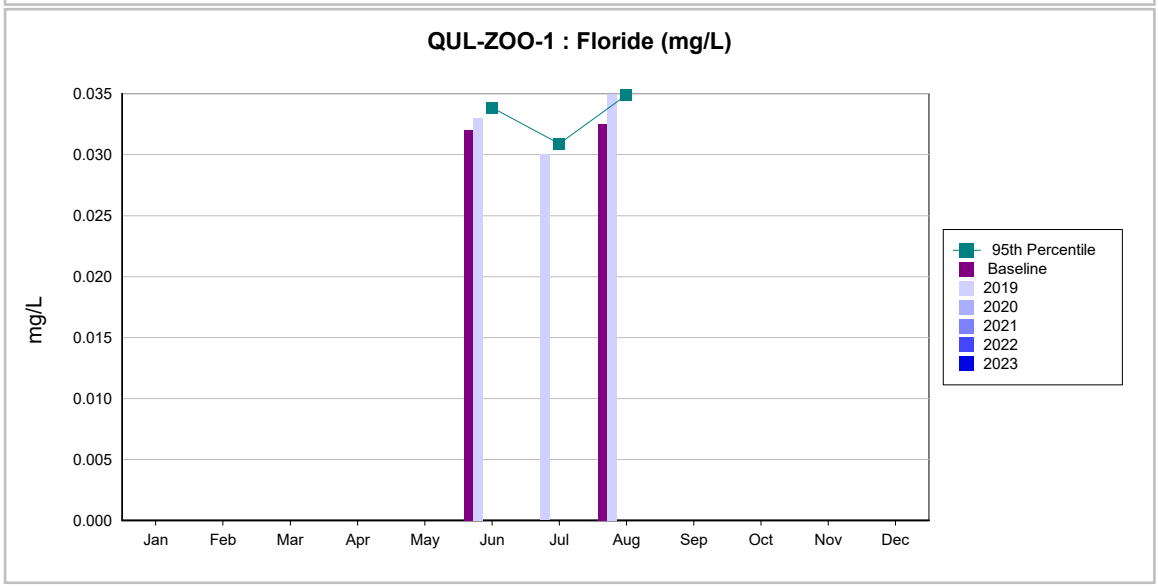

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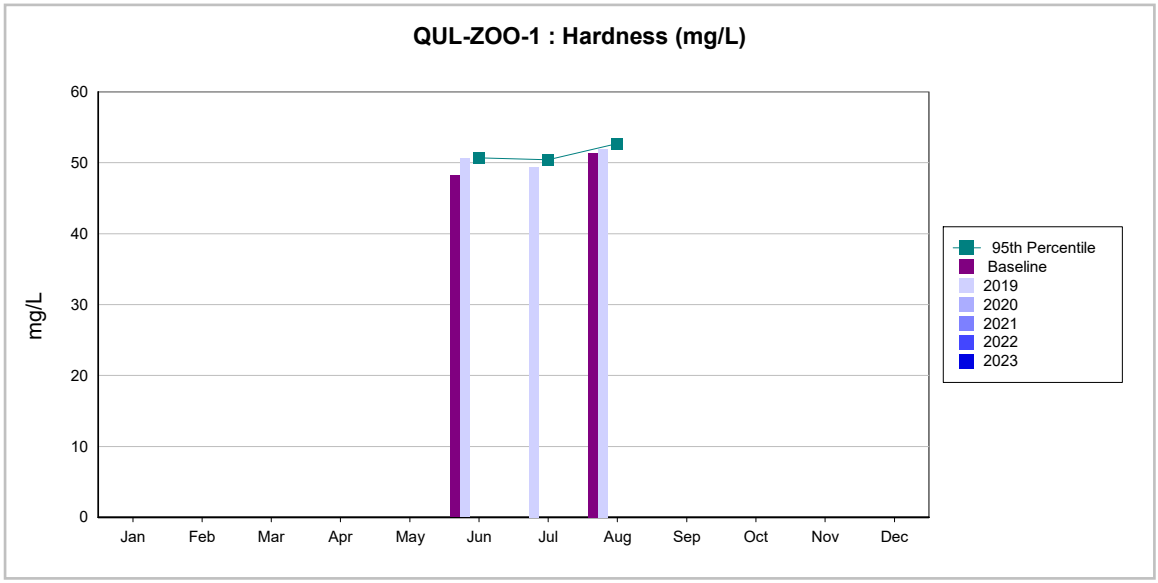

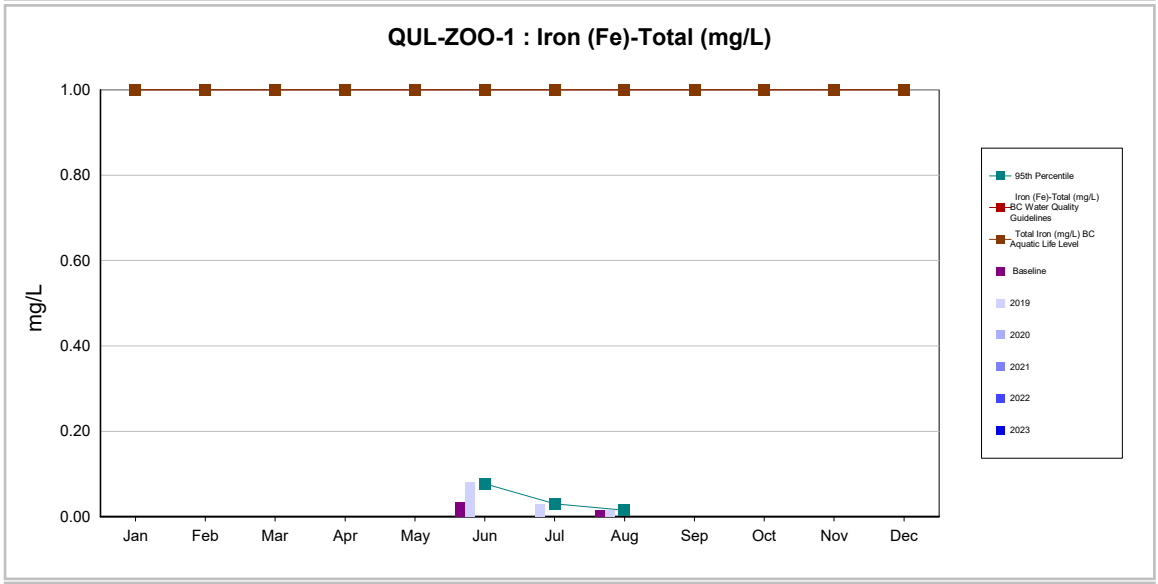

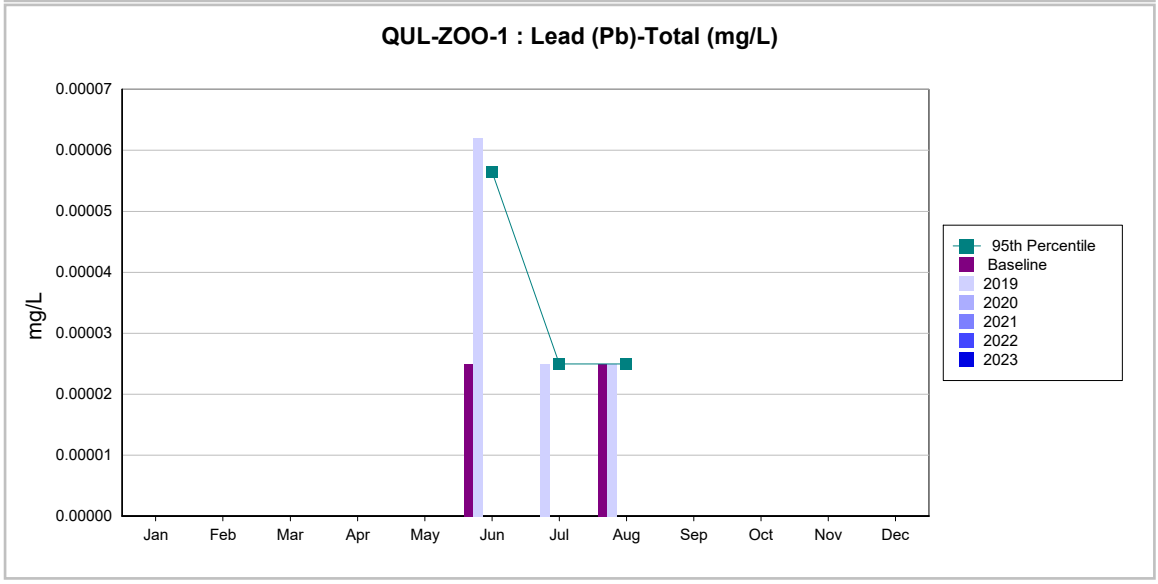

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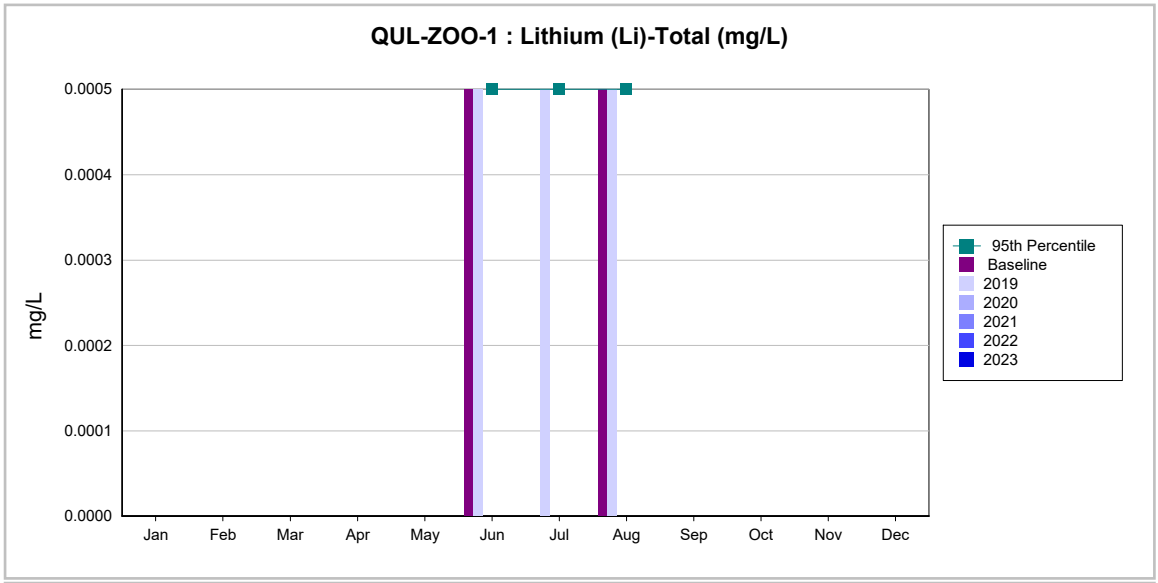

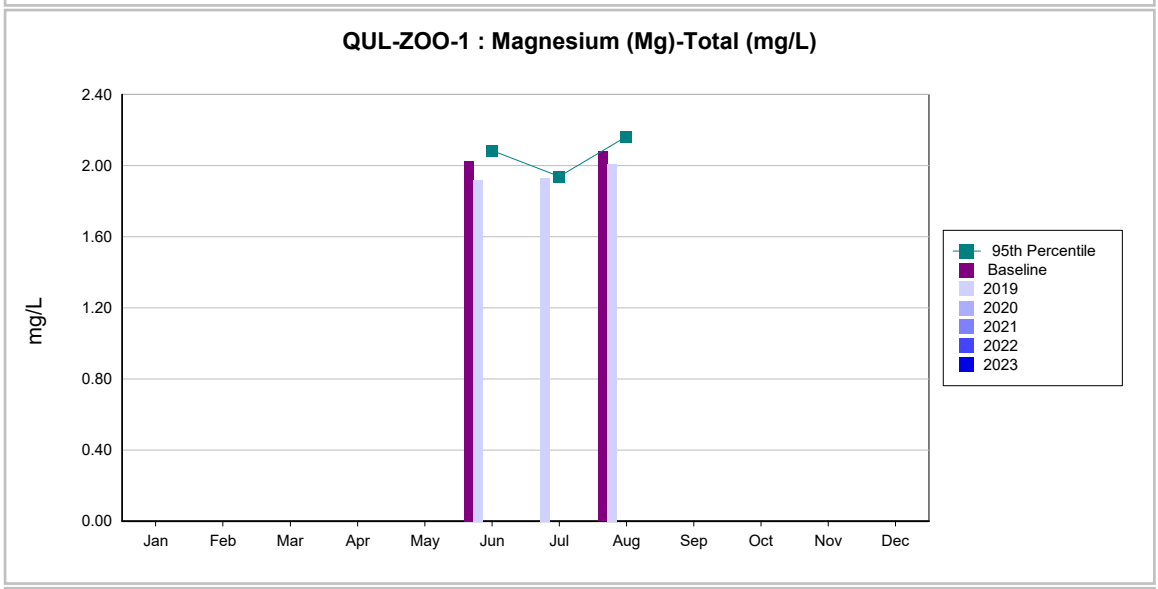

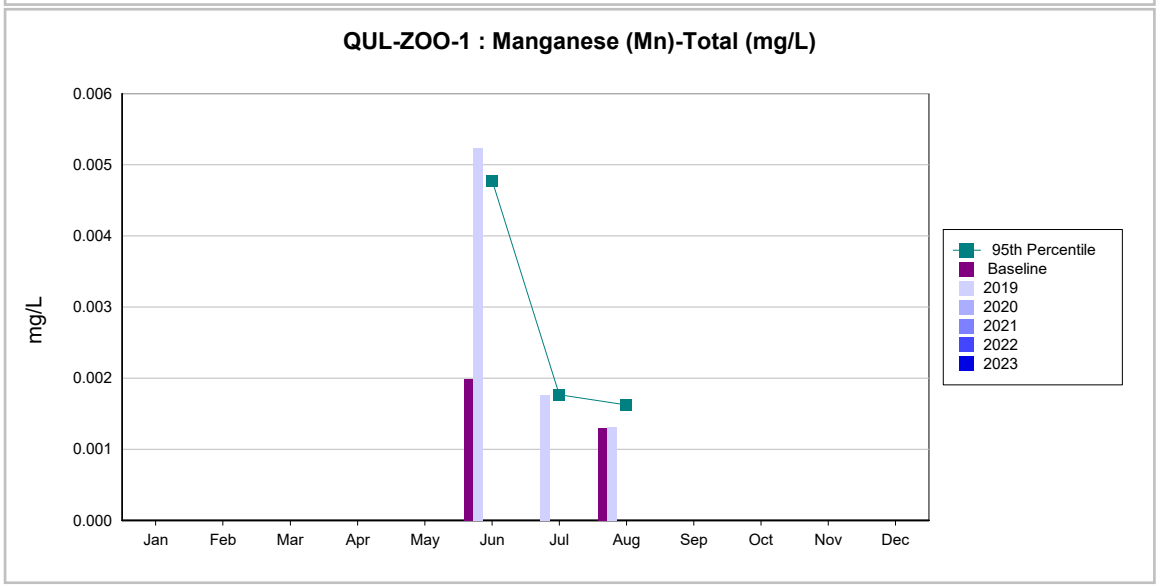

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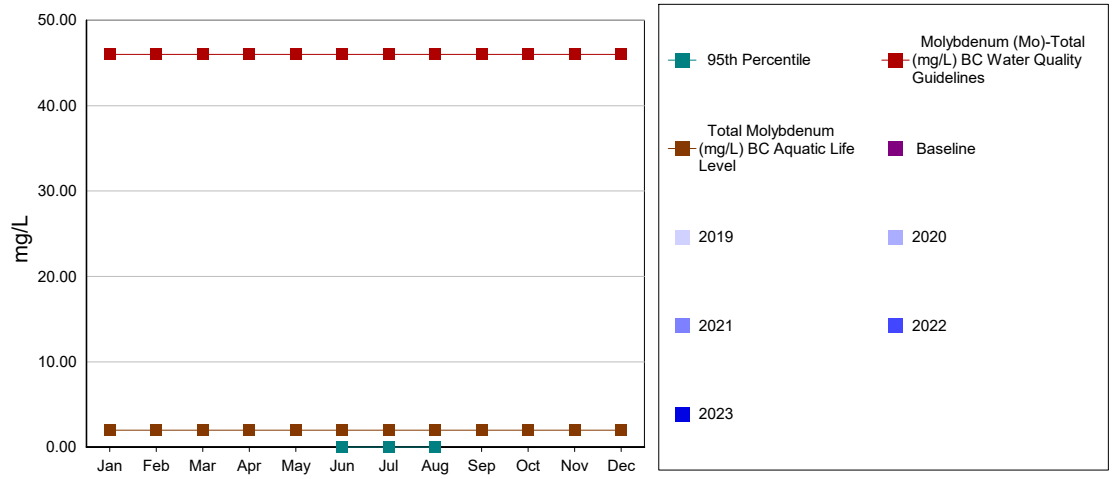
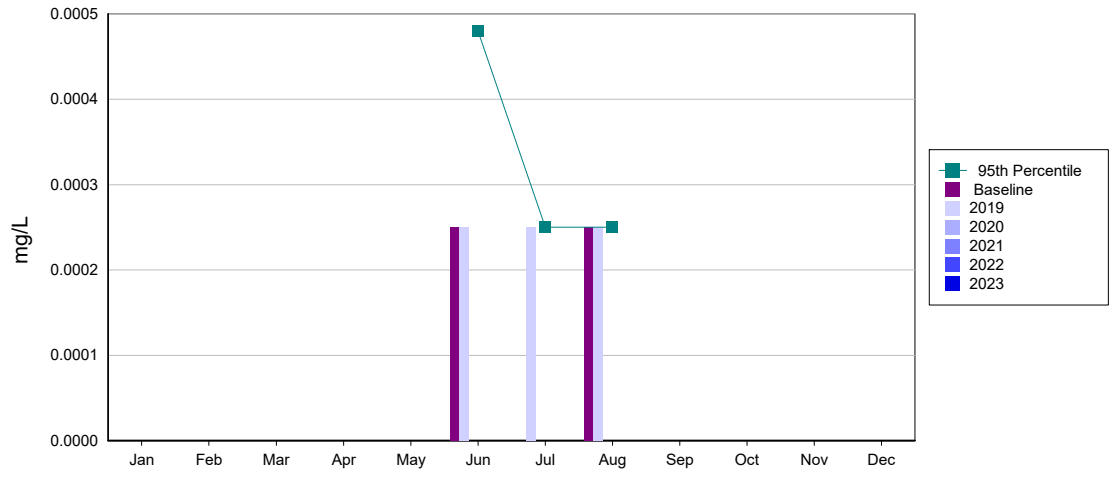
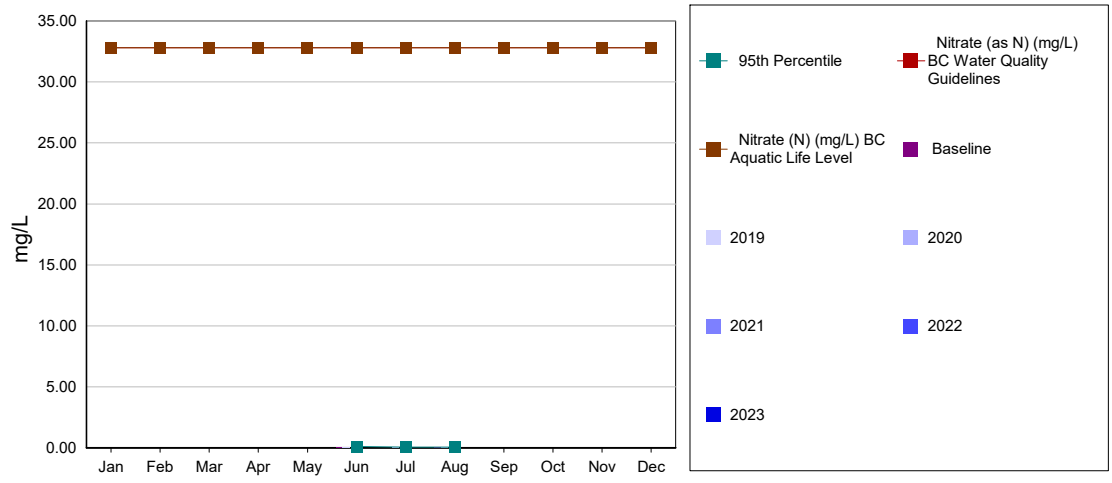
QUL-ZOO-1 : Molybdenum (Mo)-Tota (mg/L)



QUL-ZOO-1 : Nickel (Ni)-Total (mg/L)



QUL-ZOO-1 : Nitrate (N) (mg/L)



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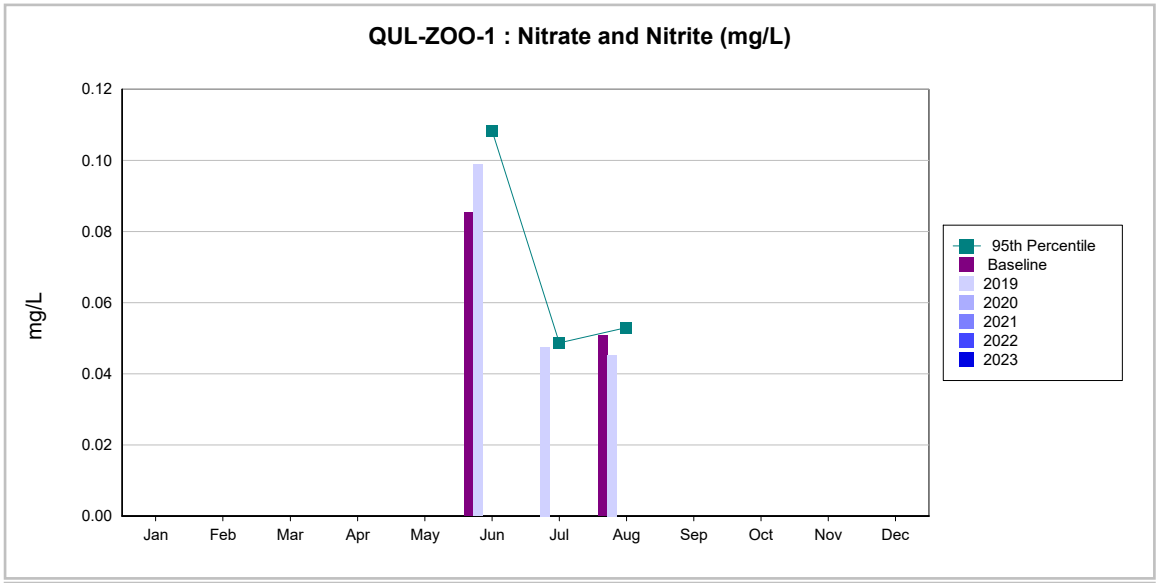

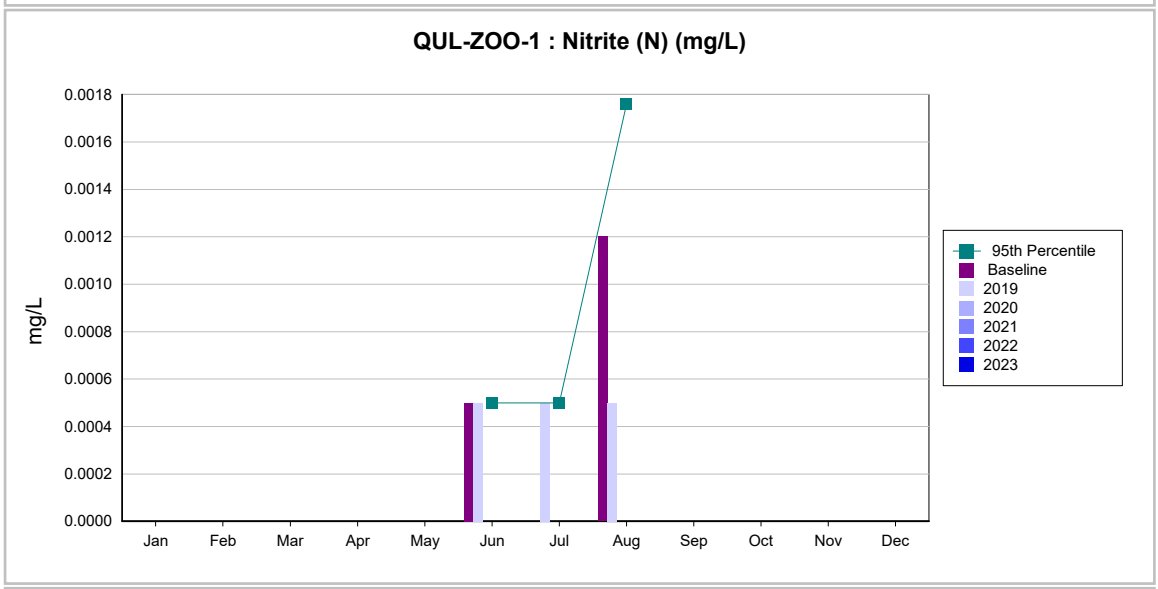

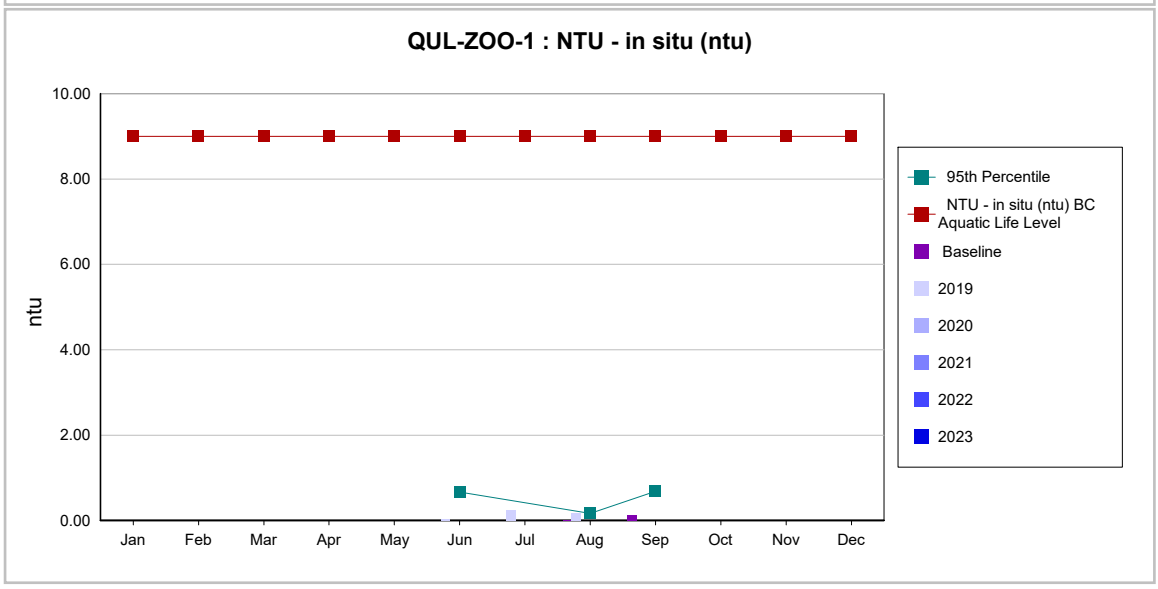

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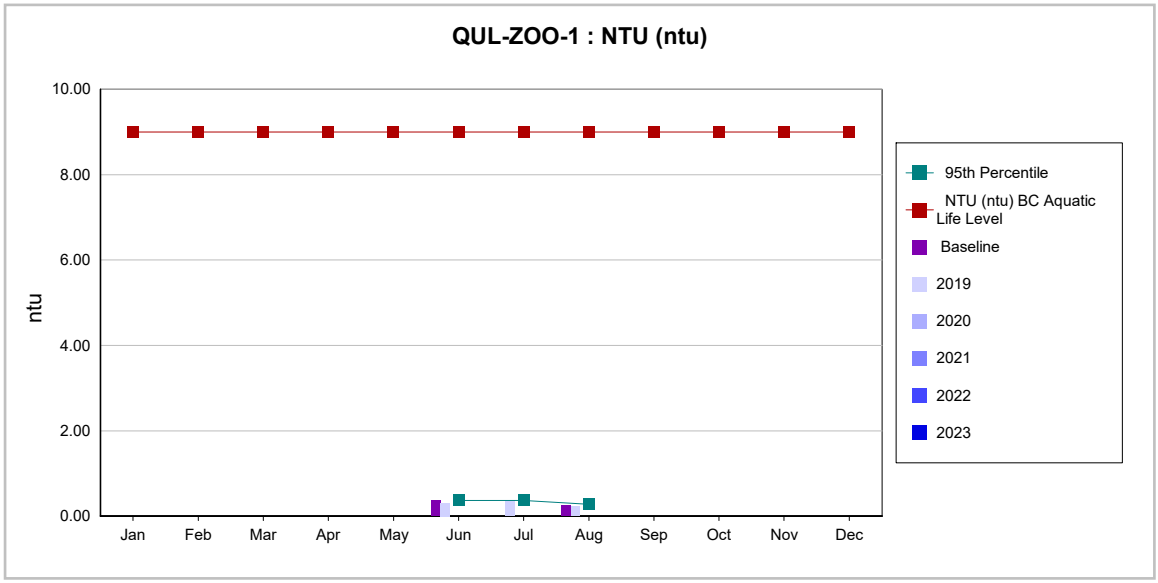

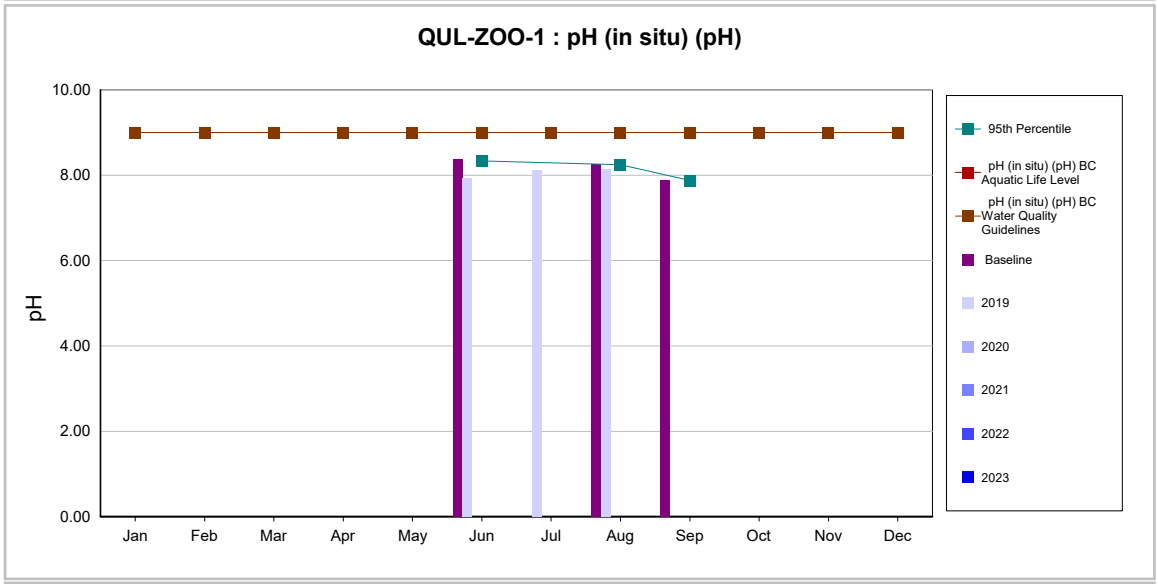

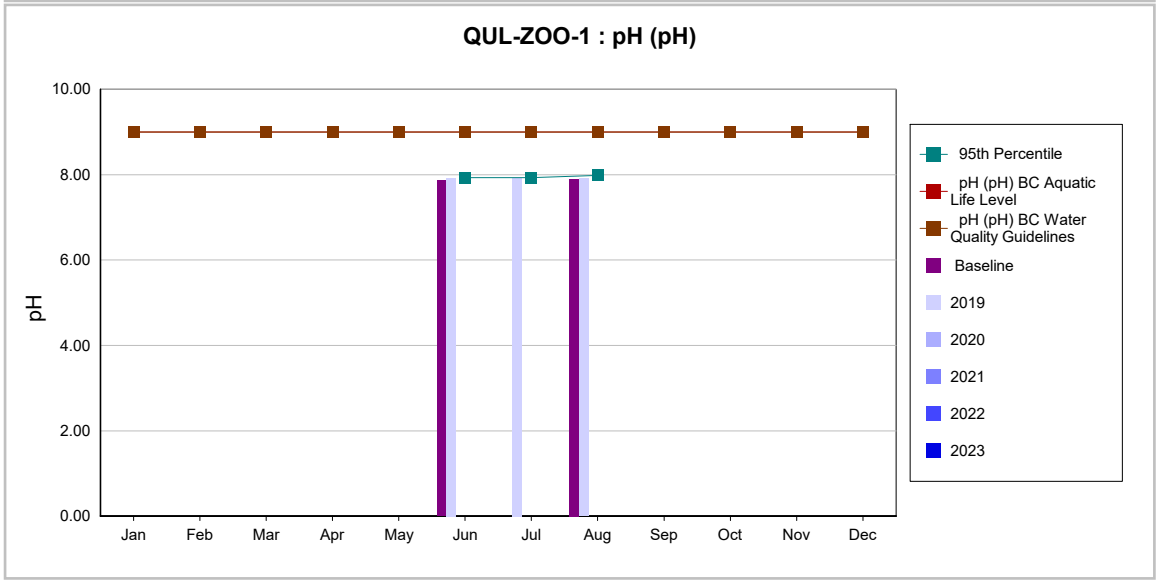

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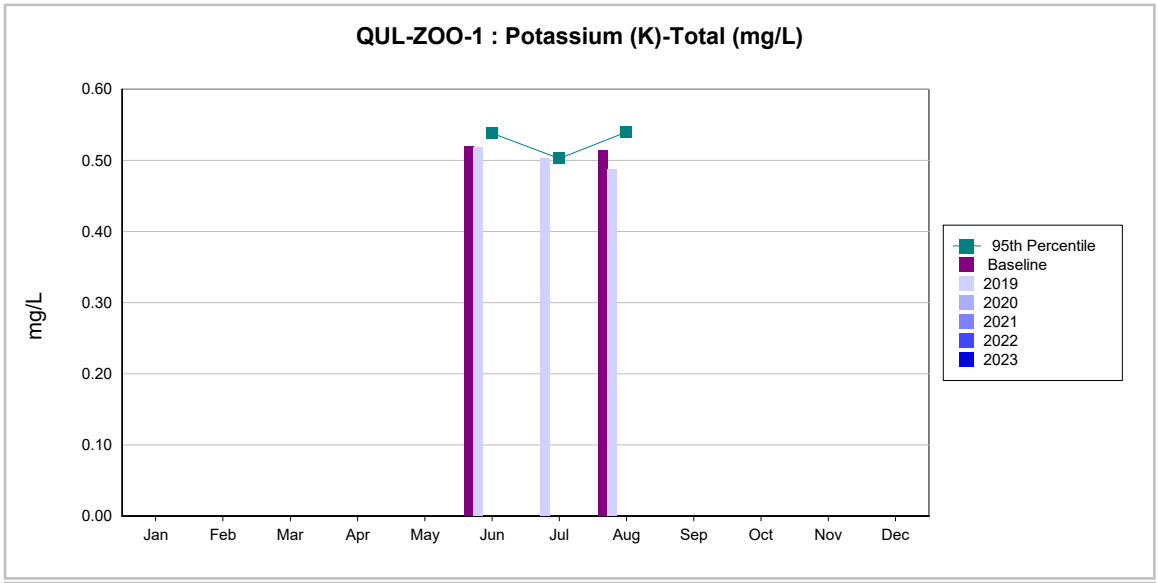

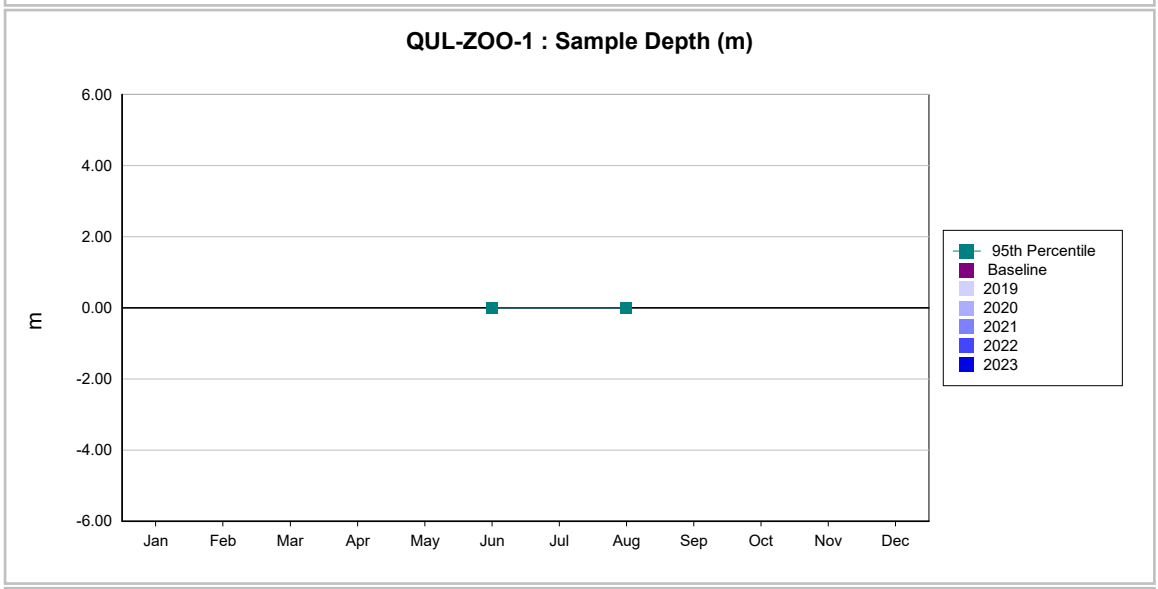

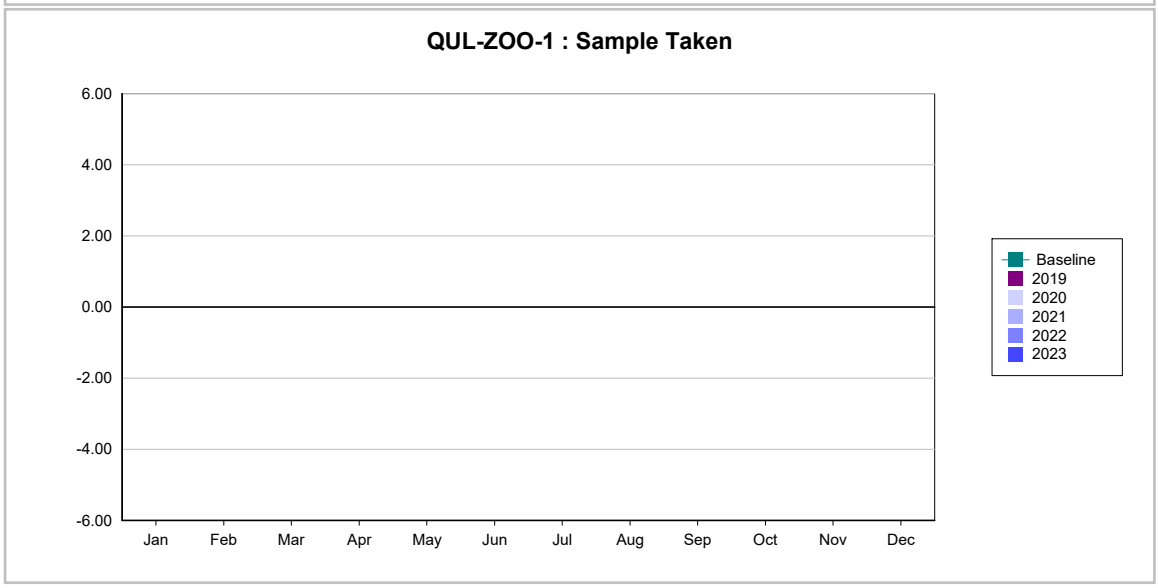

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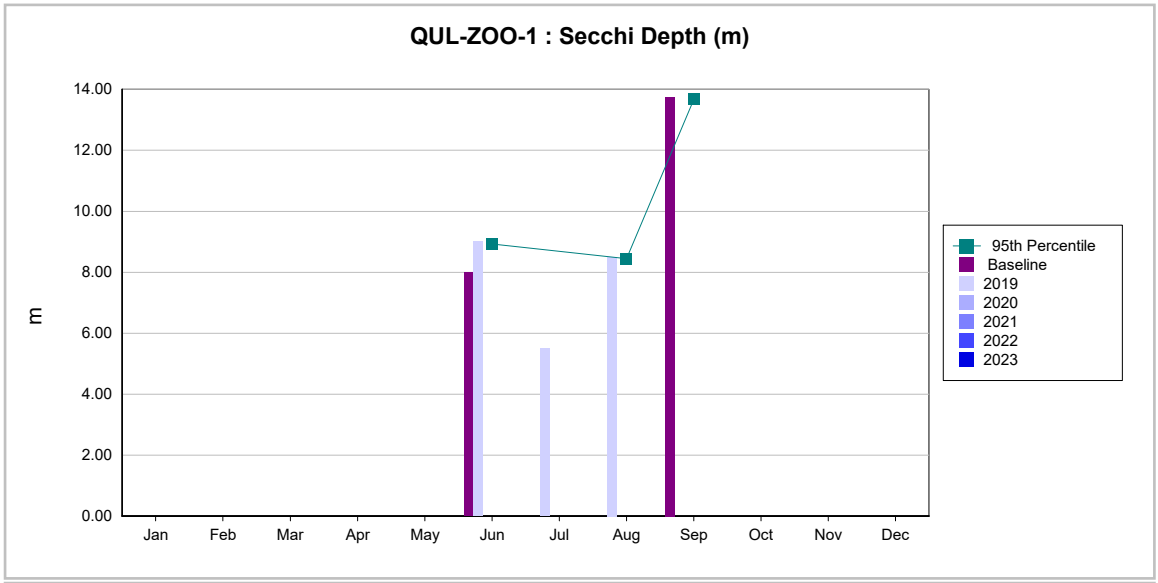

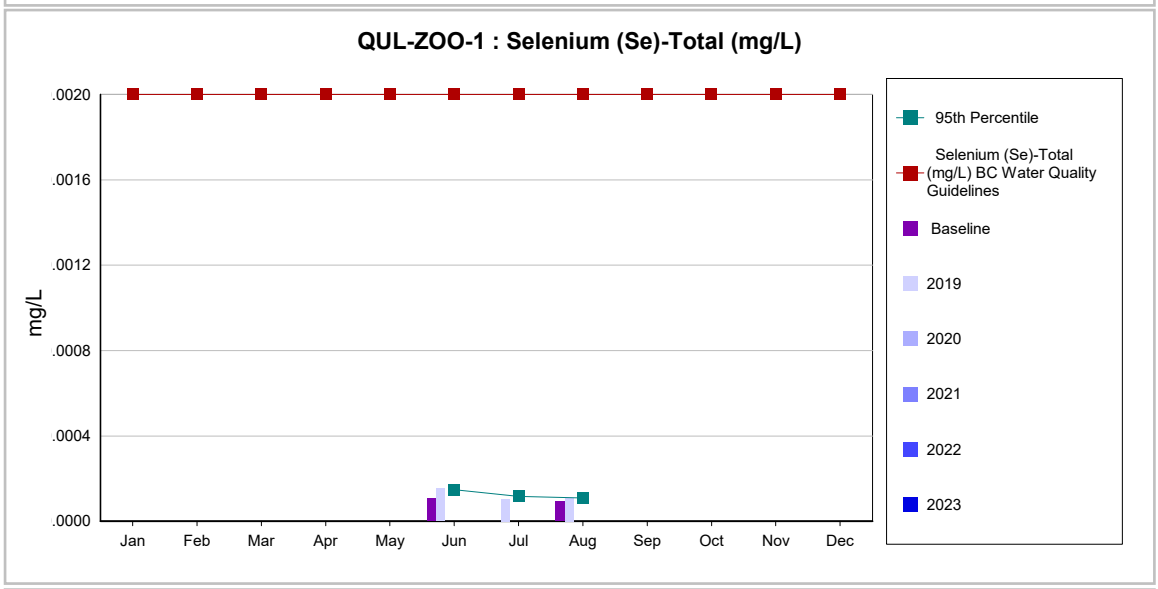

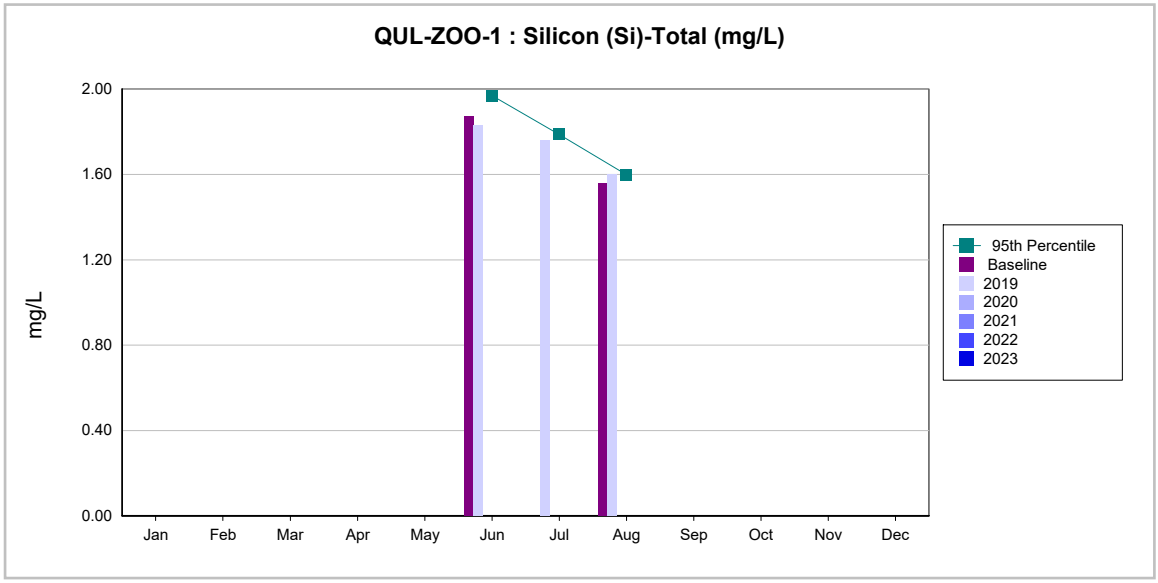

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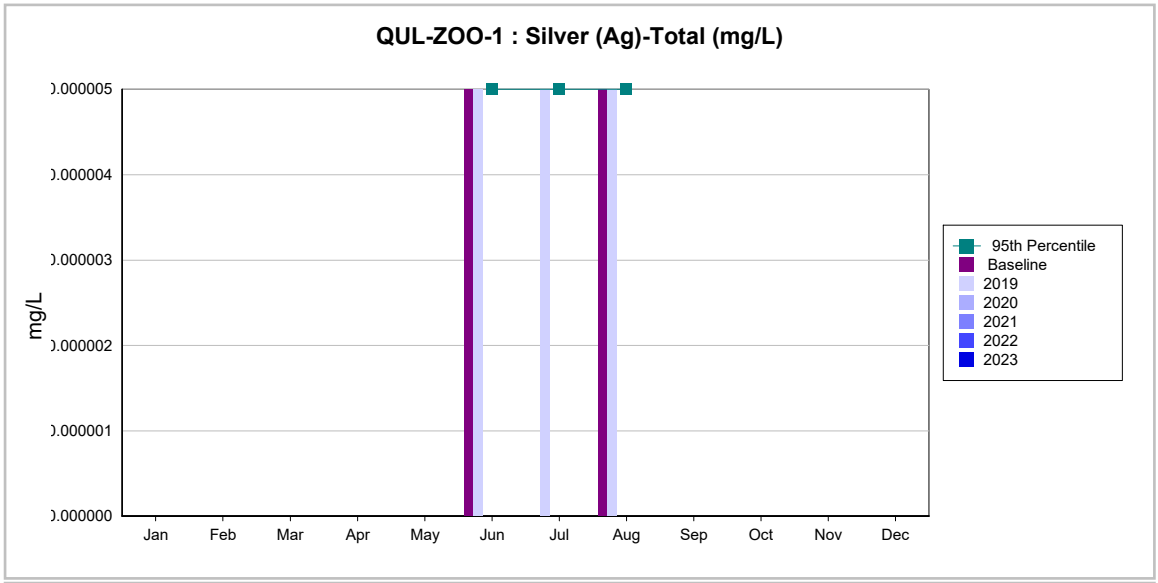

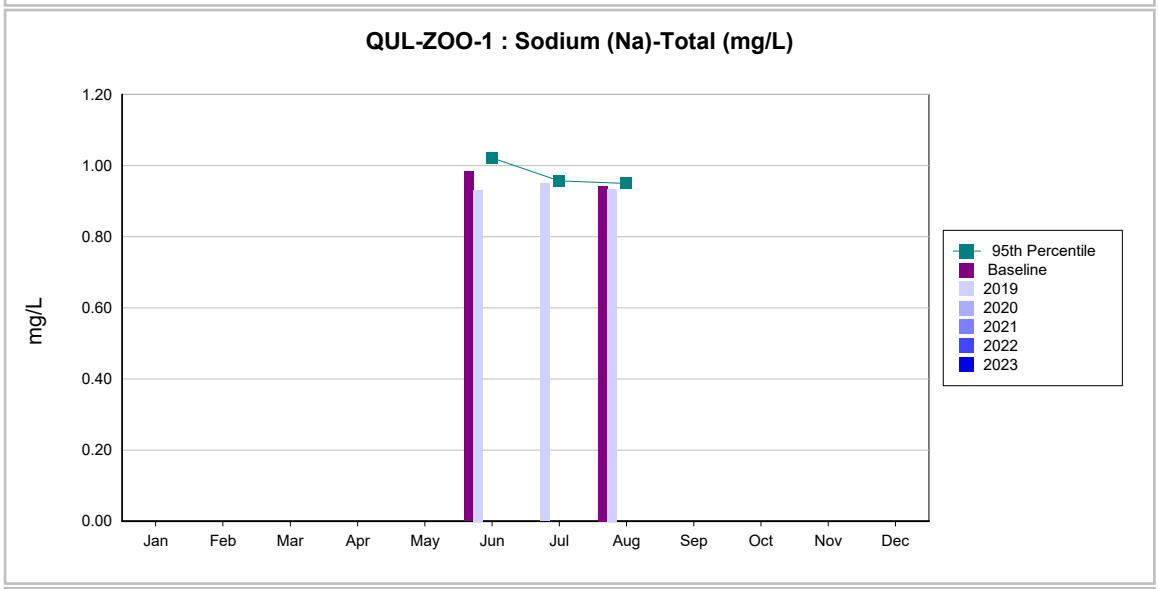

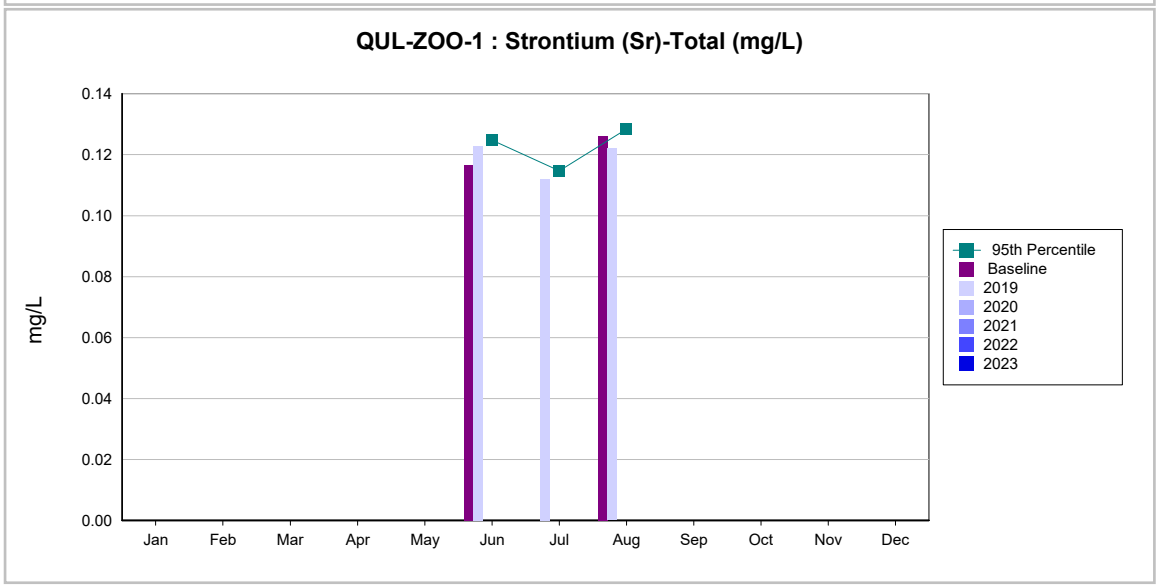

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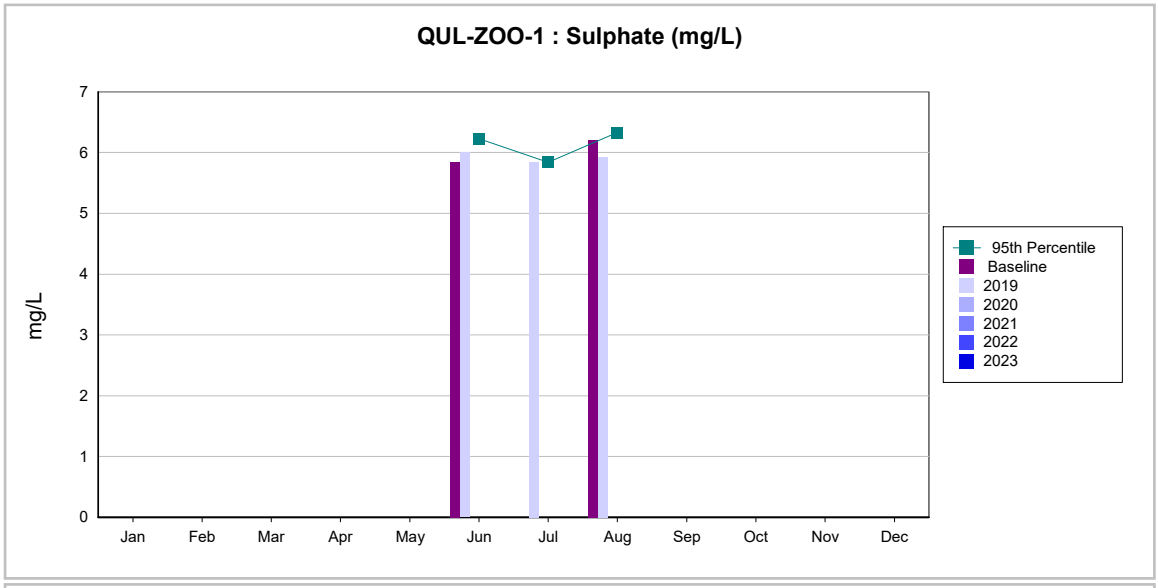

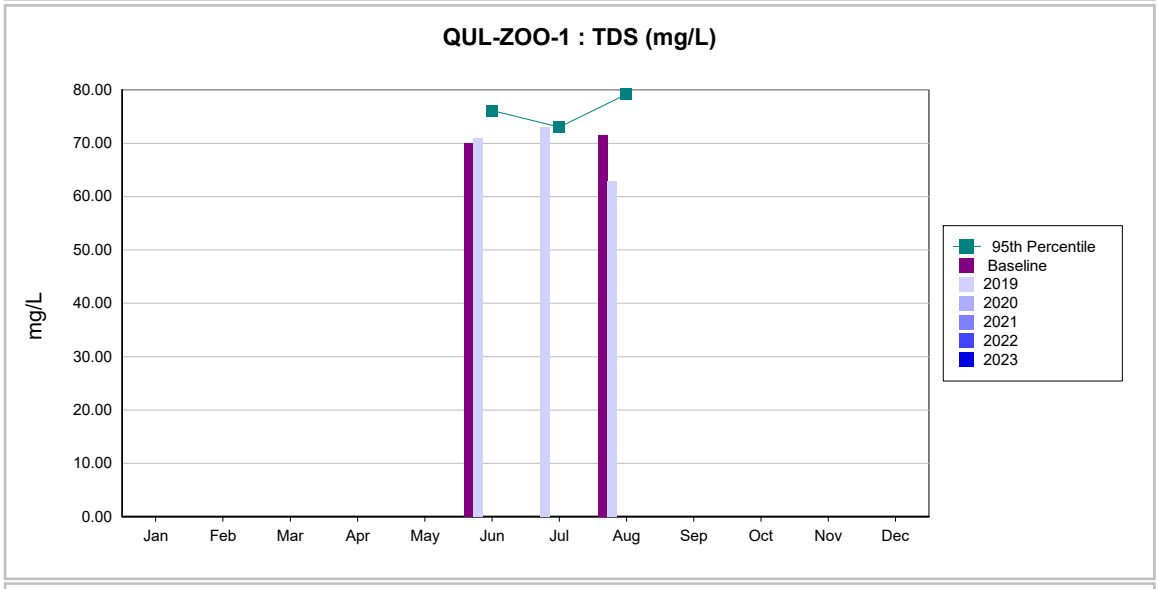

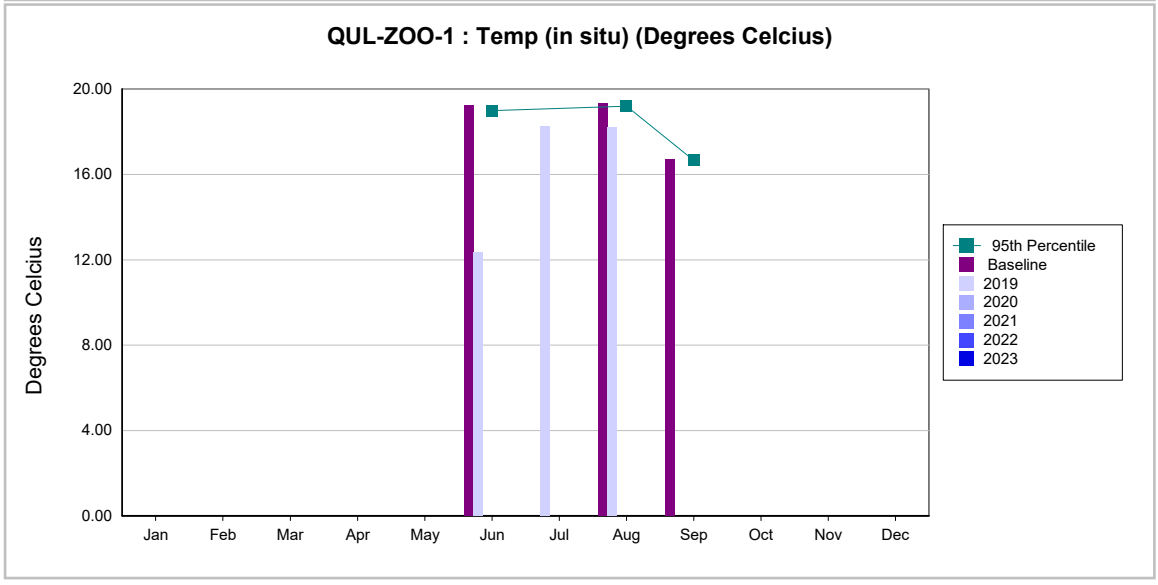

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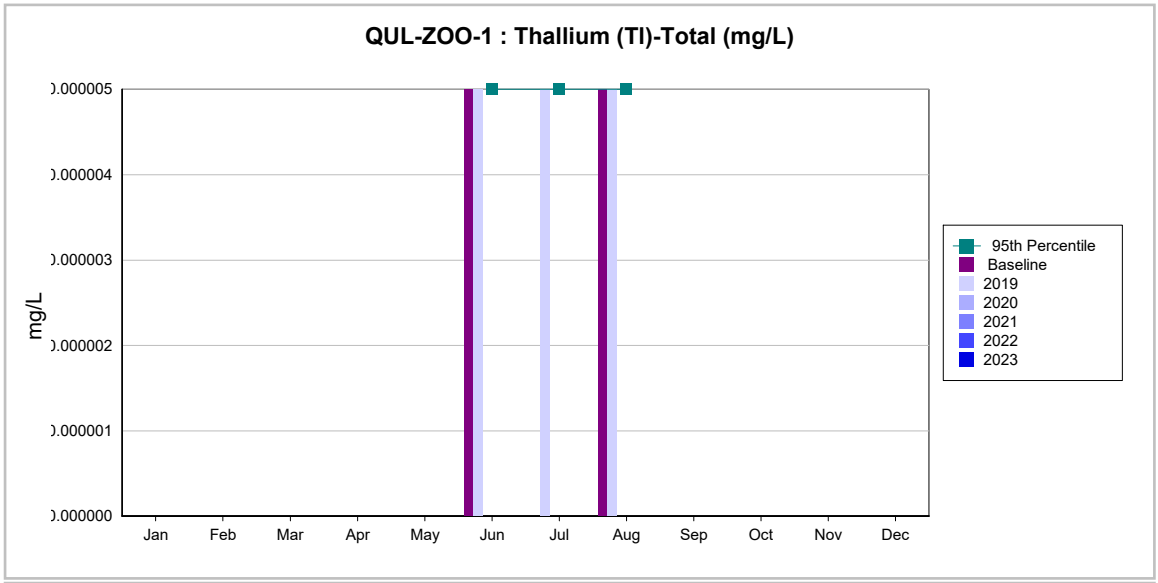

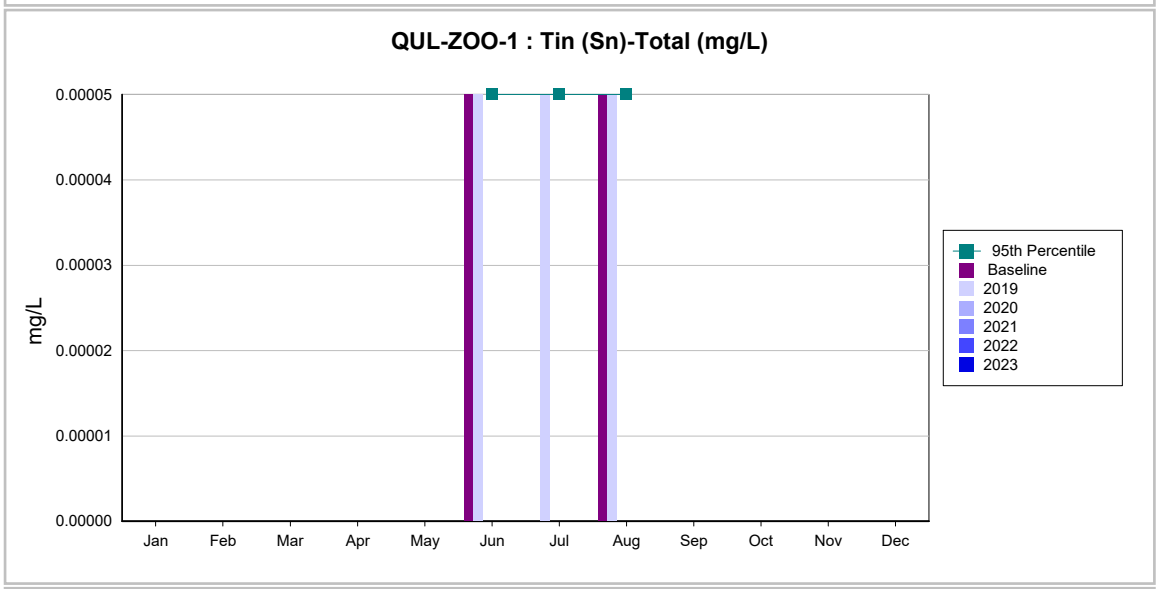

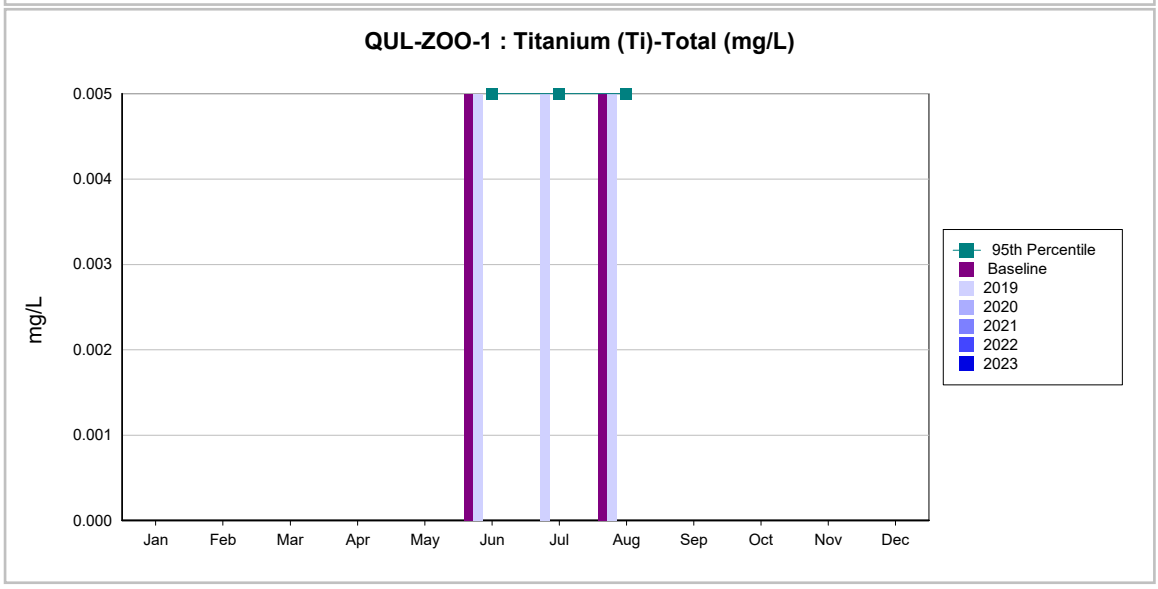

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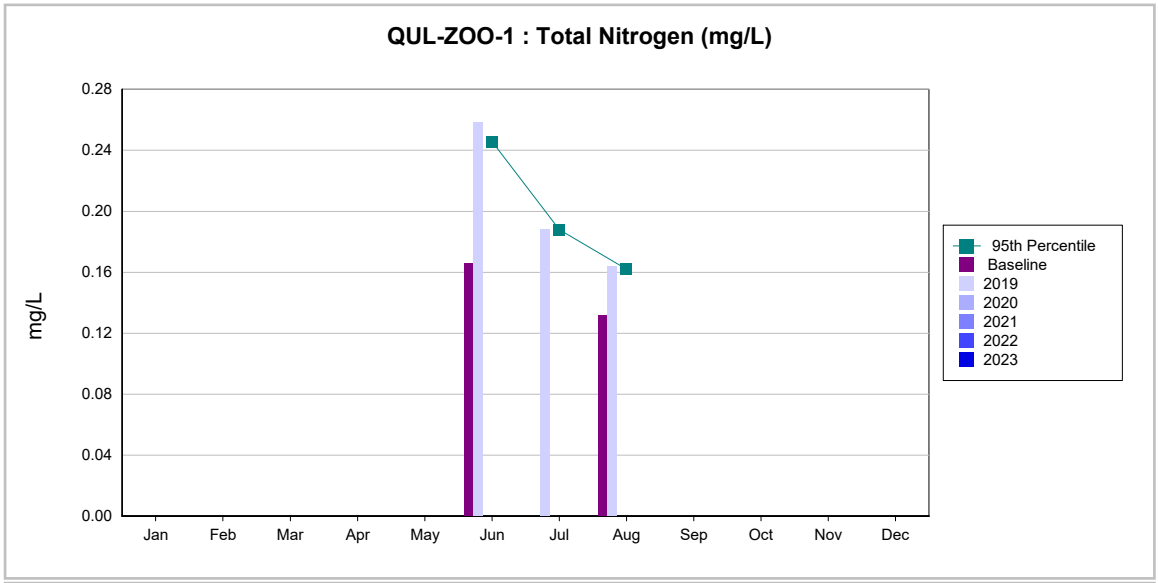

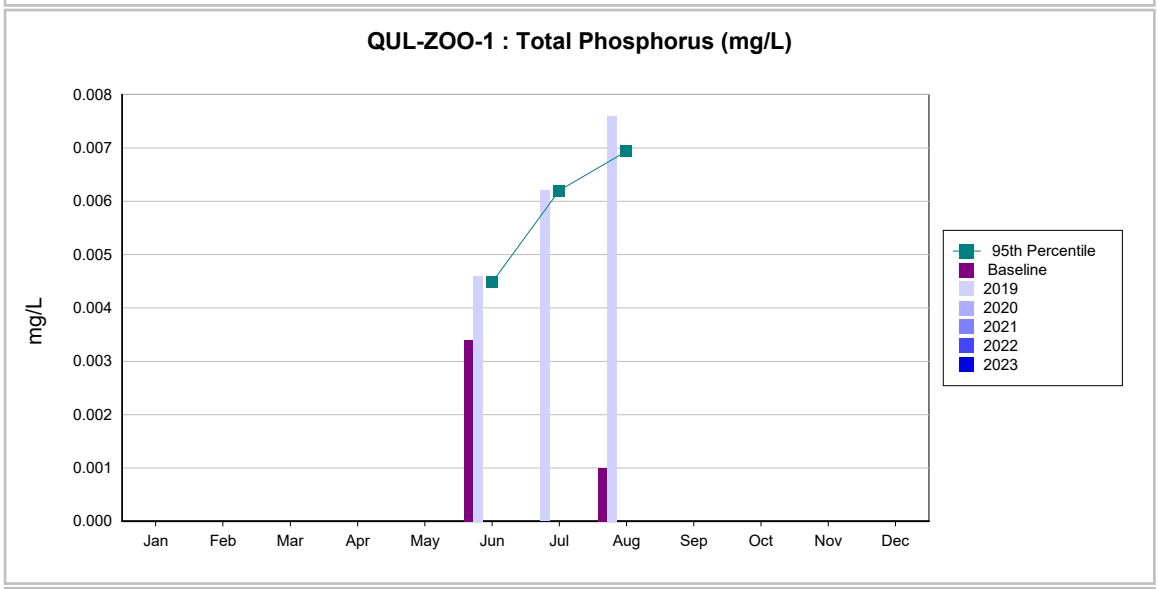

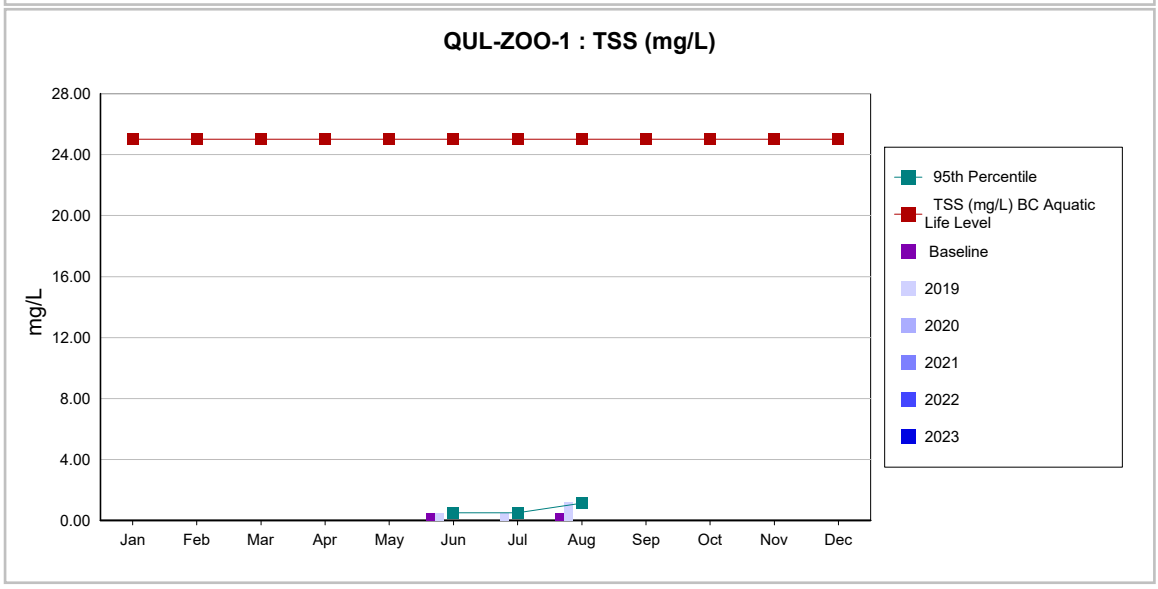

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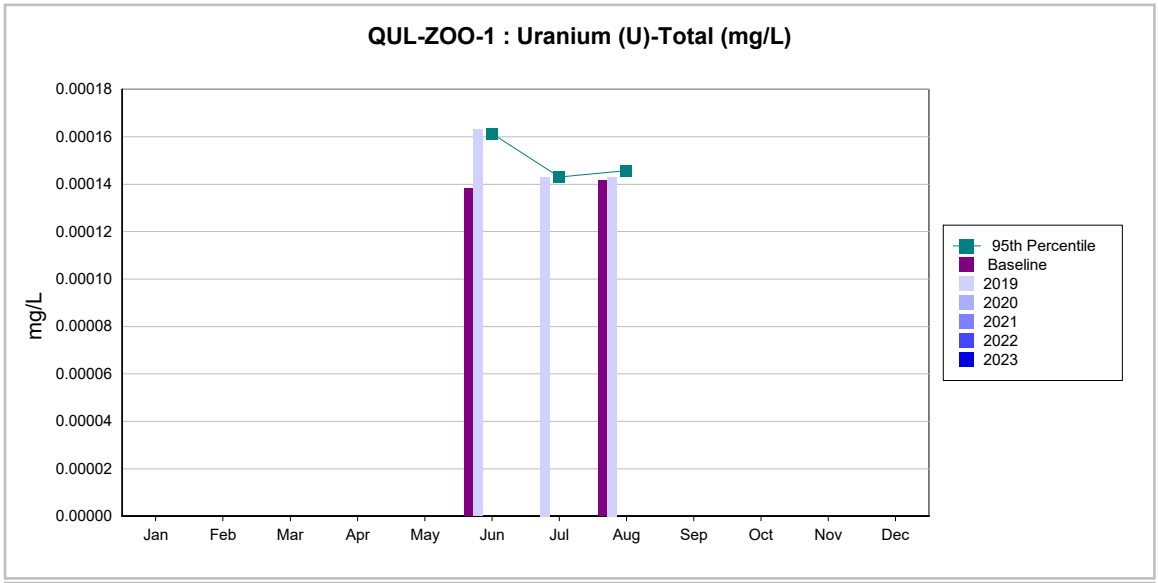

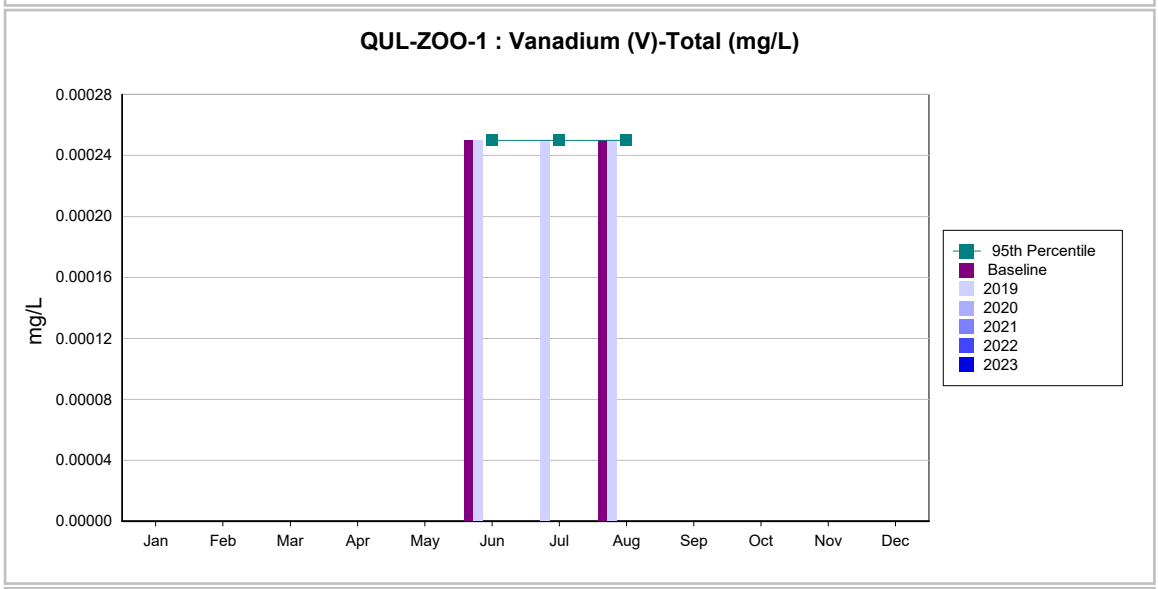

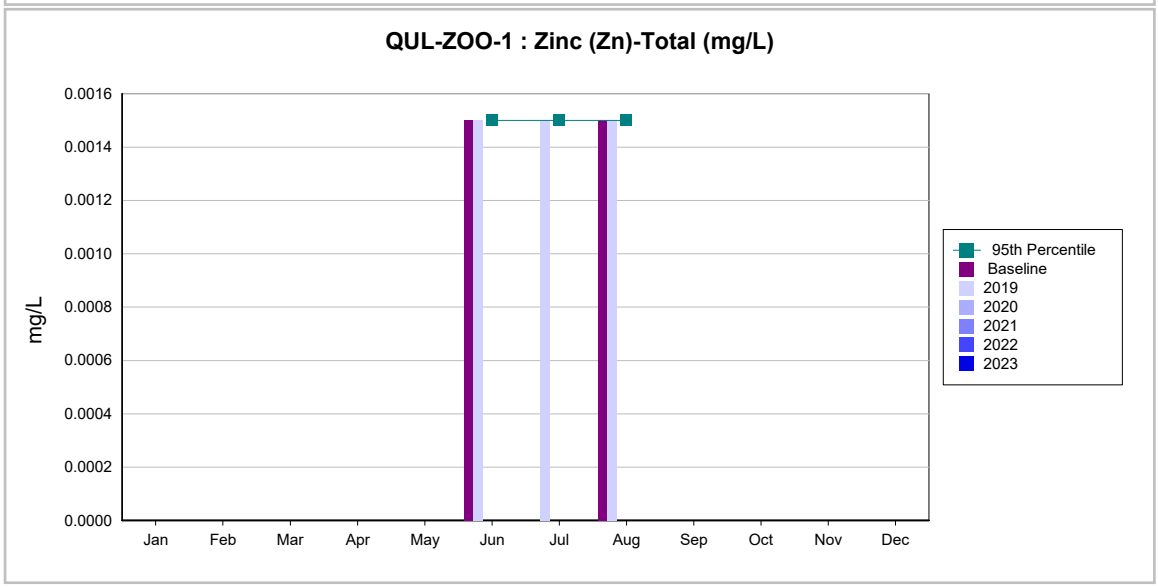

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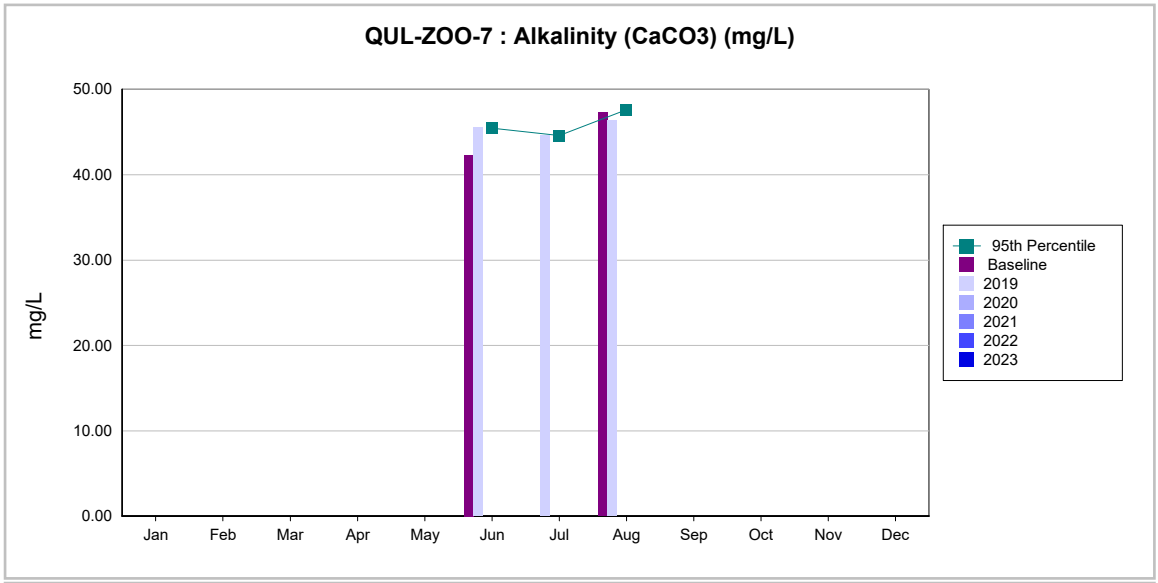

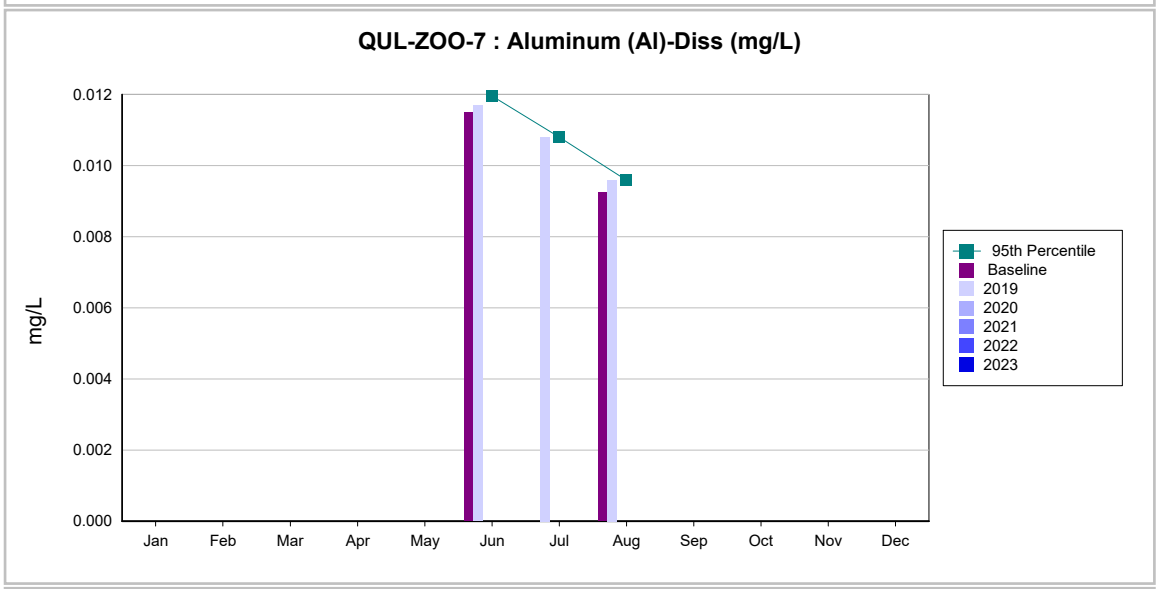

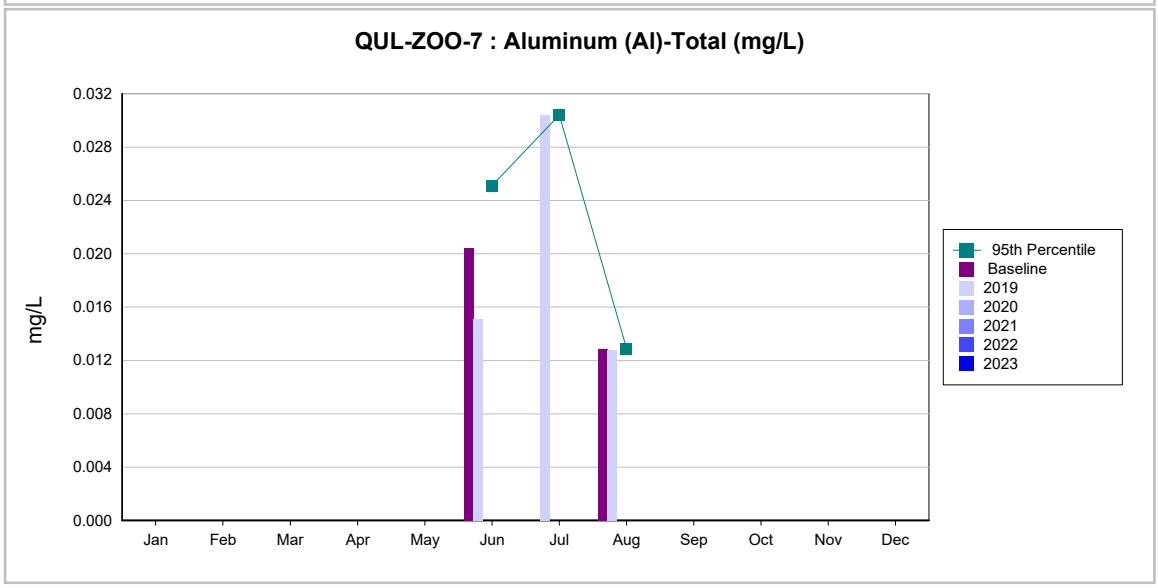

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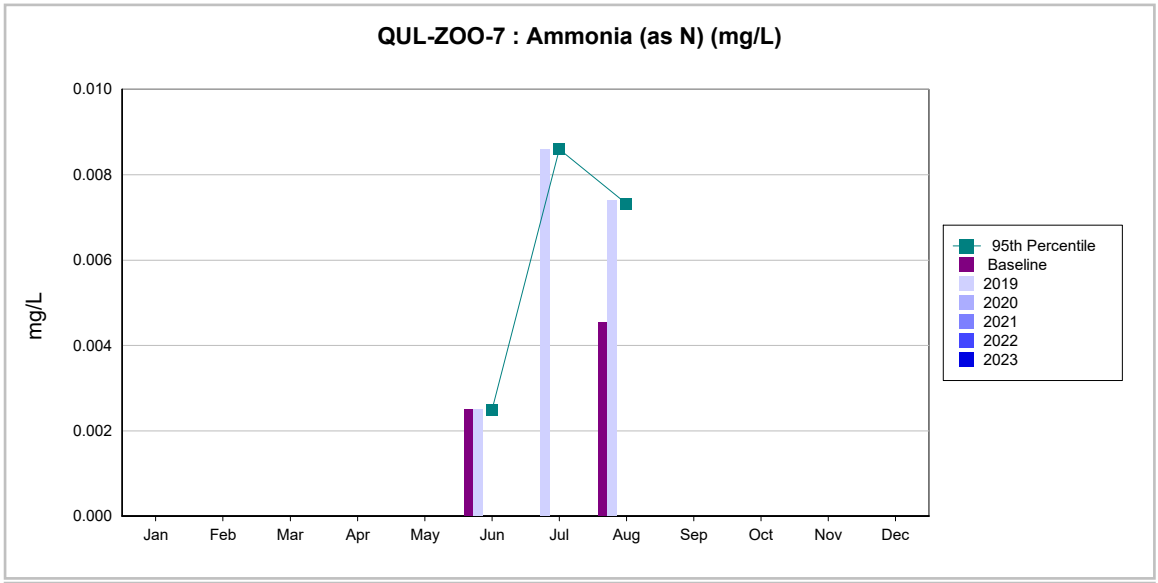

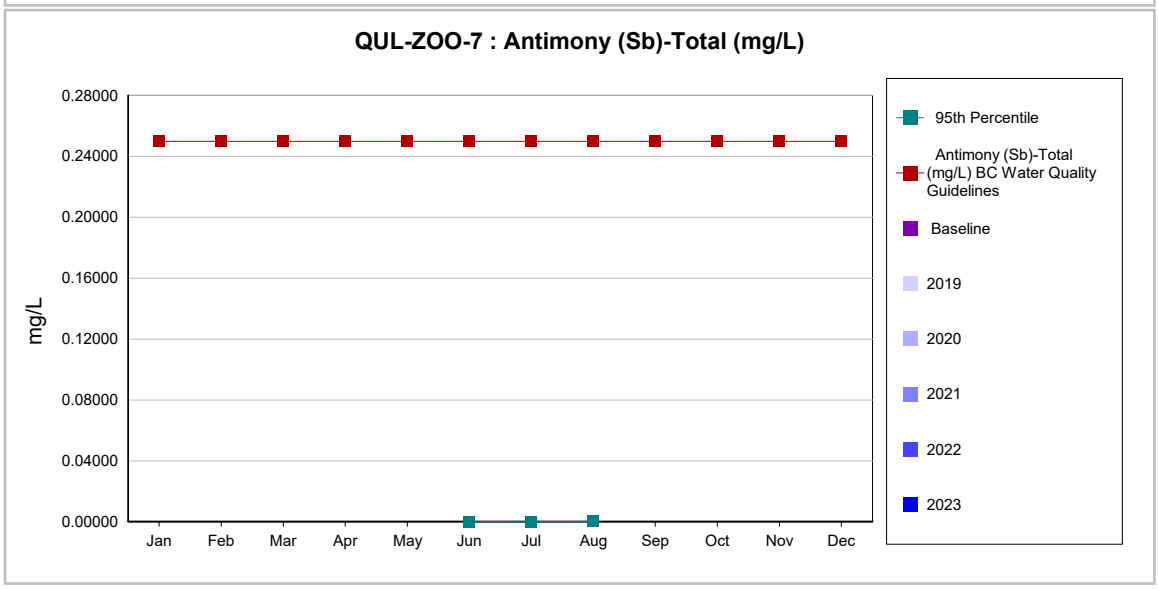

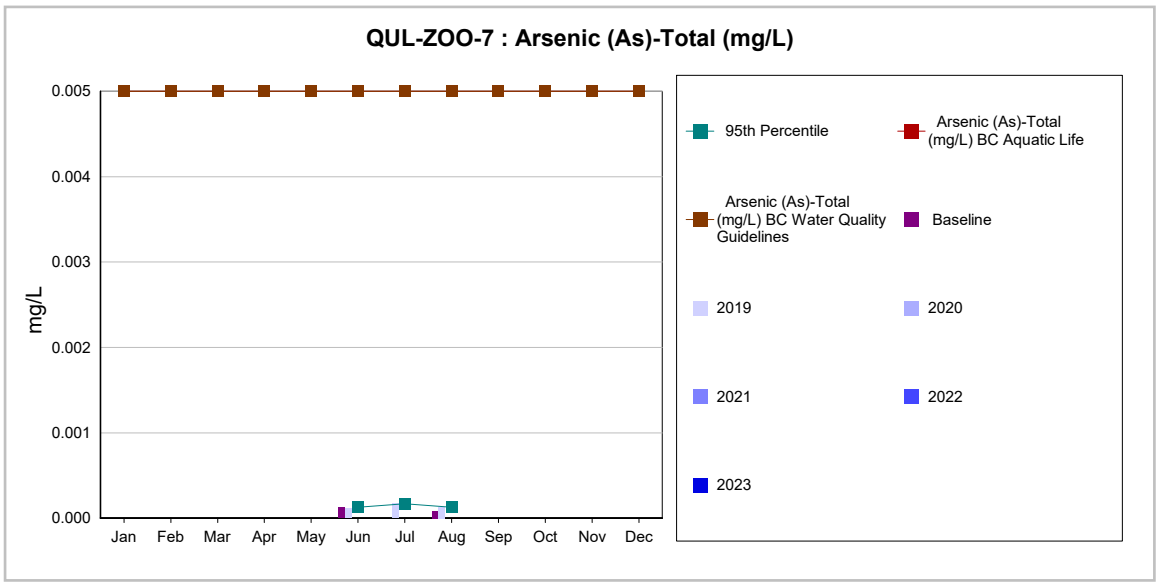

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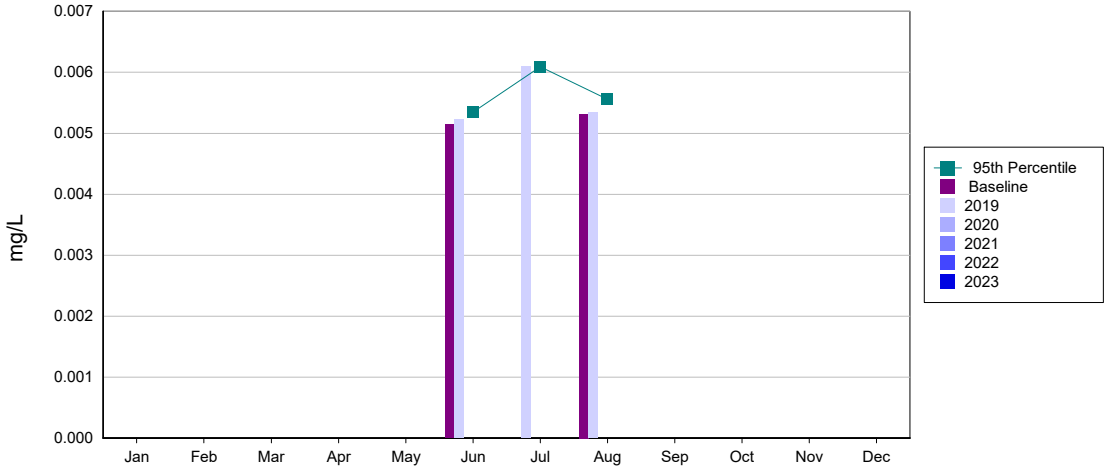

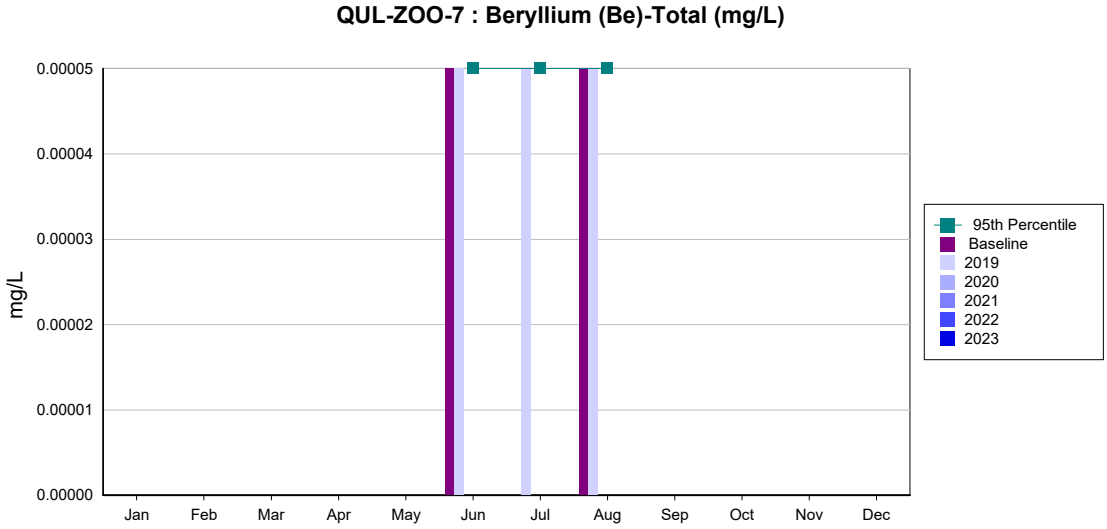

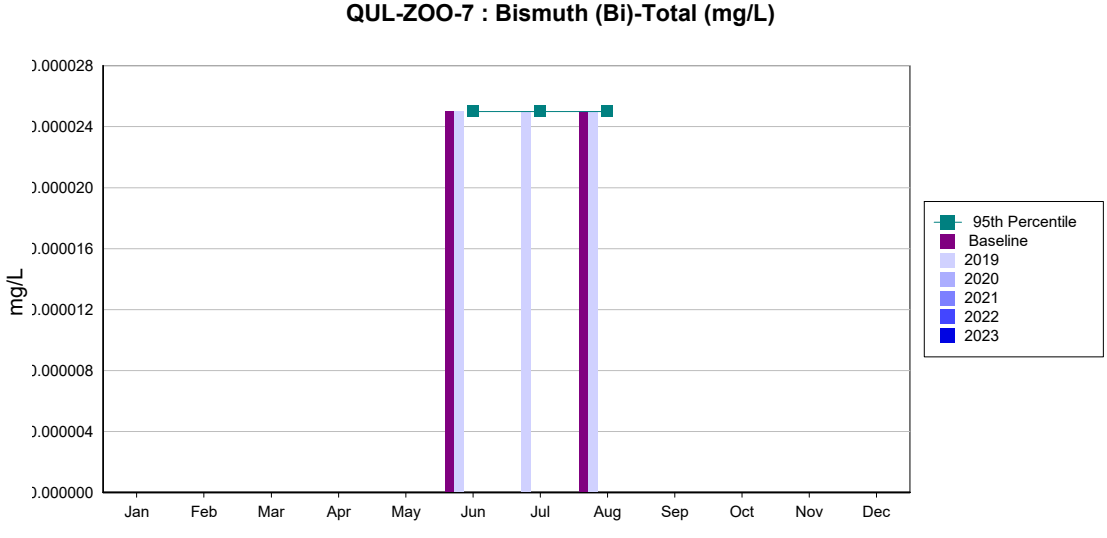

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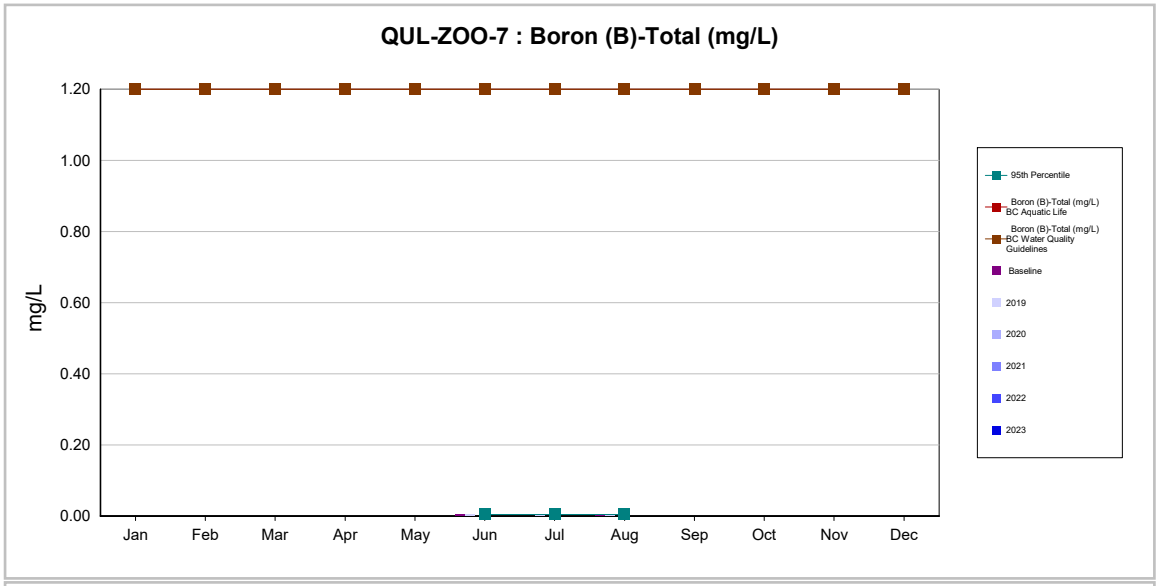

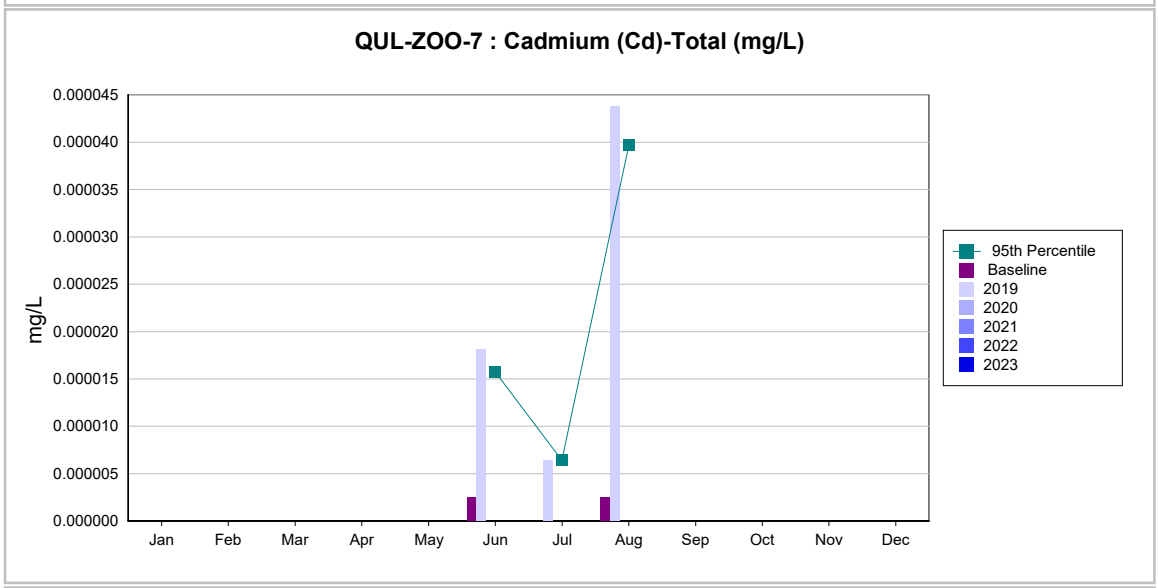

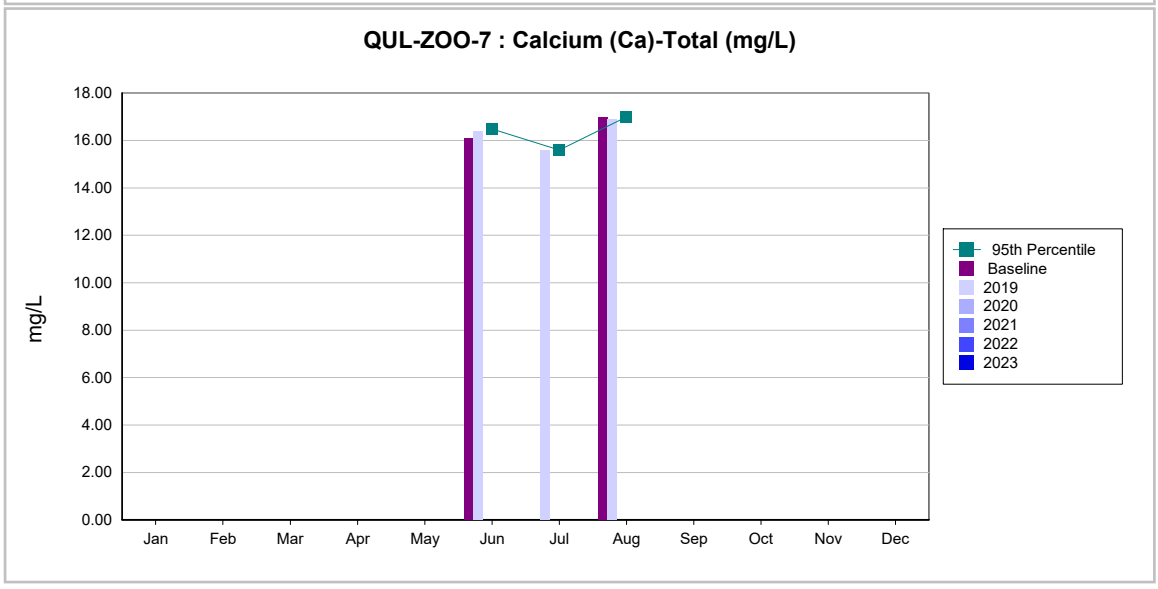

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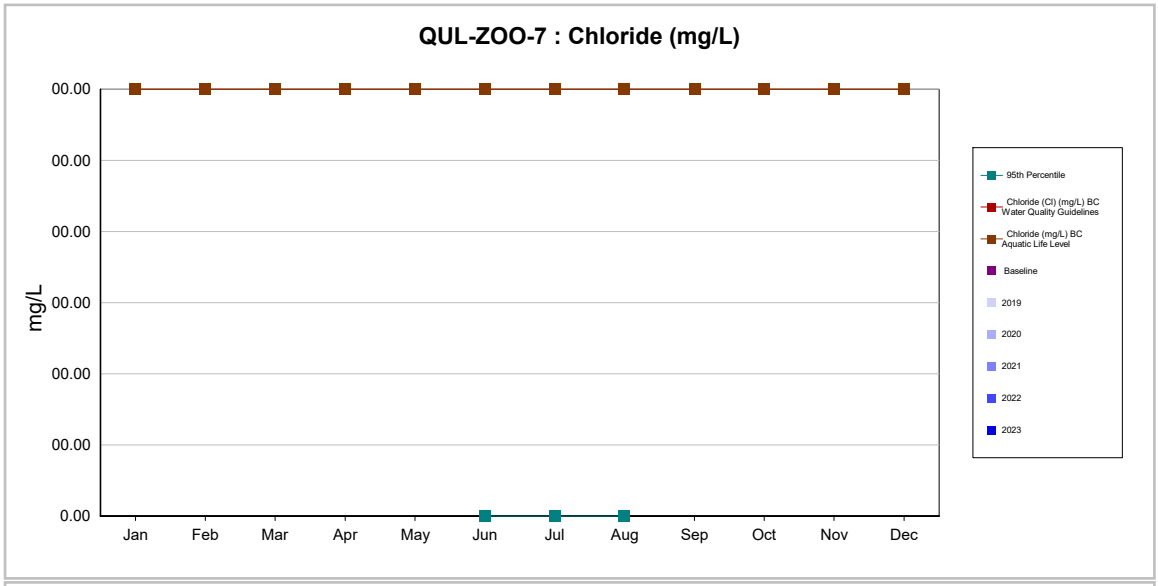

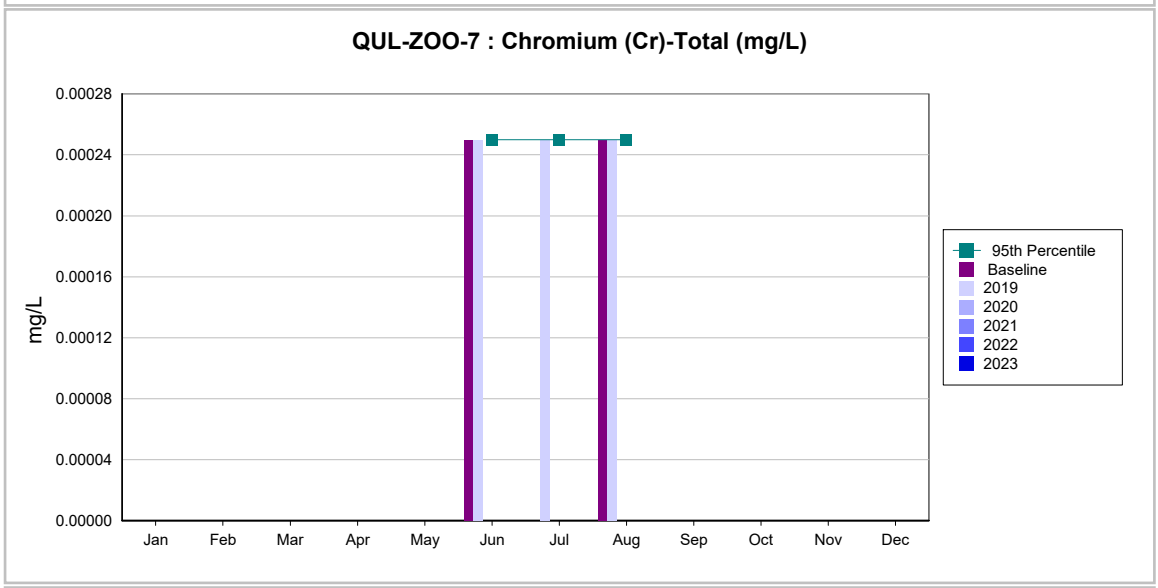

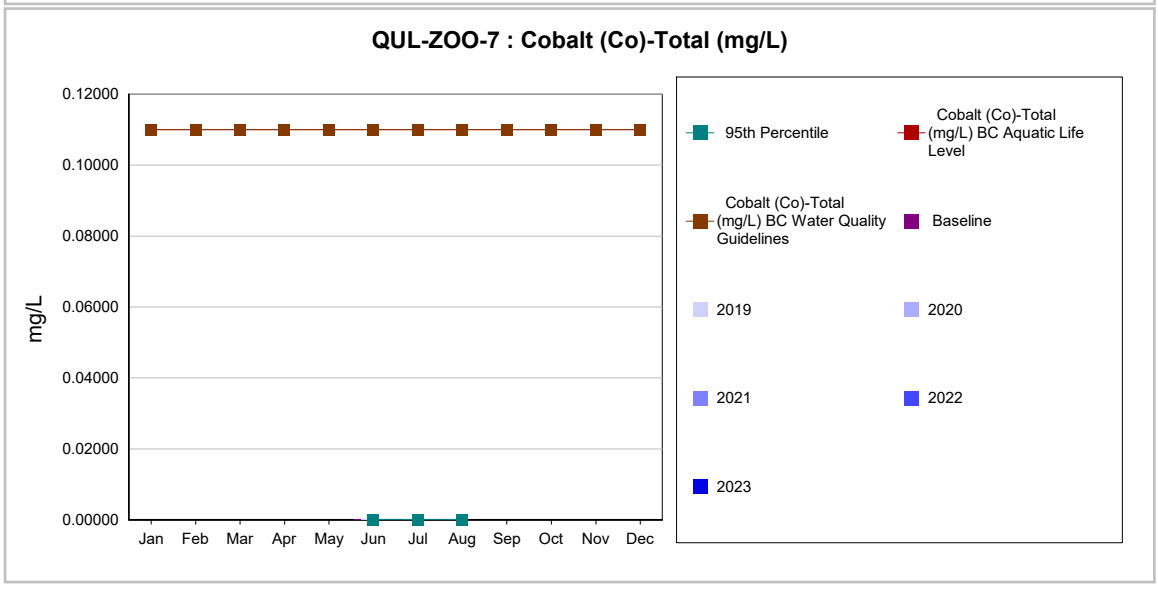

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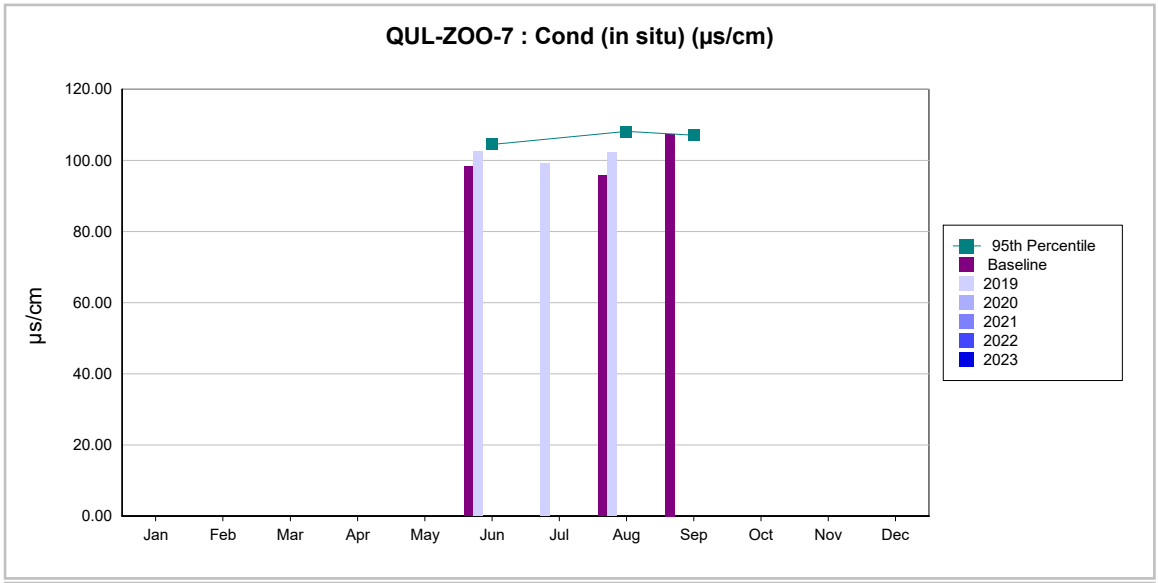

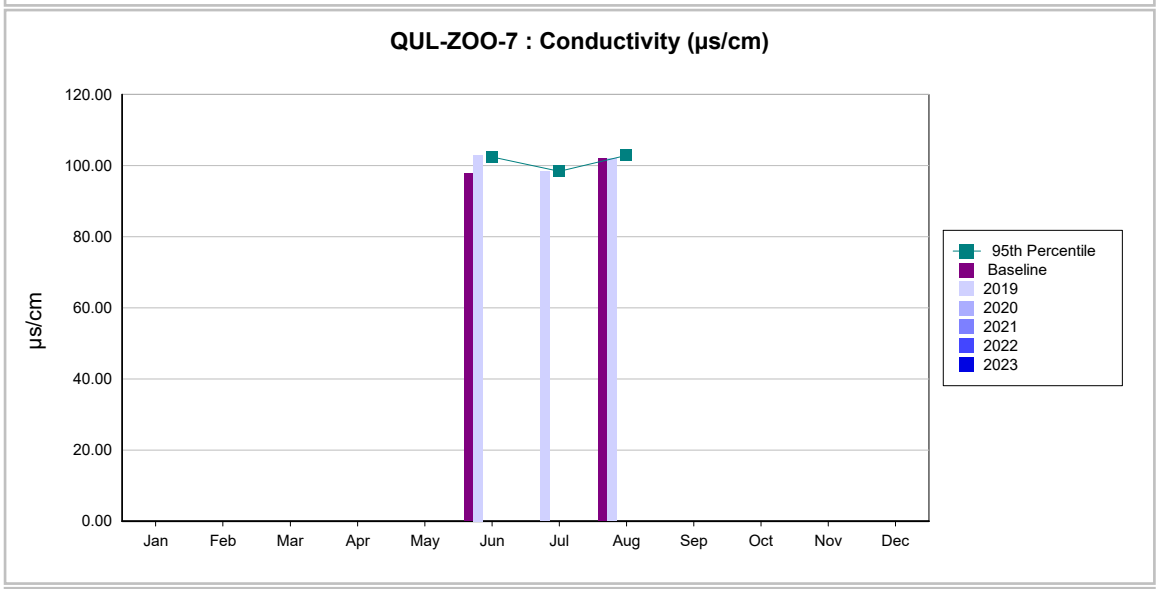

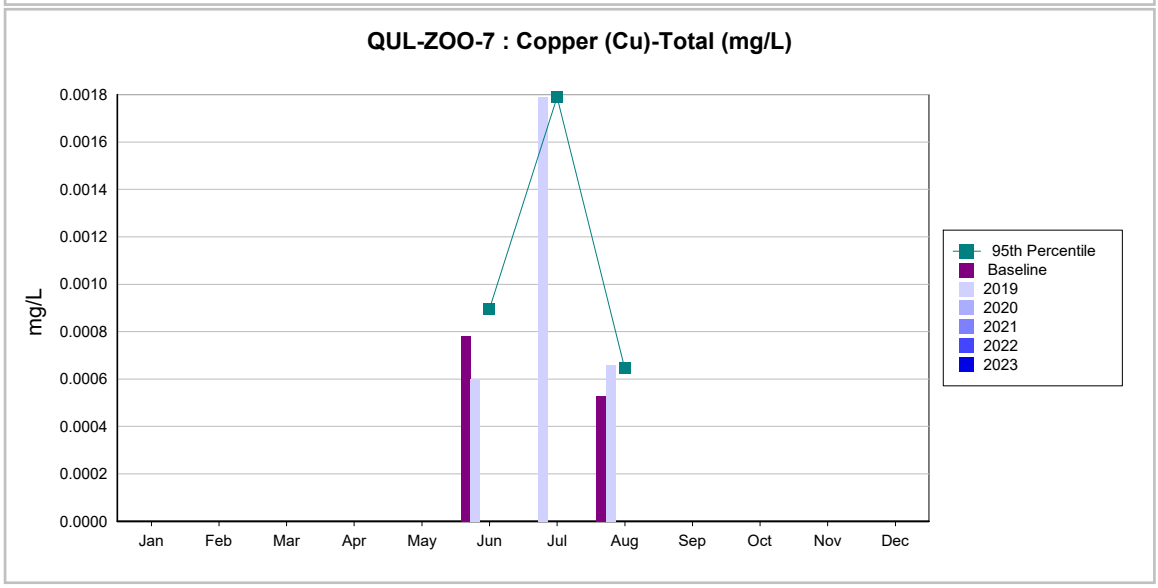

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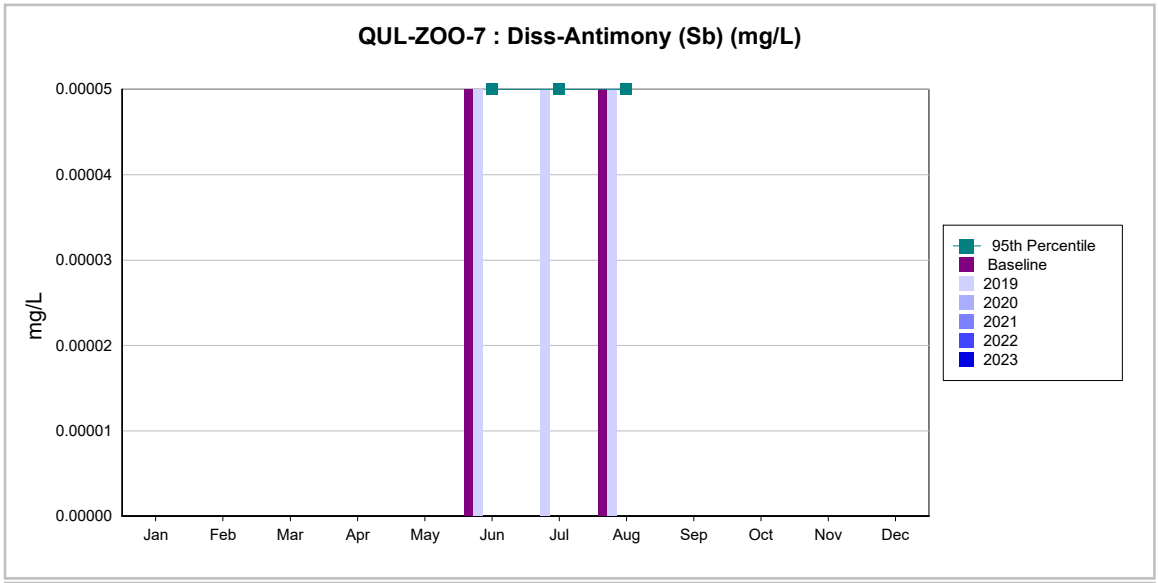

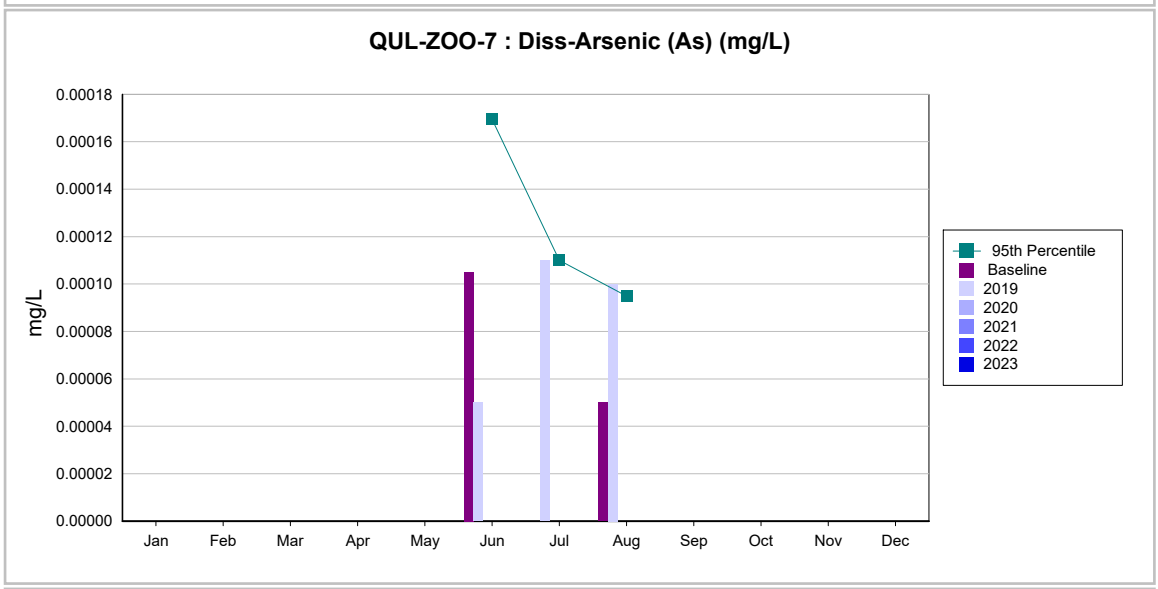

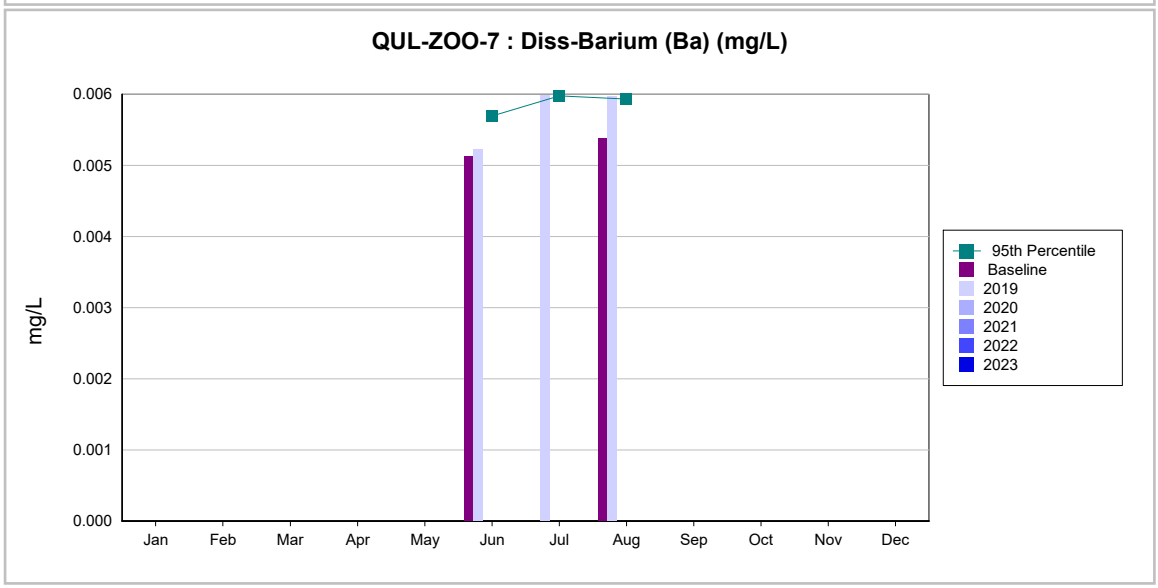

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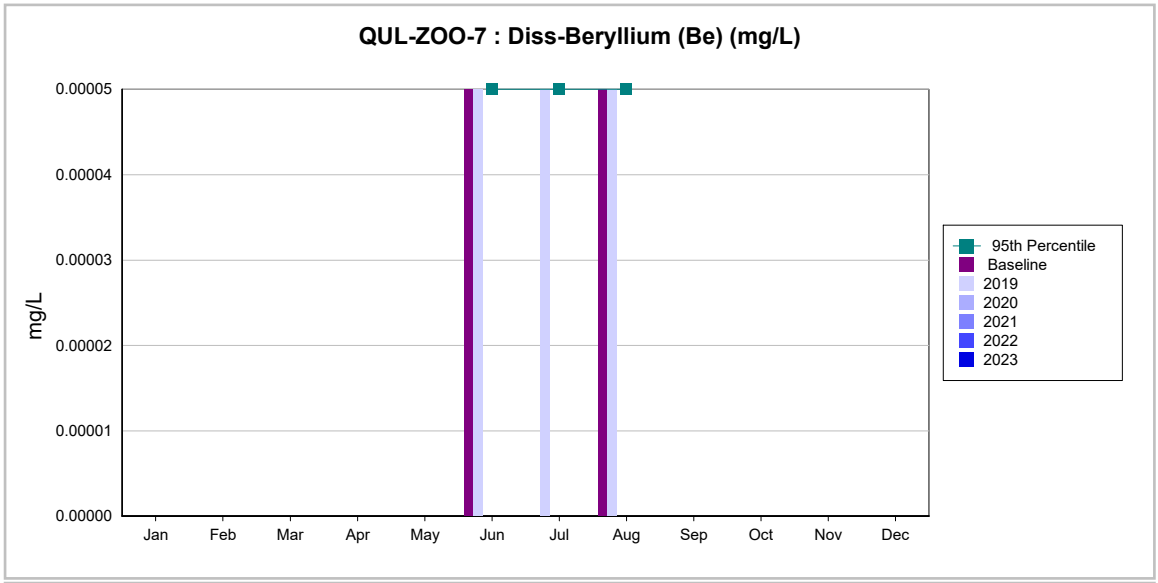

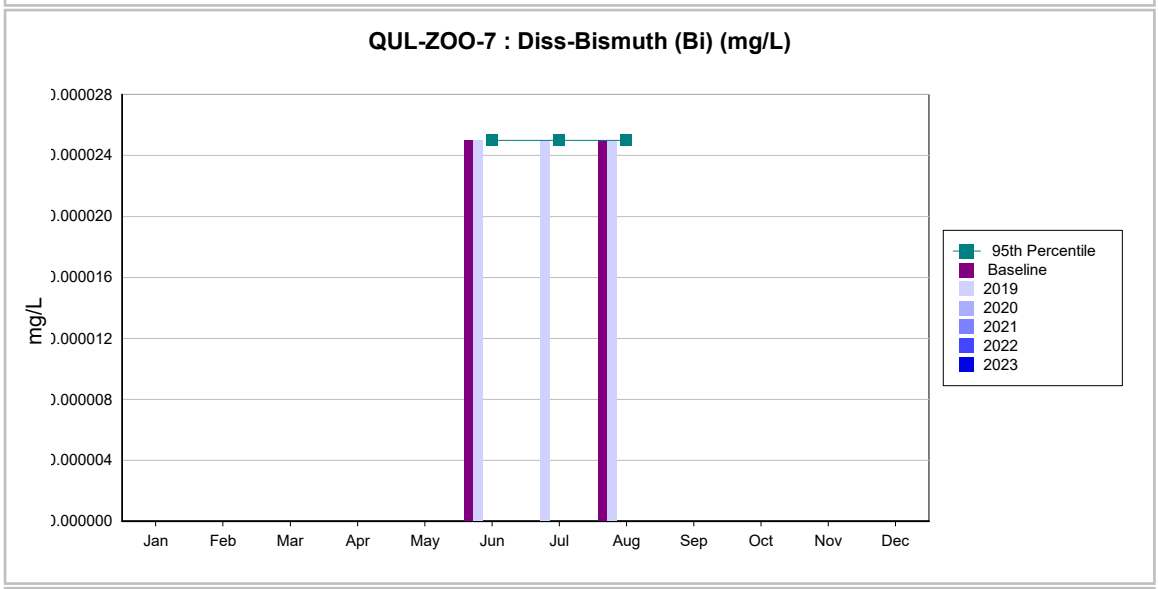

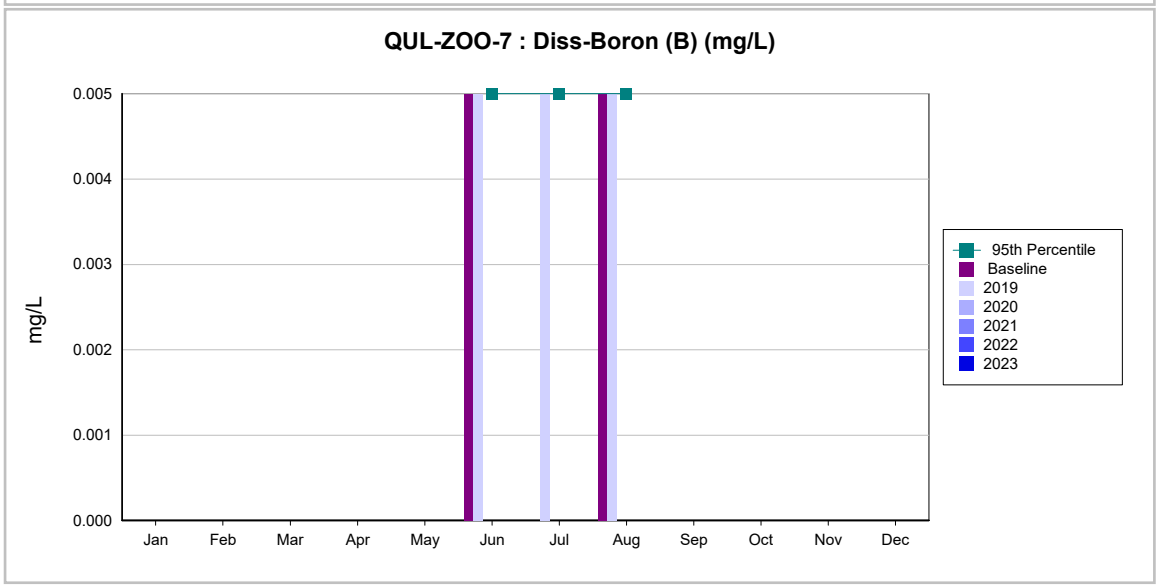

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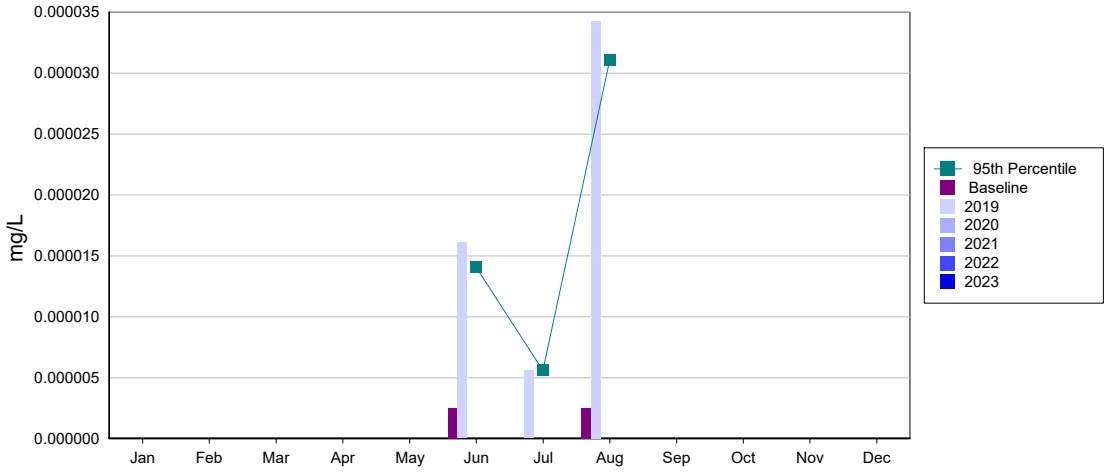

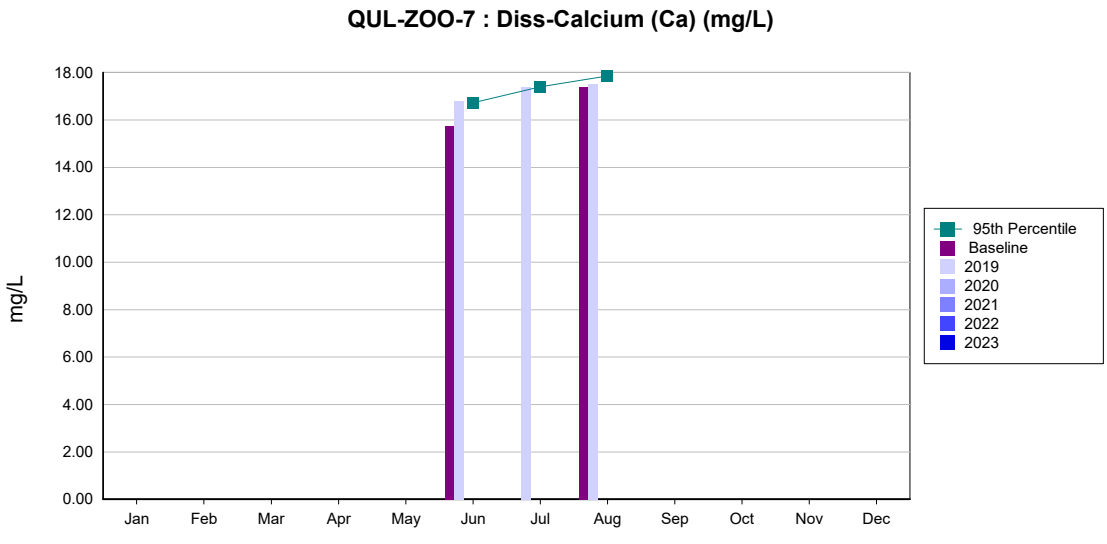

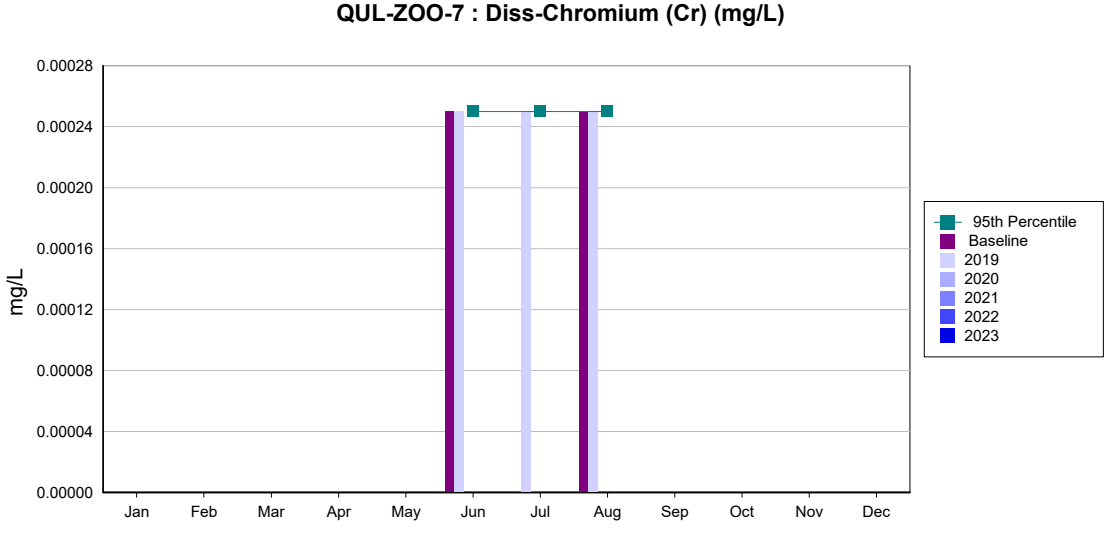

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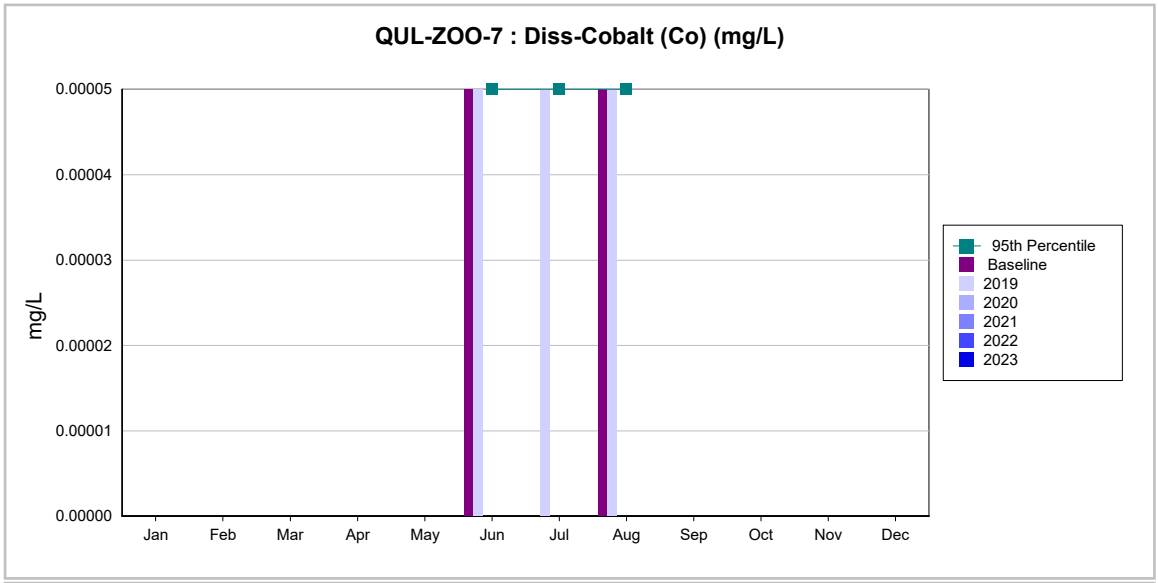

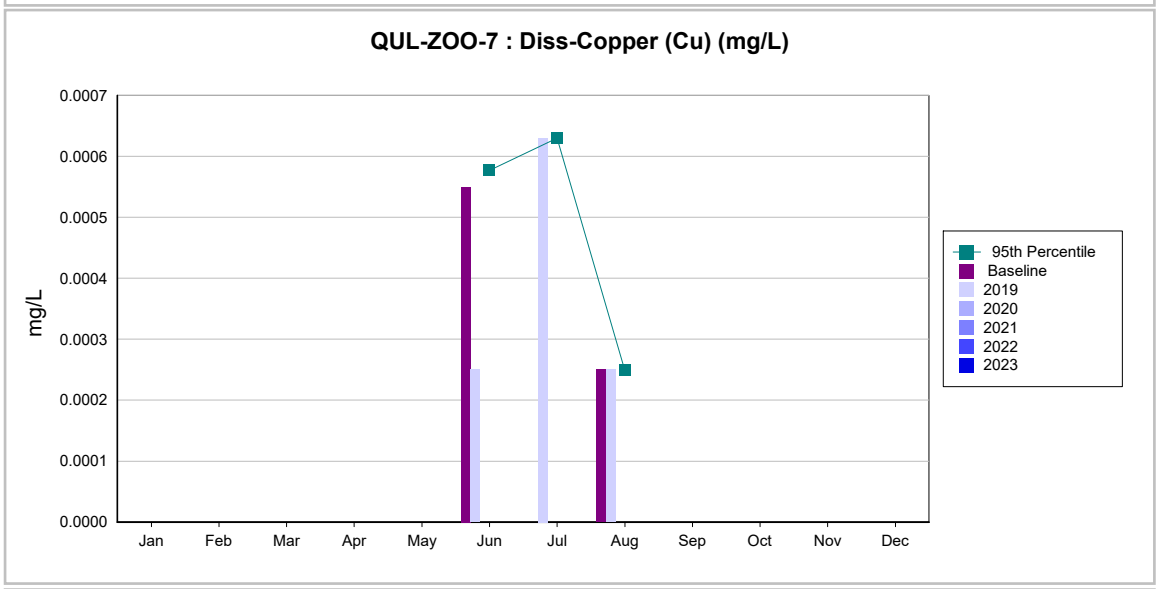

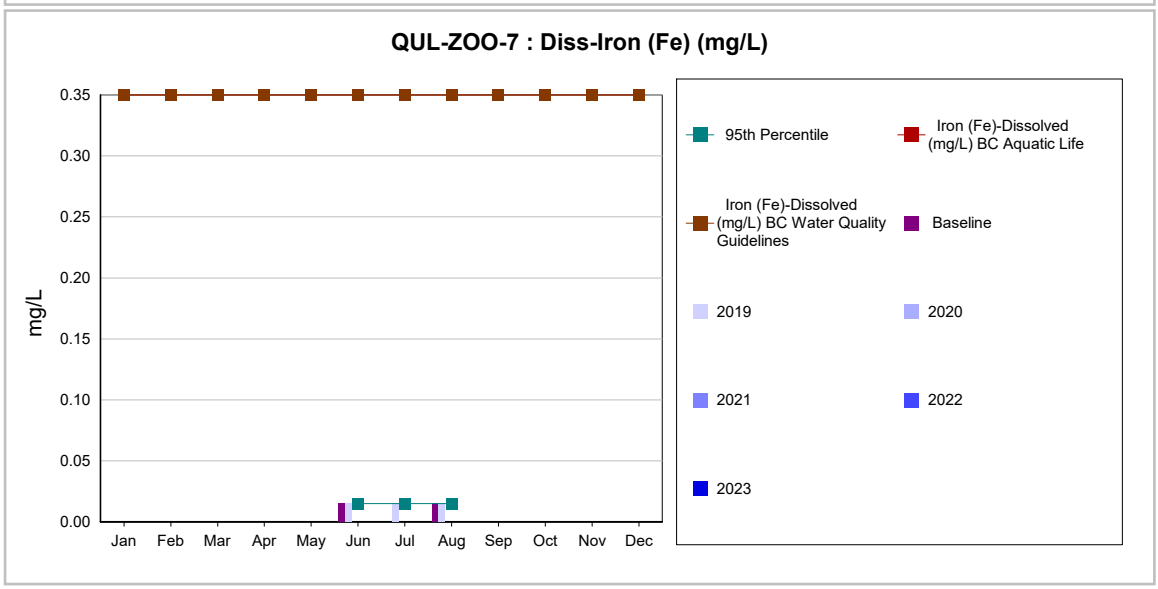

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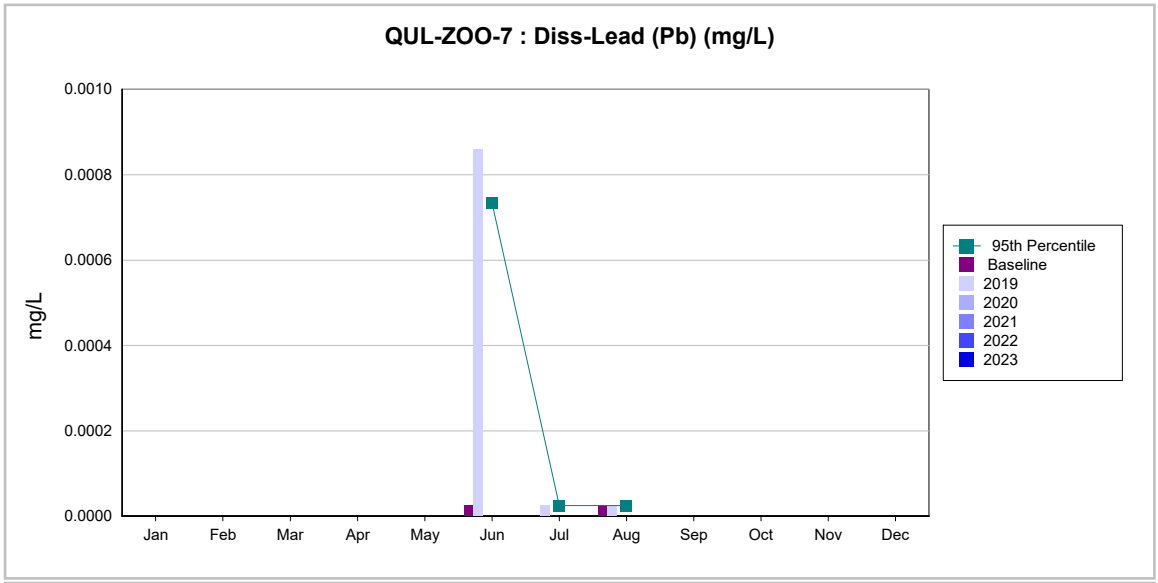

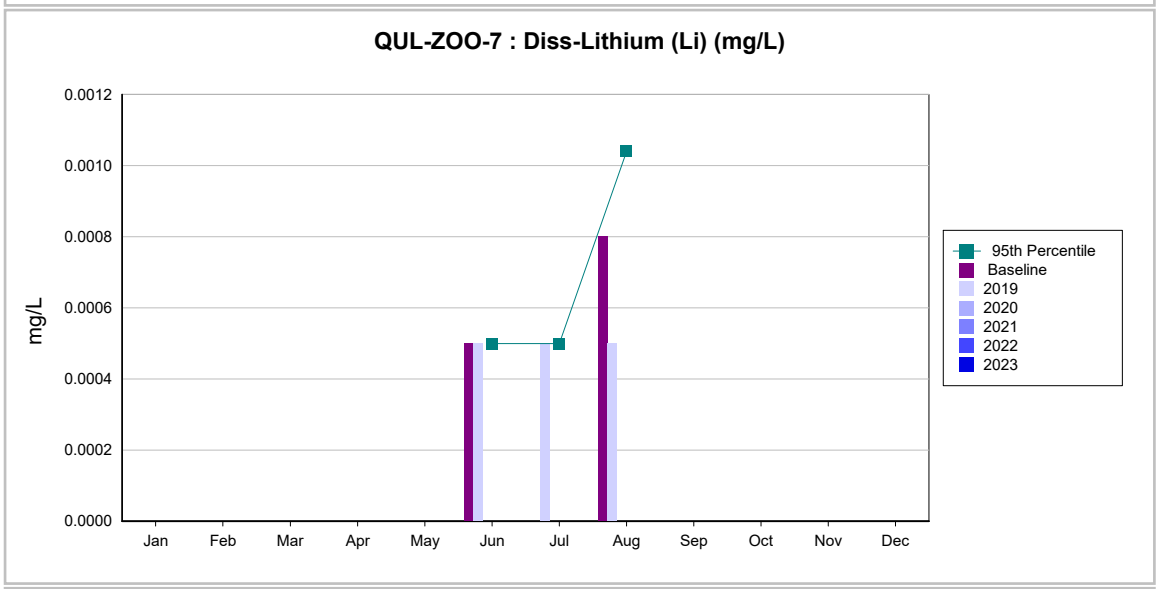

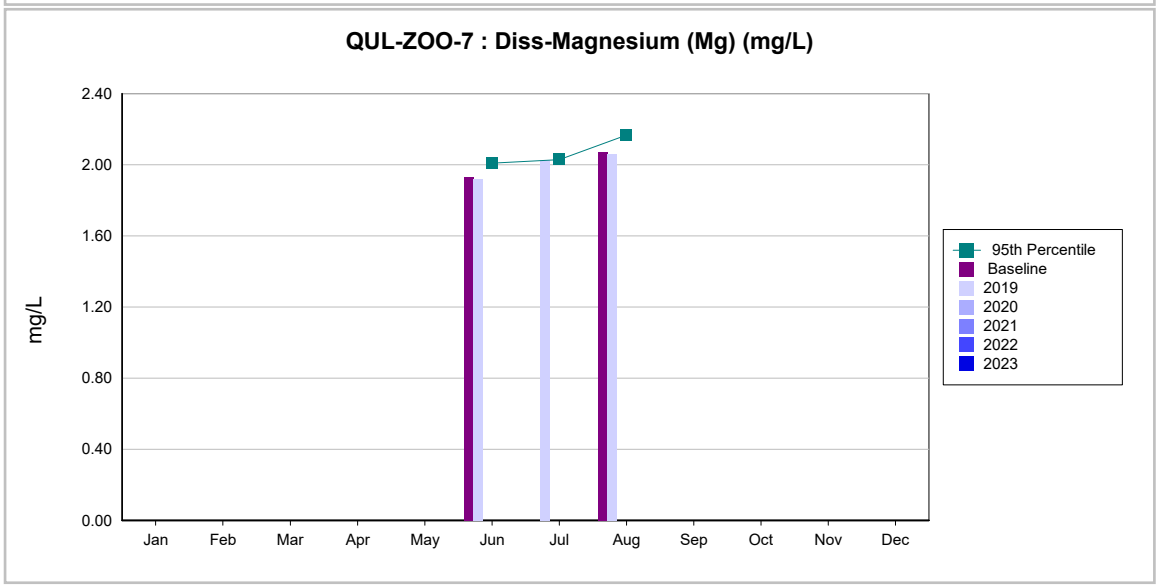

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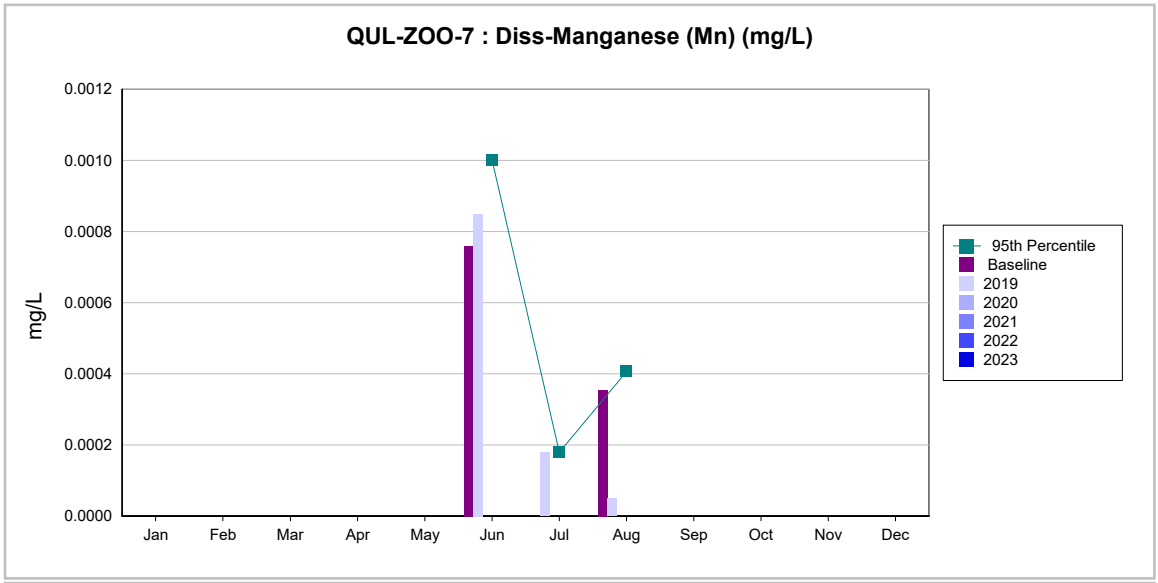

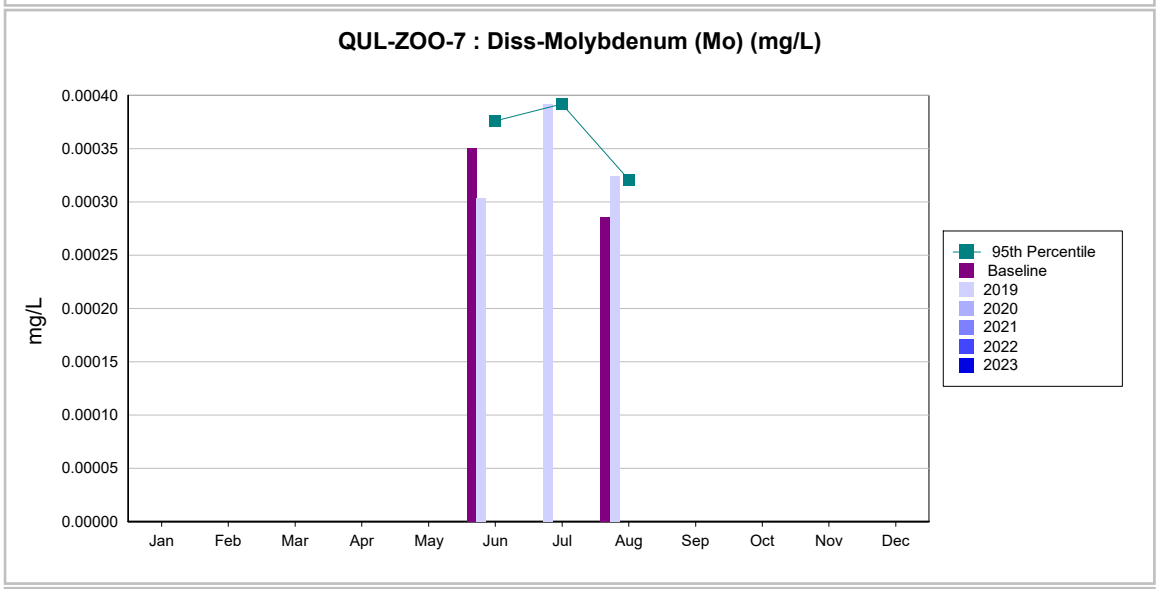

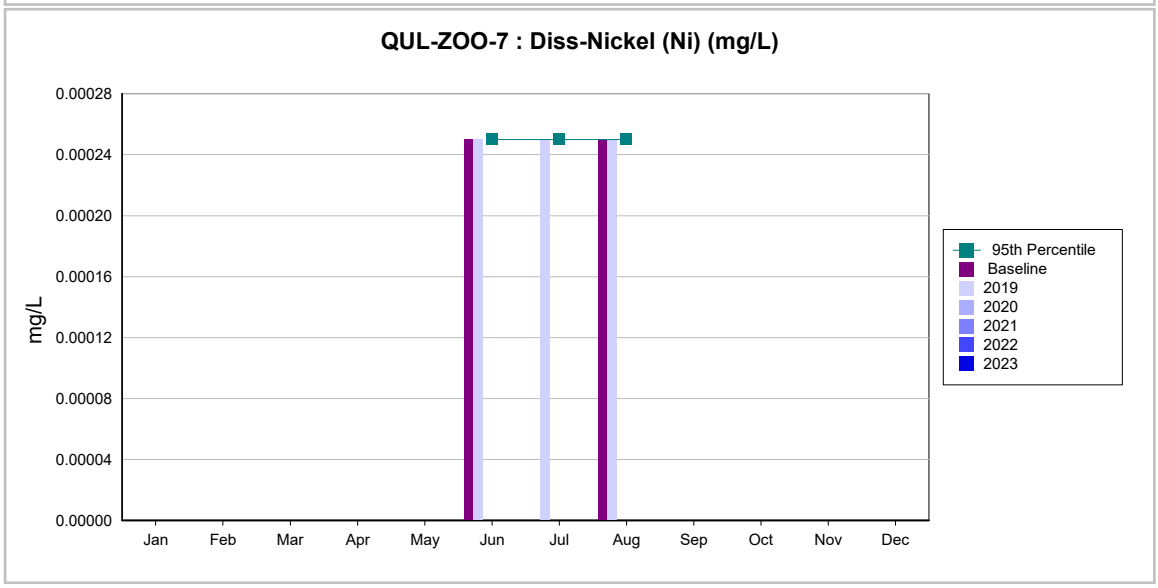

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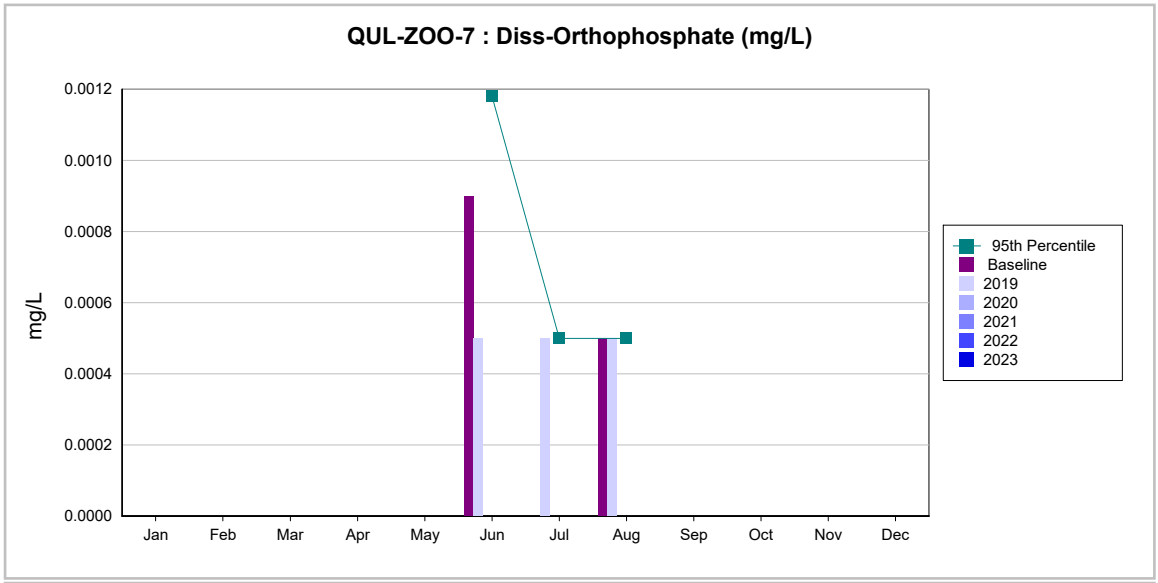

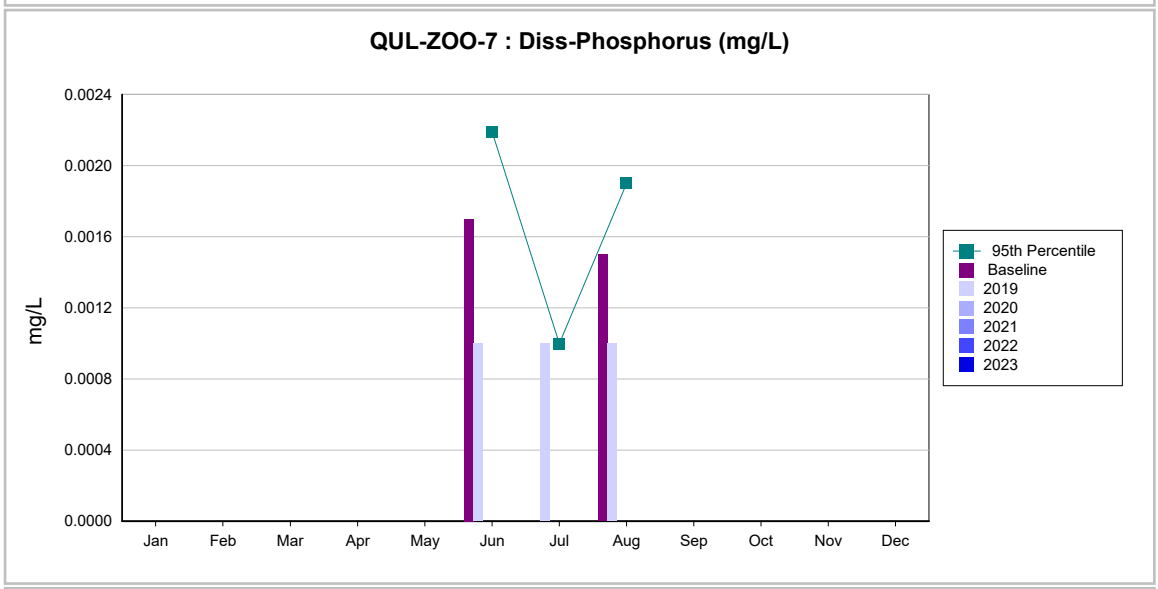

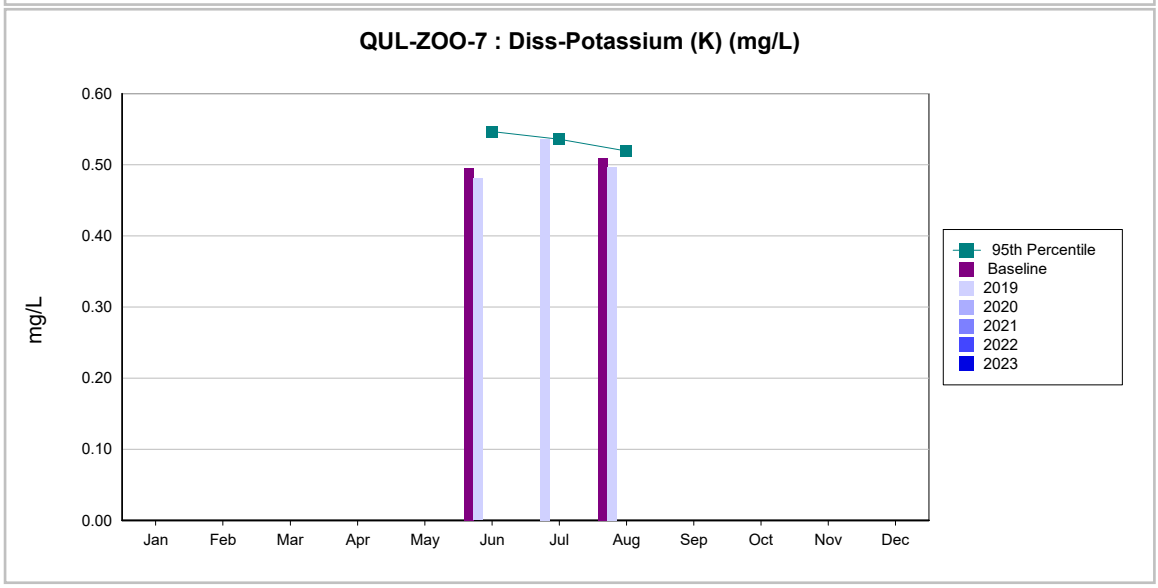

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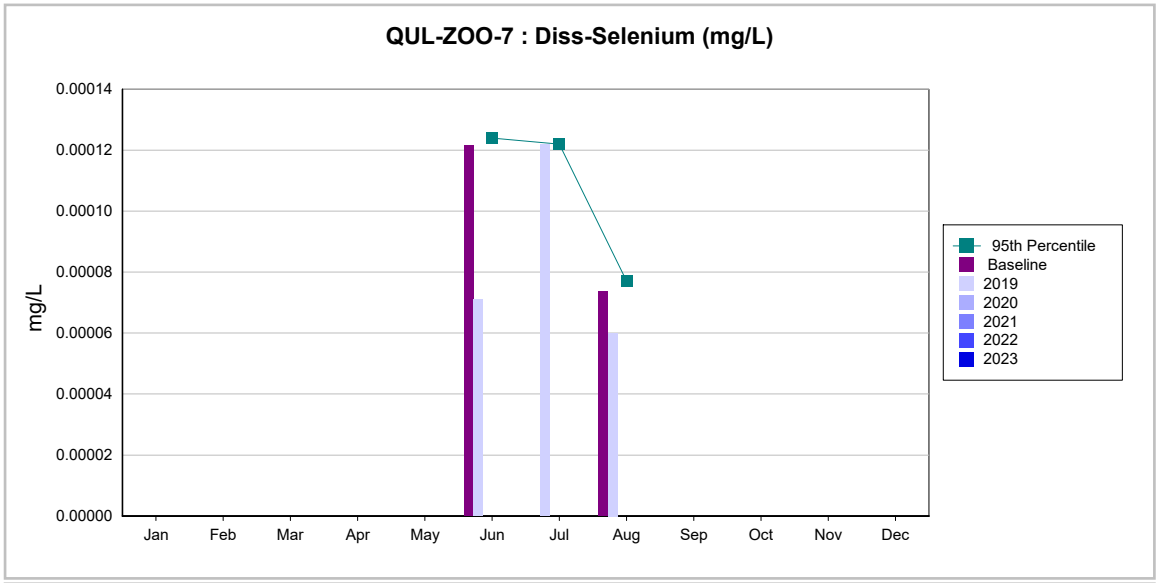

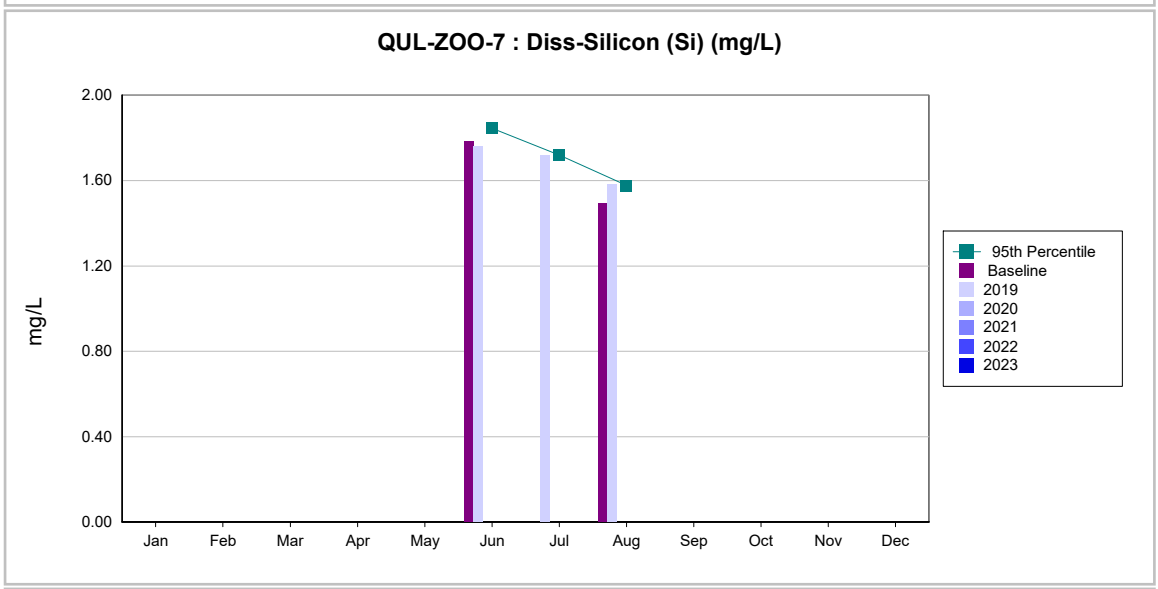

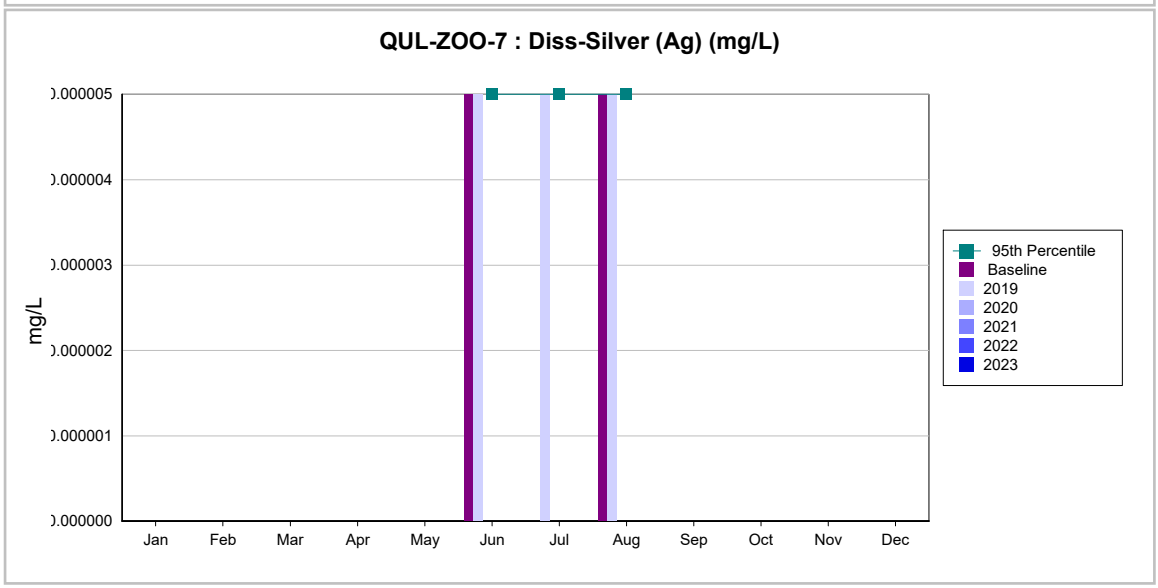

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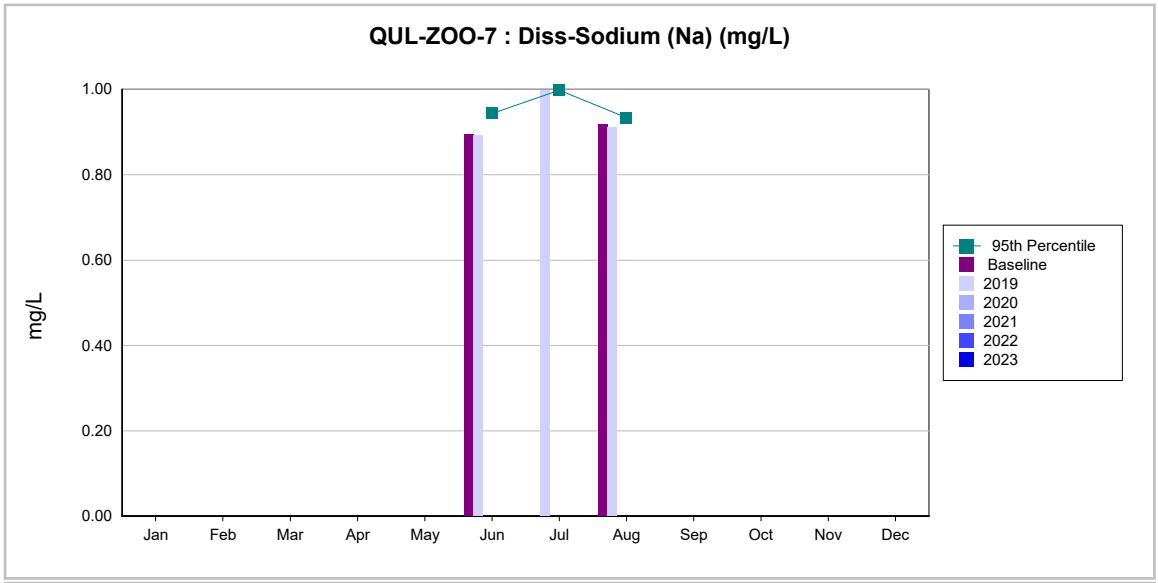

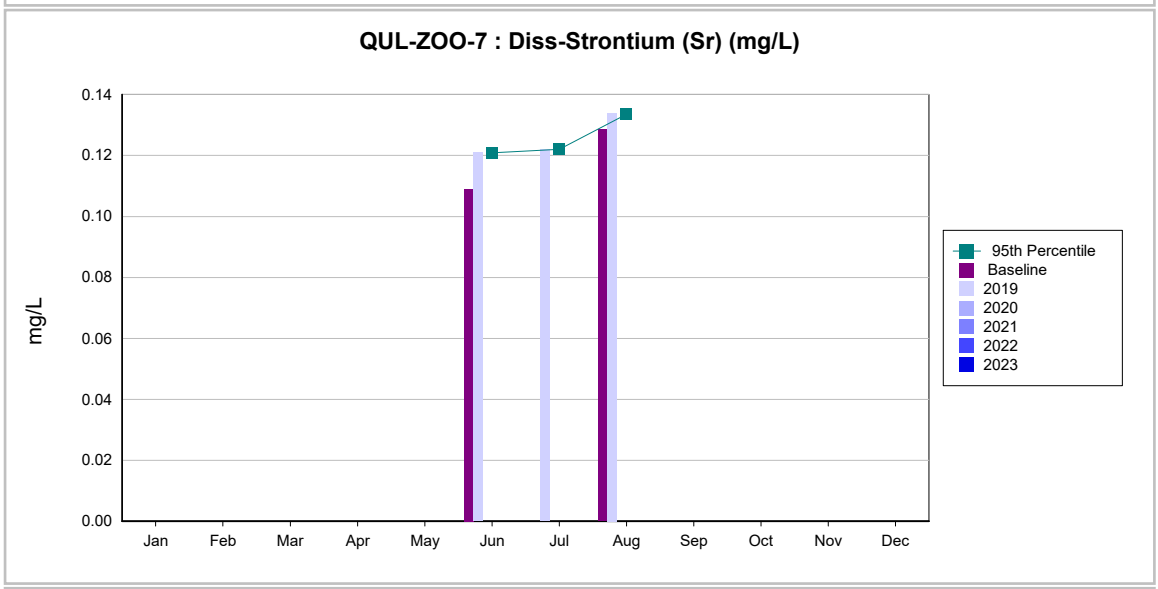

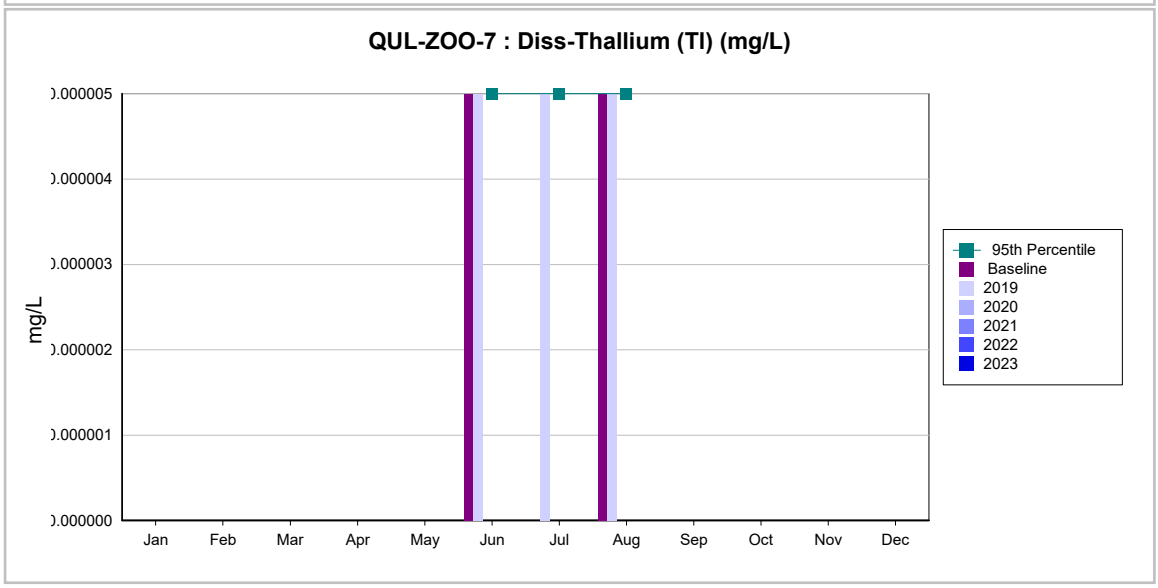

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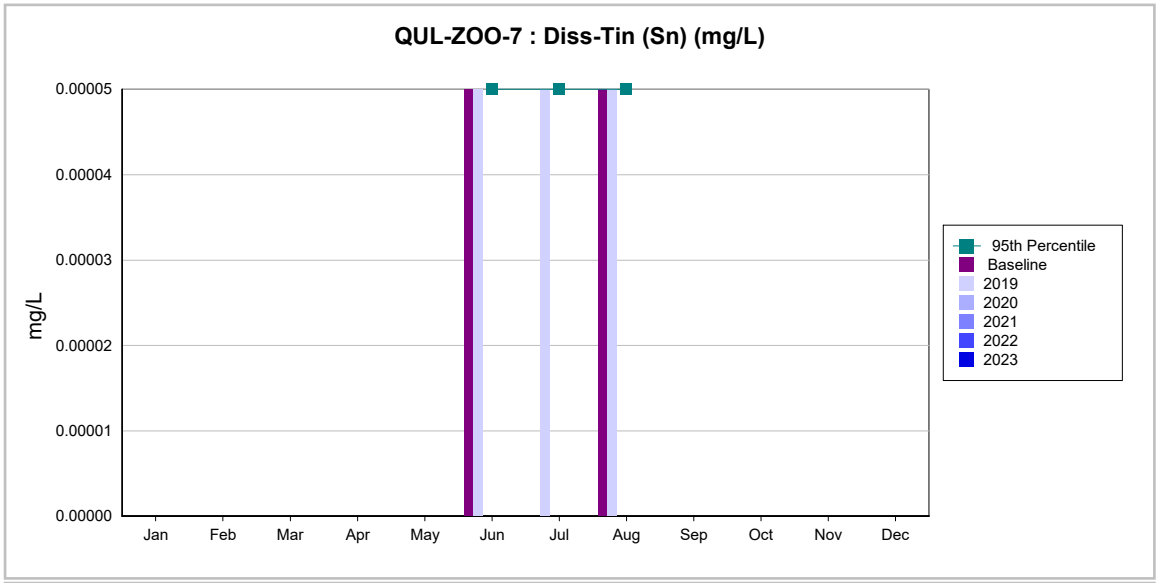

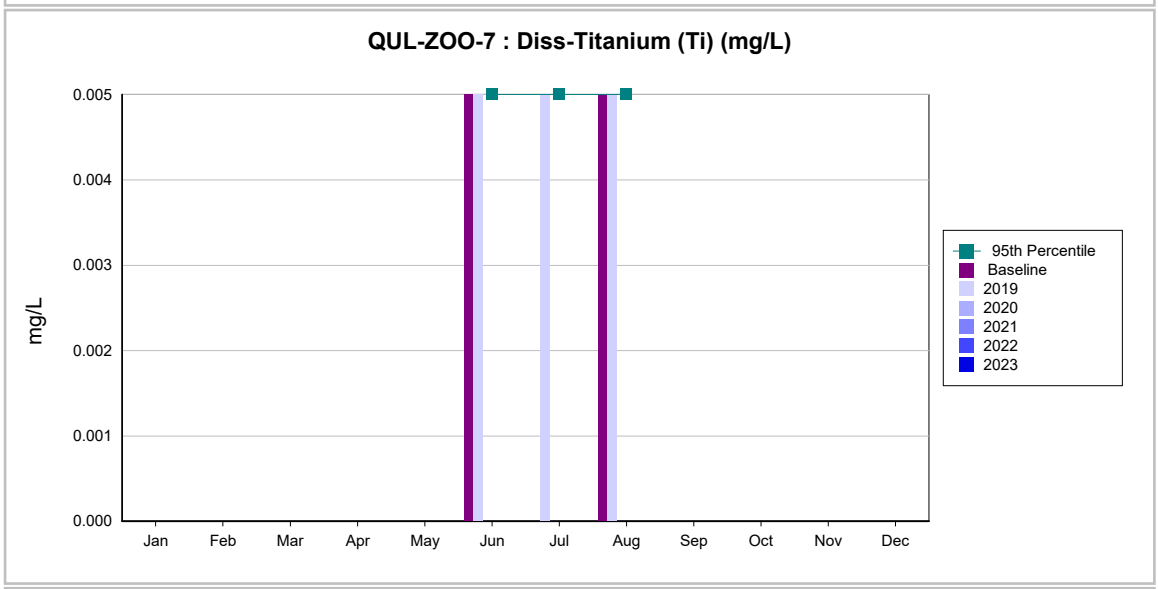

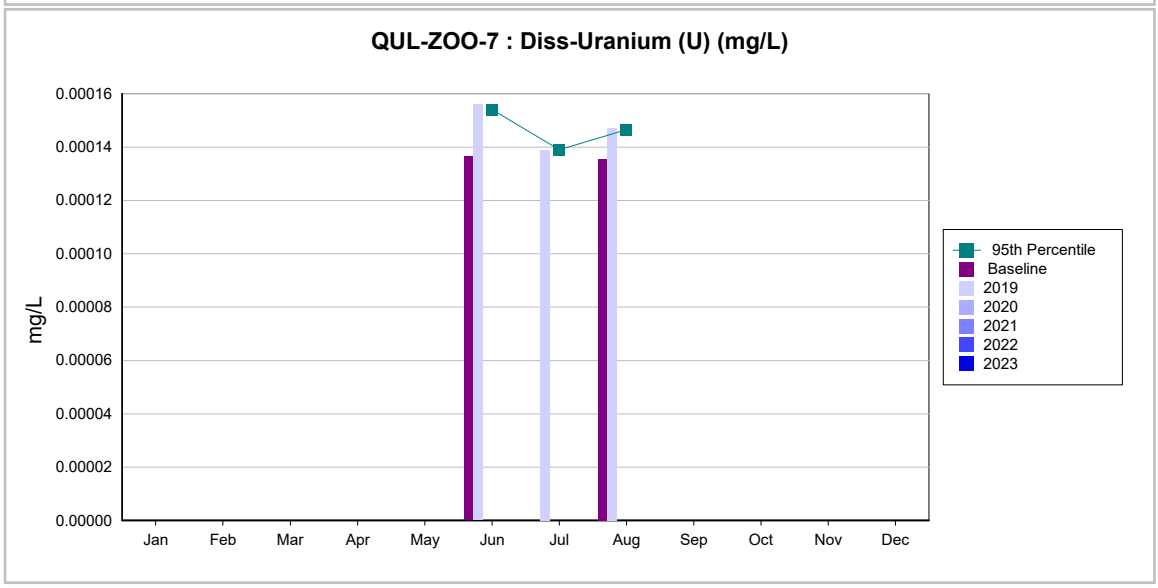

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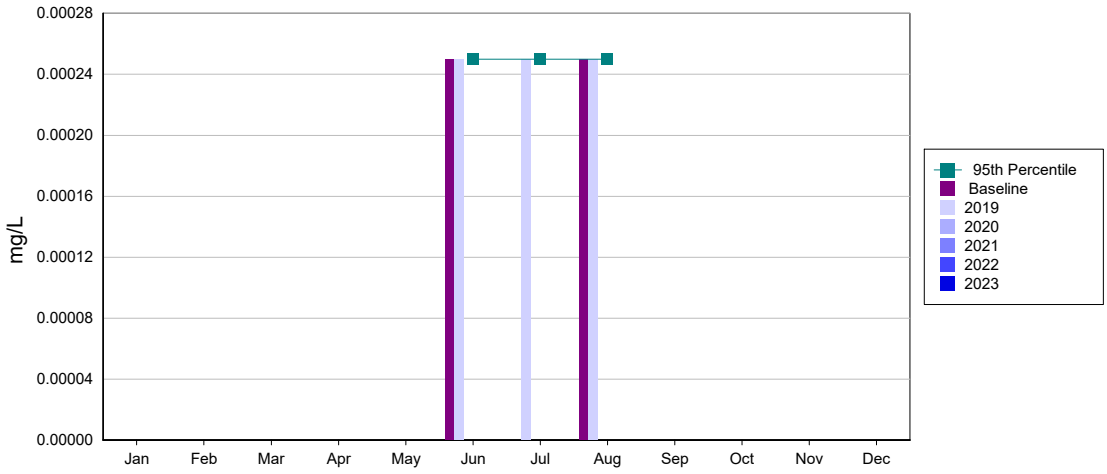

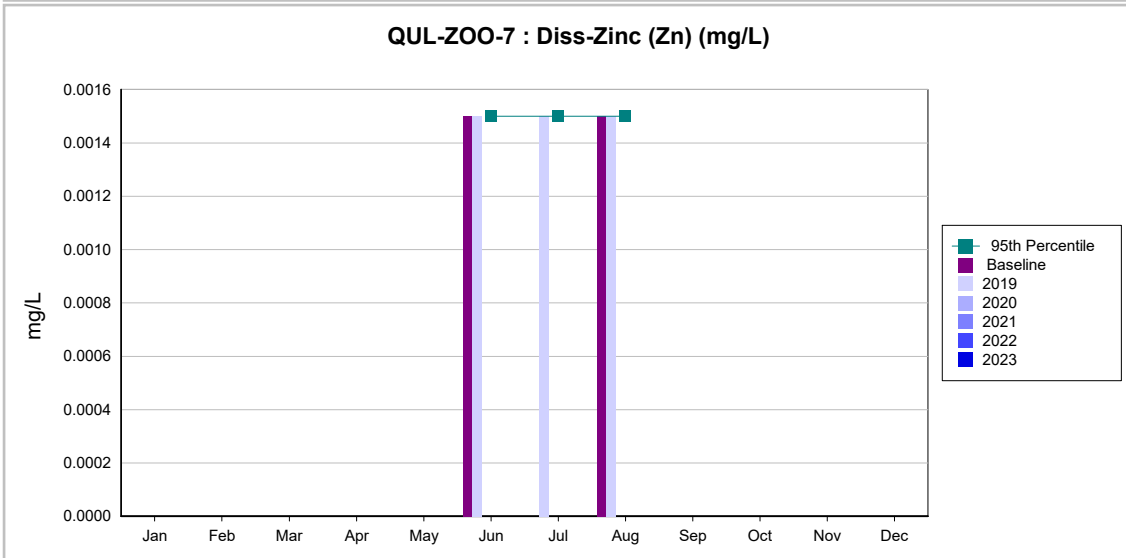

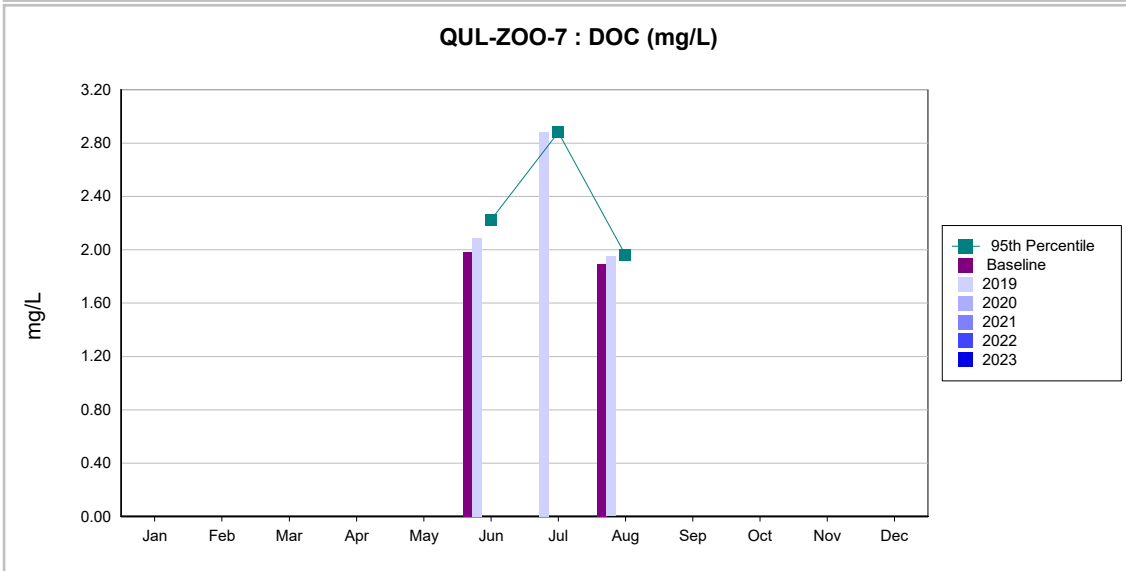

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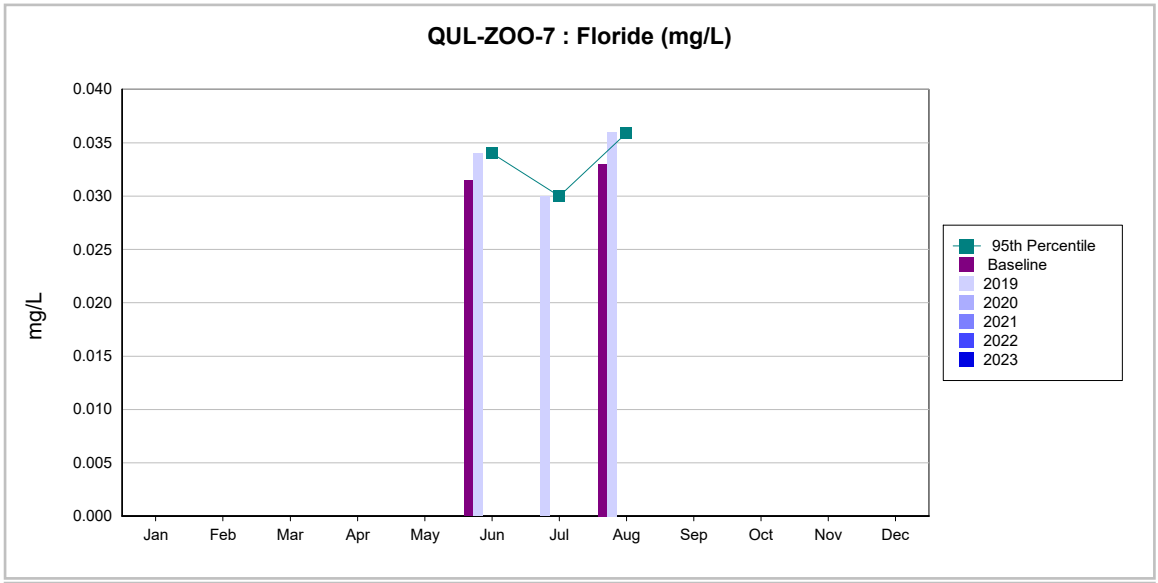

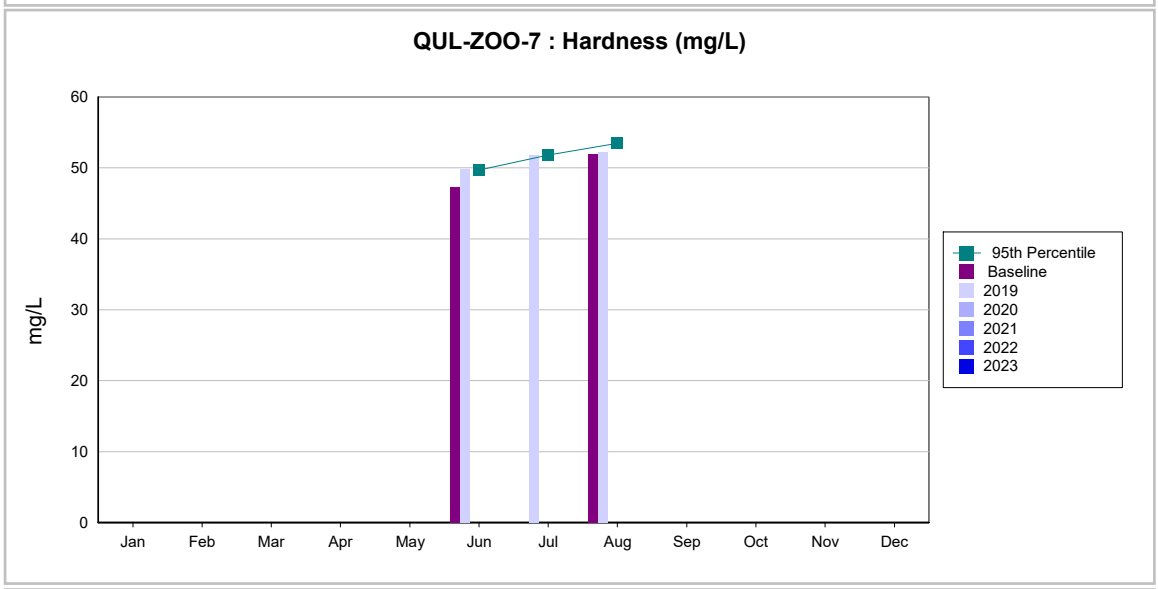

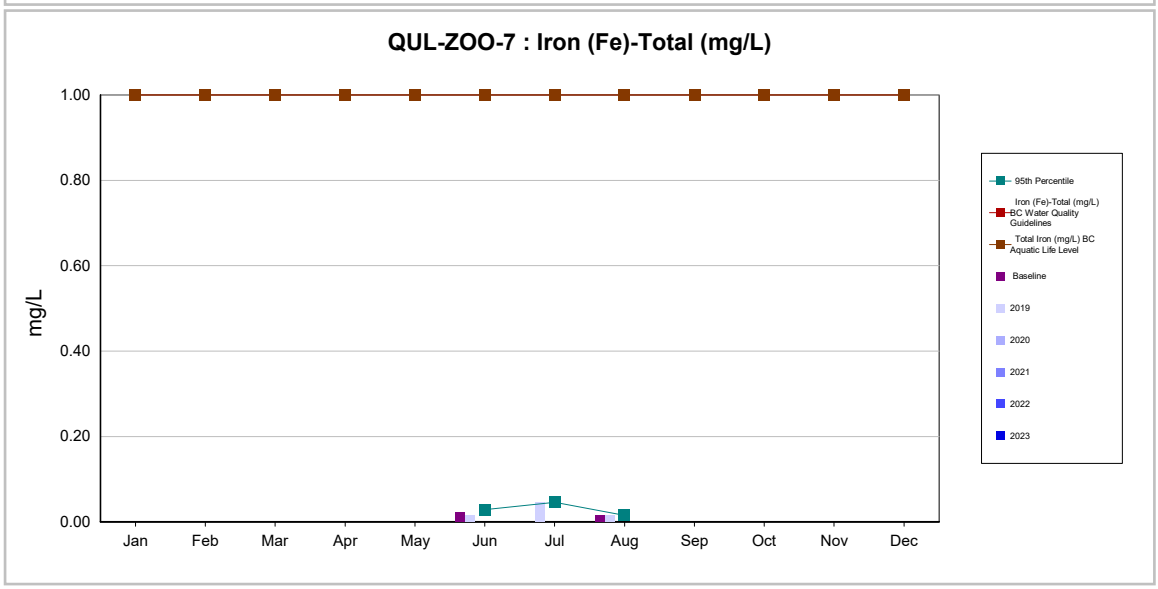

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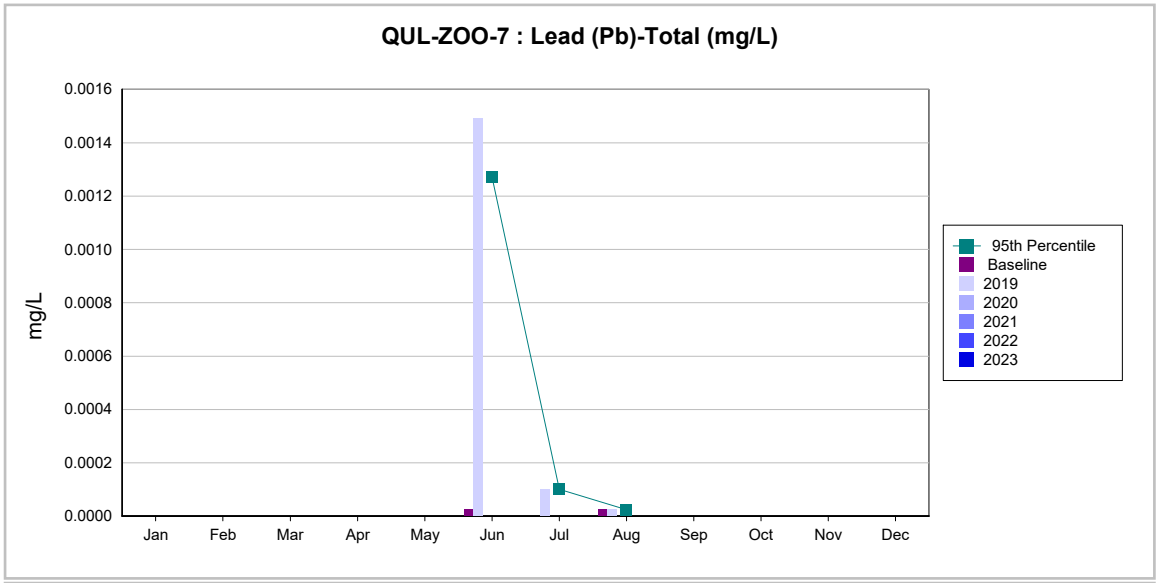

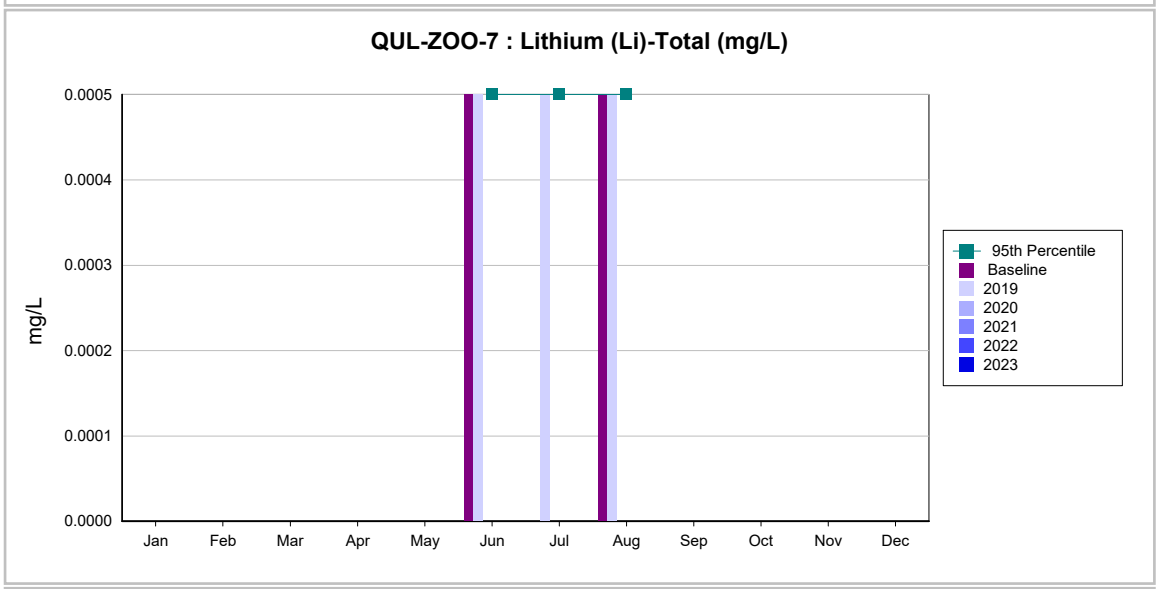

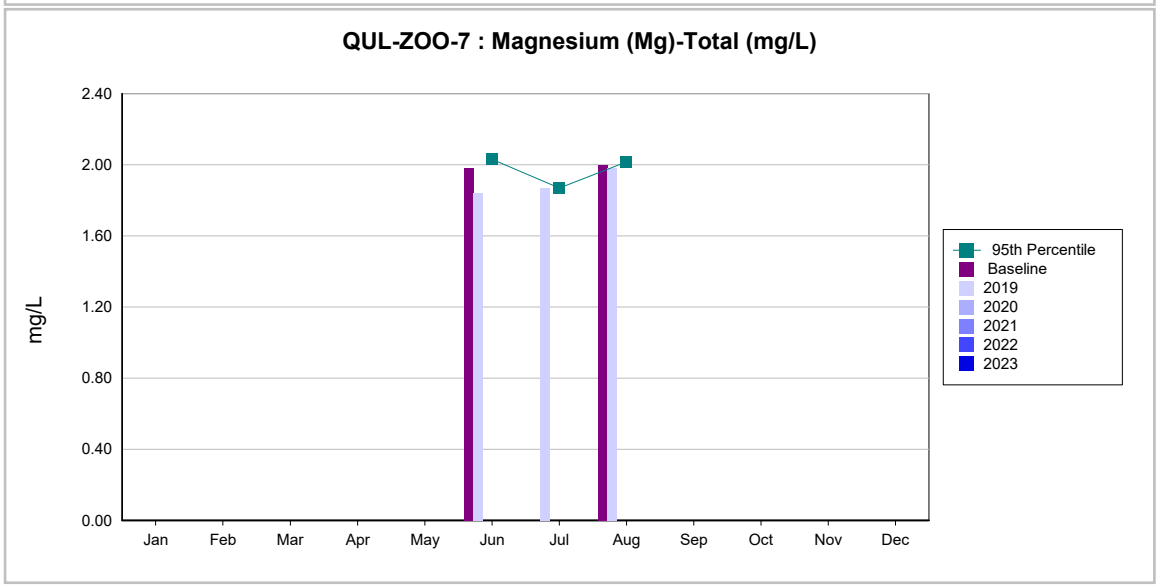

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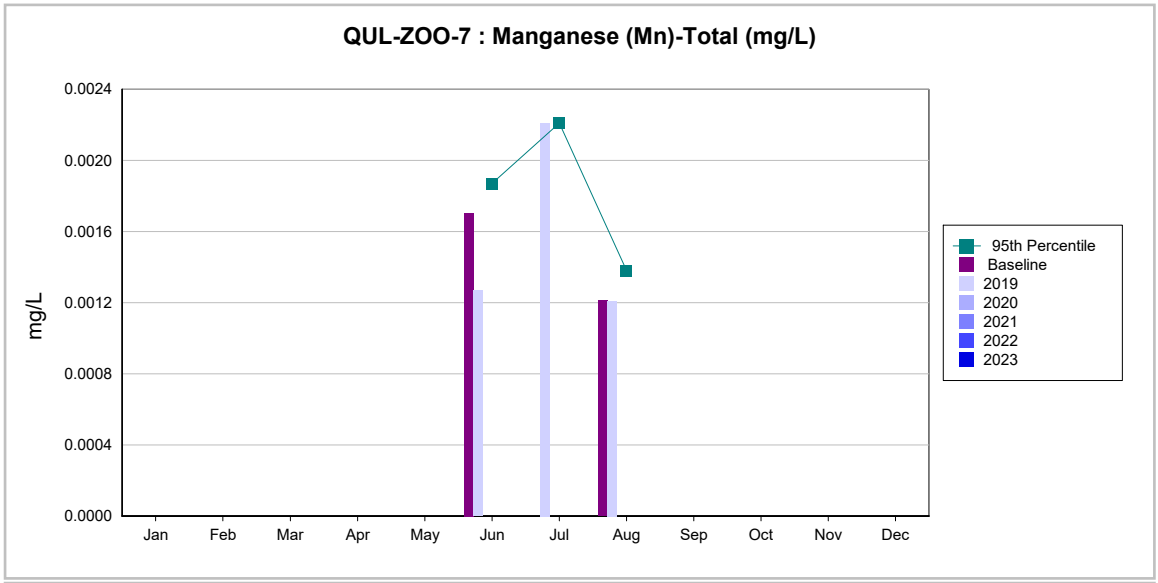

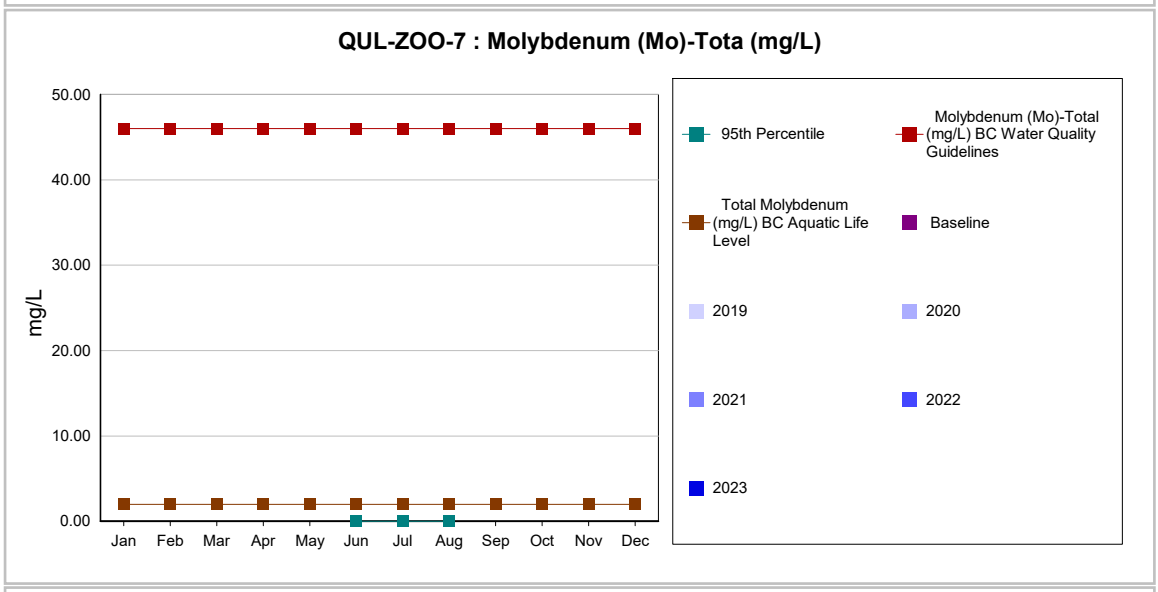

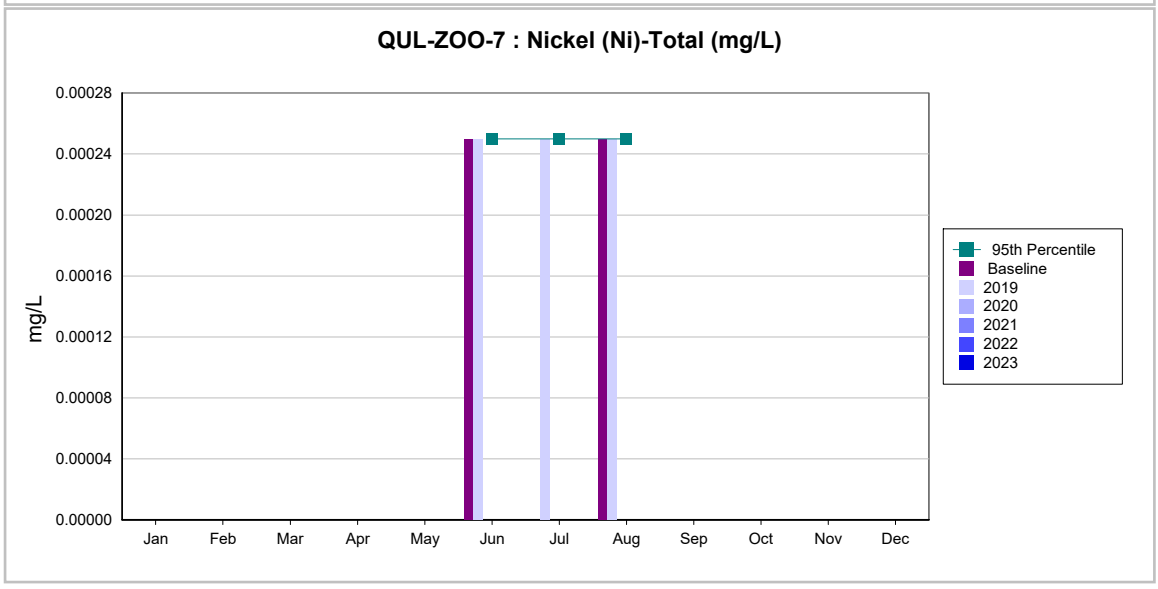

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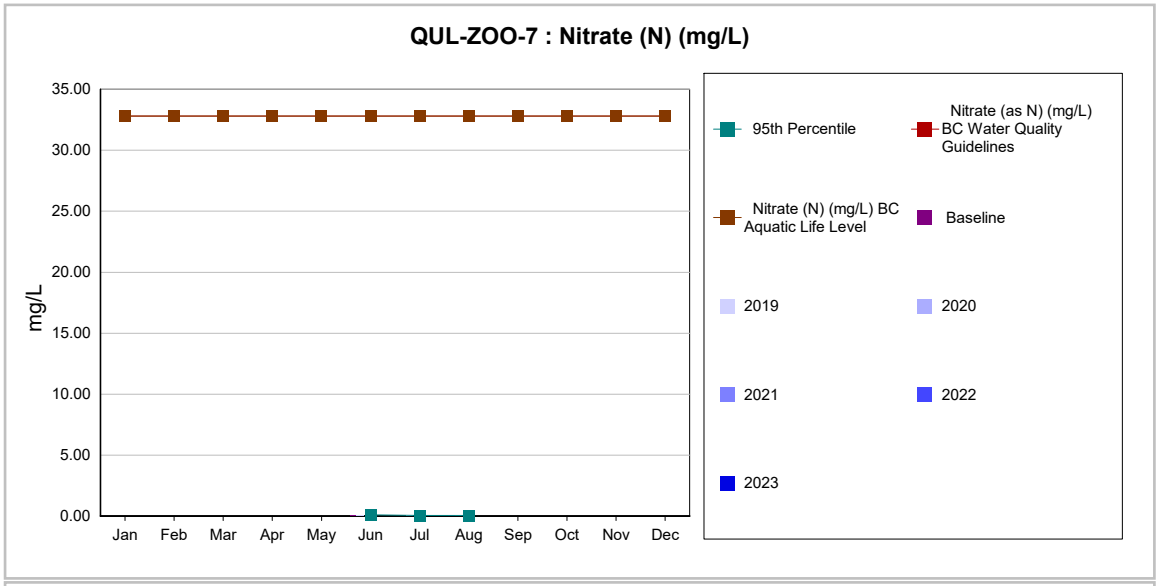

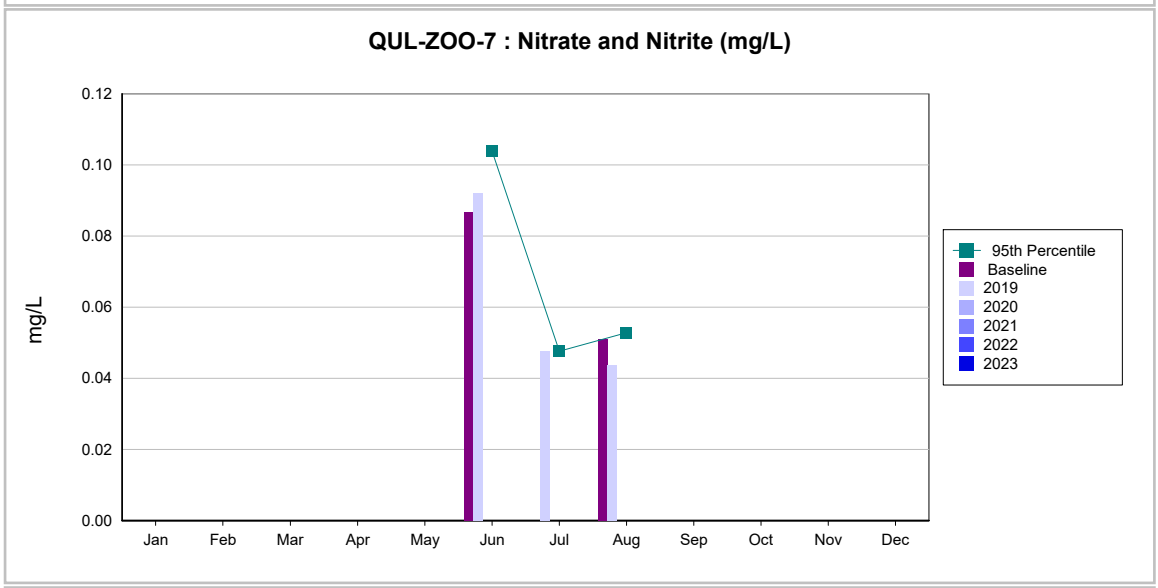

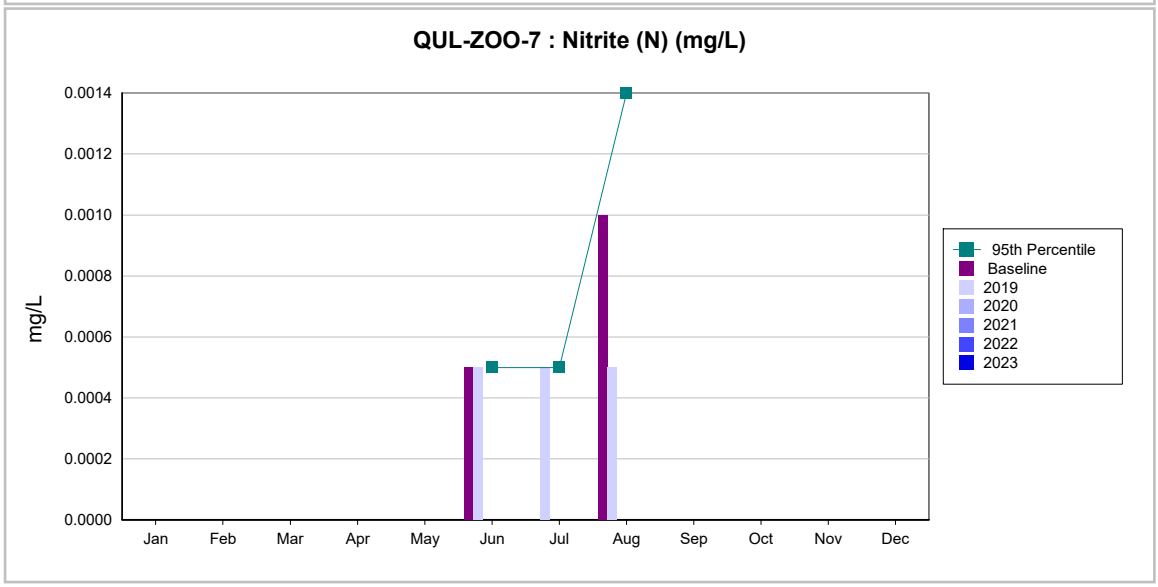

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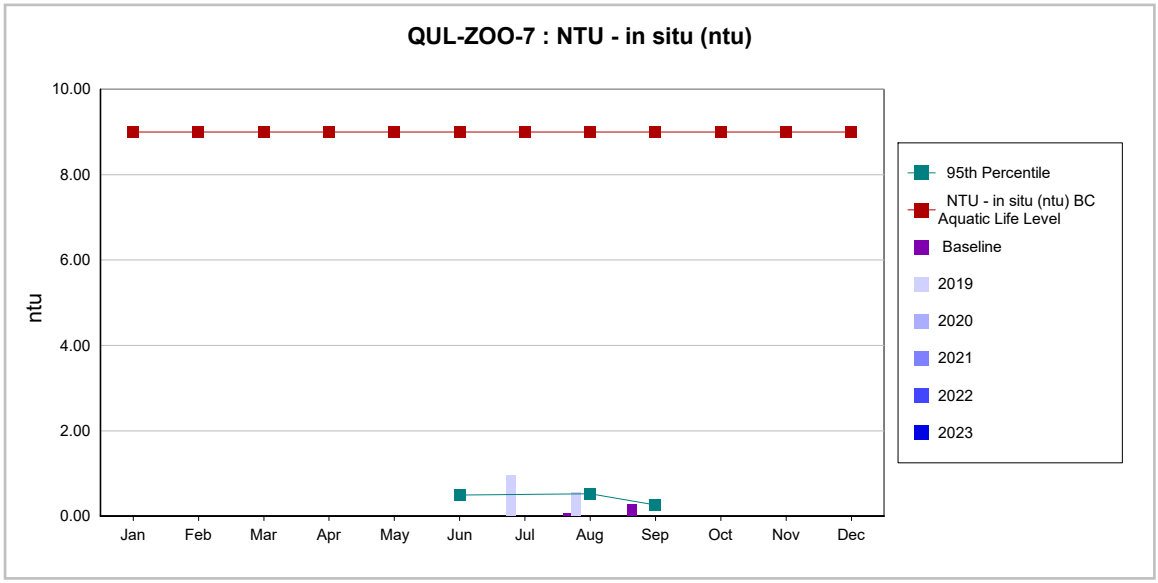

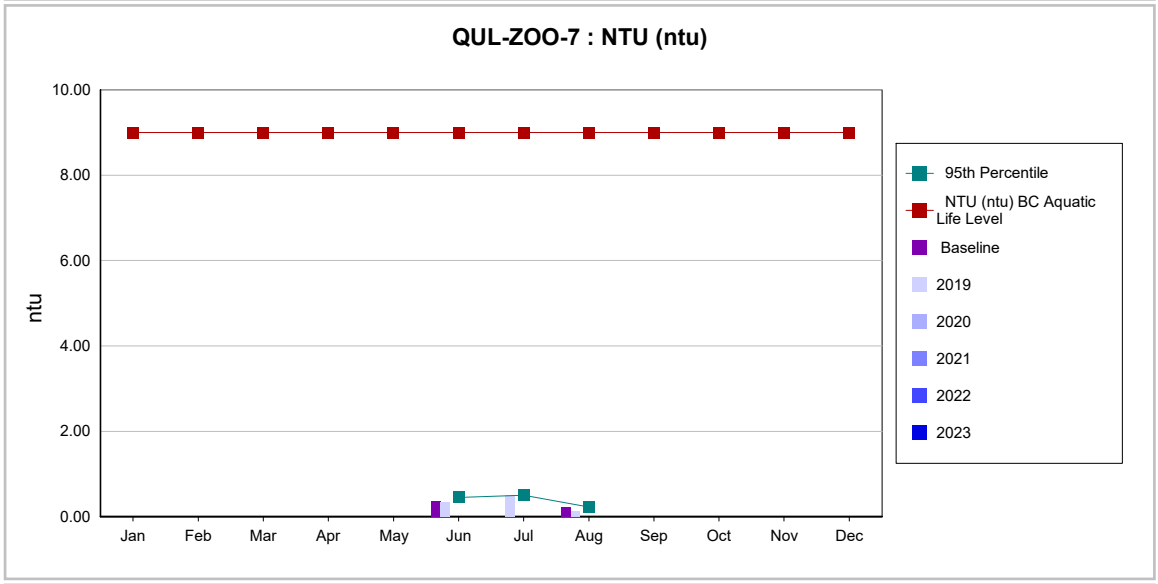

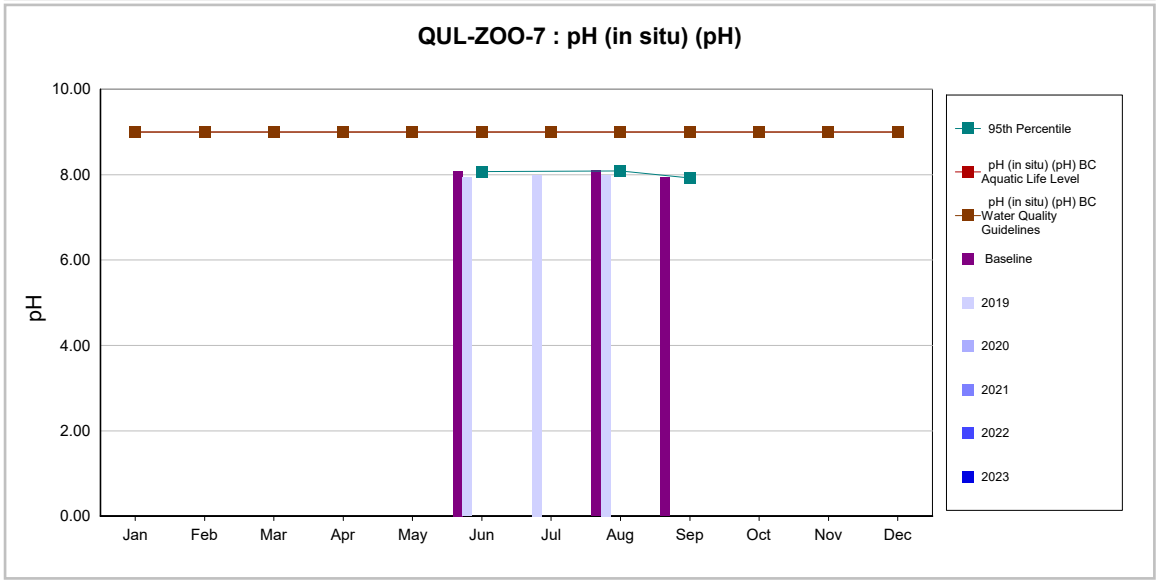

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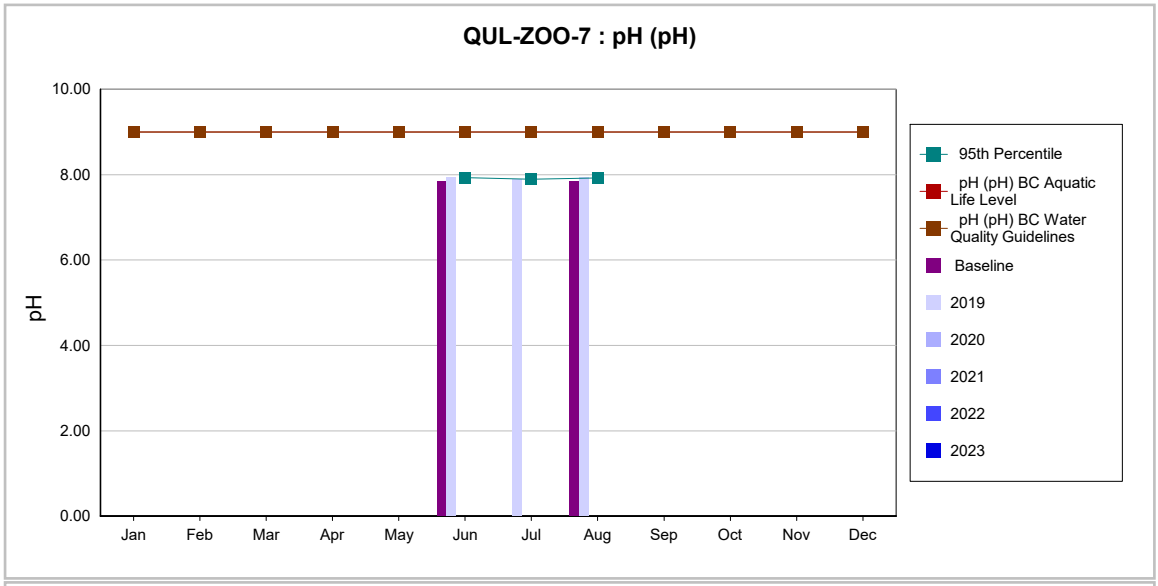

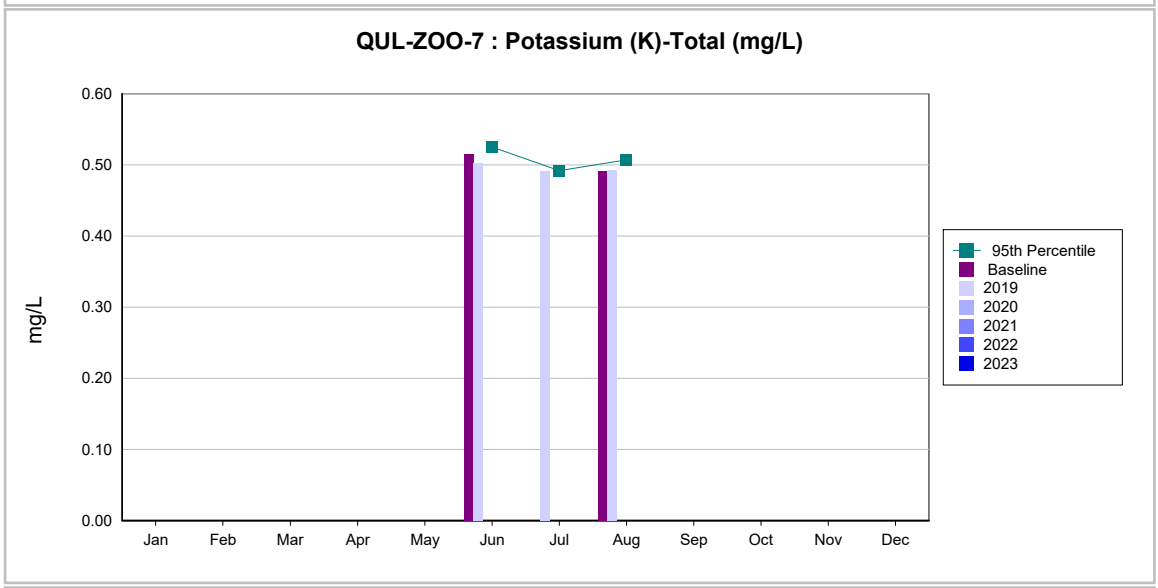

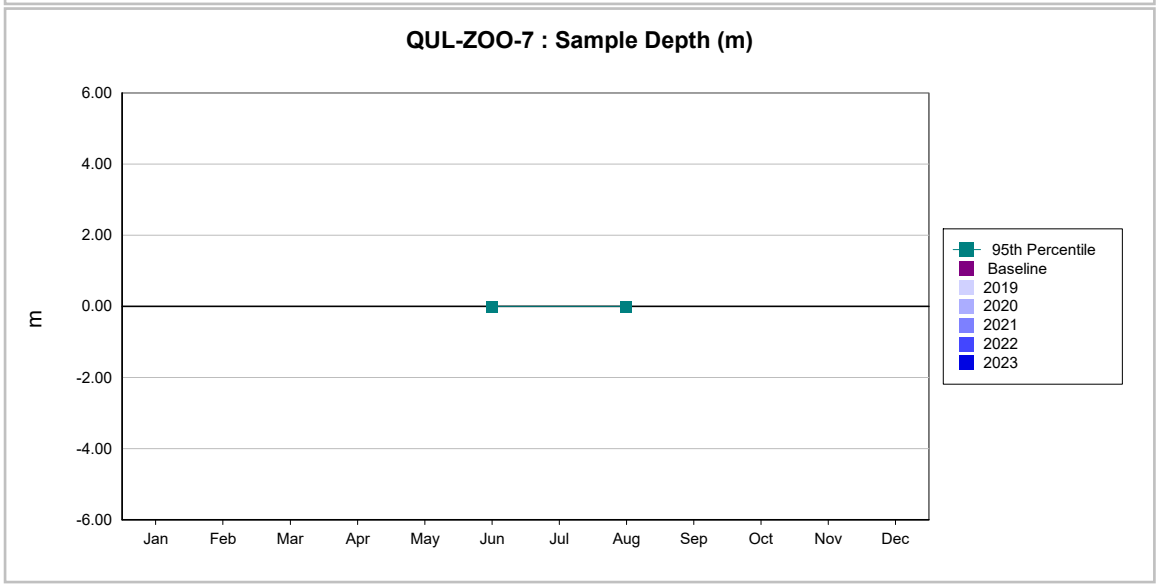

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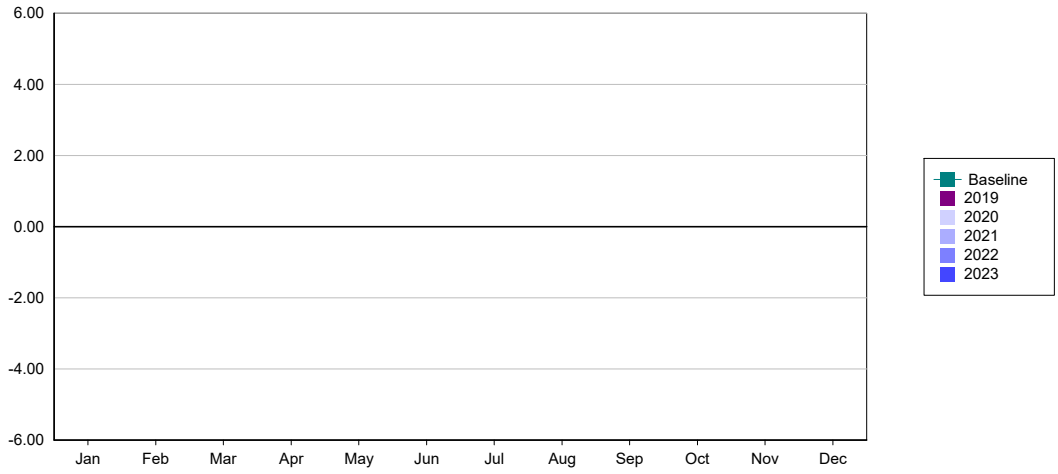
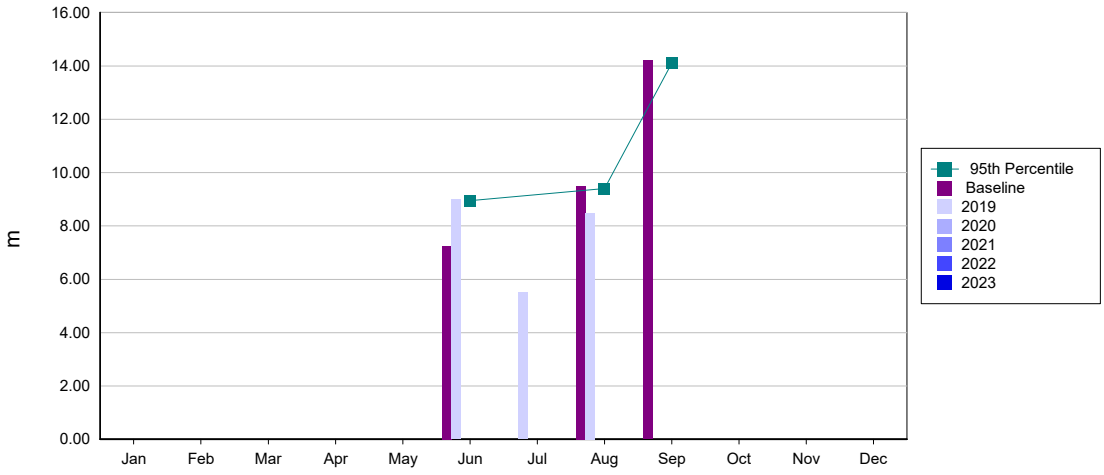
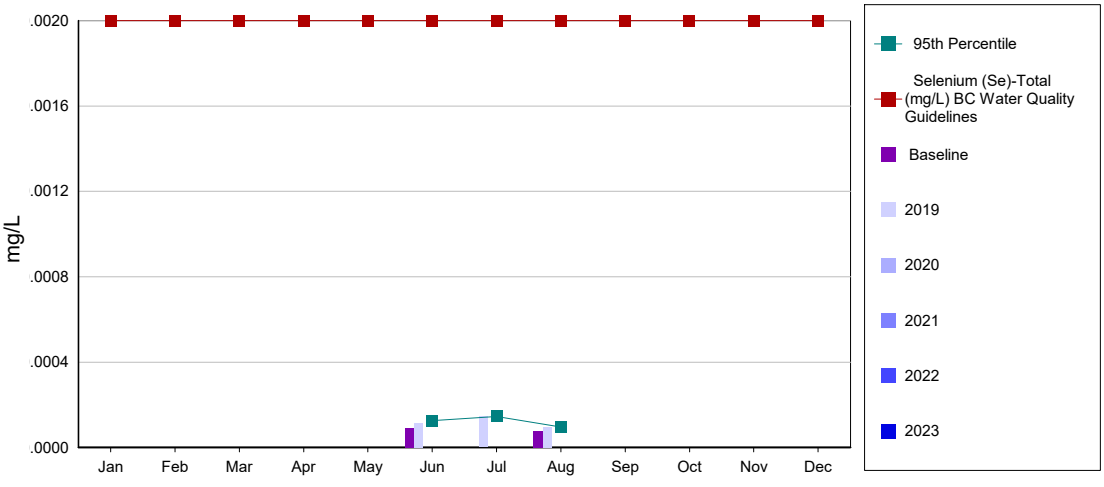
QUL-ZOO-7 : Sample Taken



QUL-ZOO-7 : Secchi Depth (m)



QUL-ZOO-7 : Selenium (Se)-Total (mg/L)



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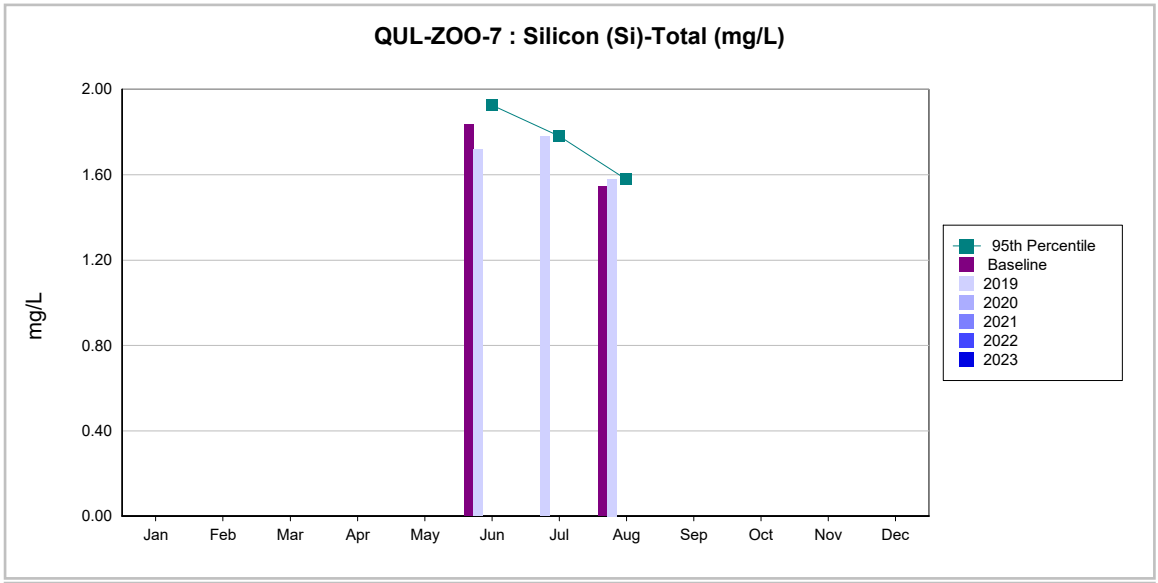

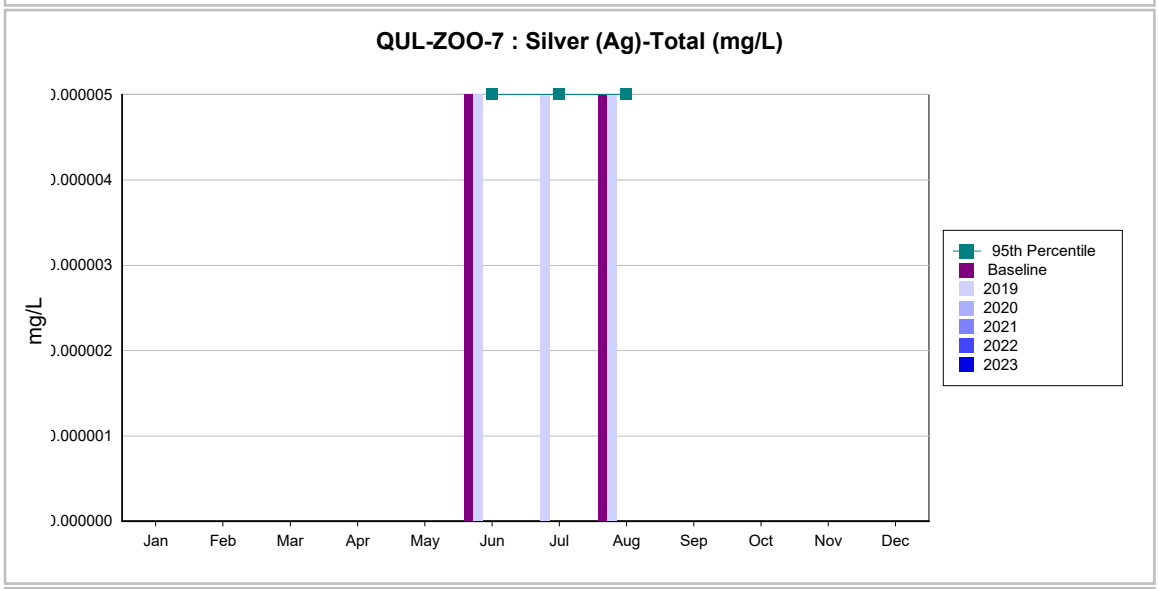

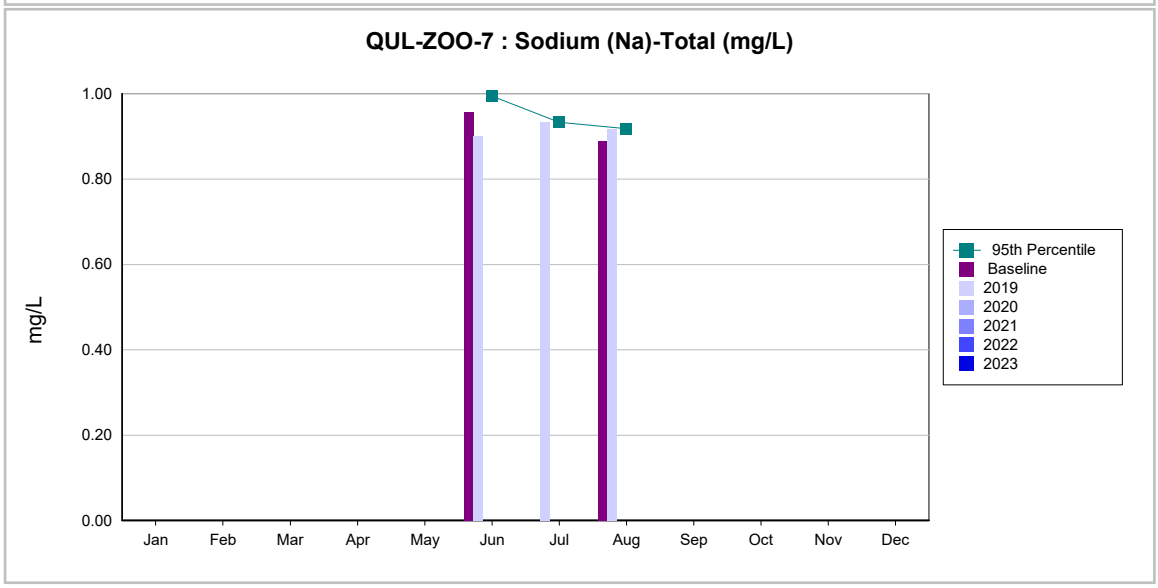

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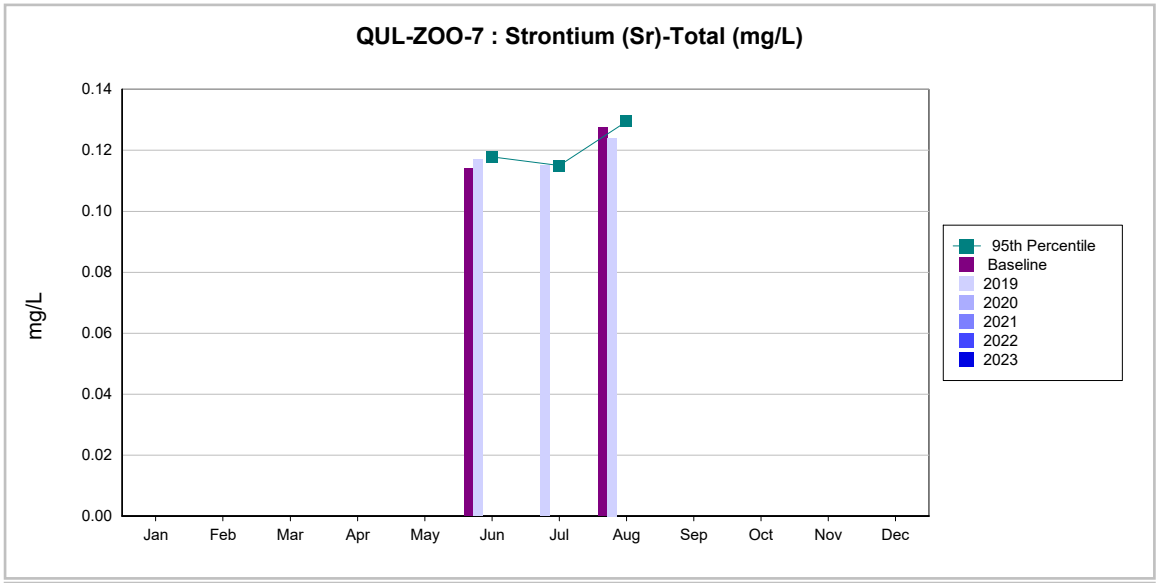

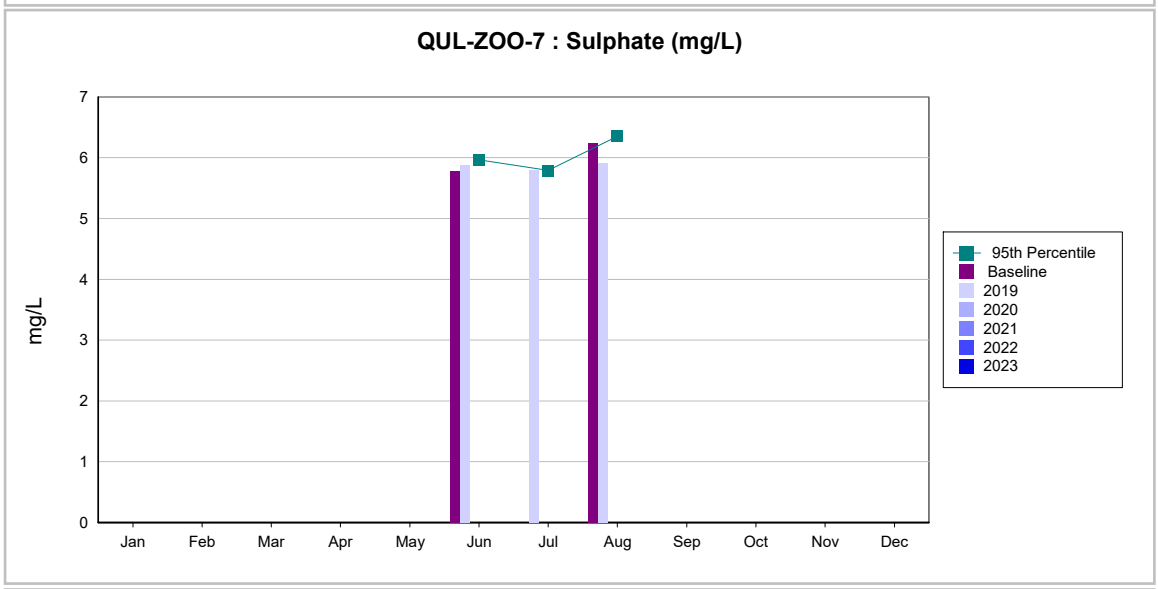

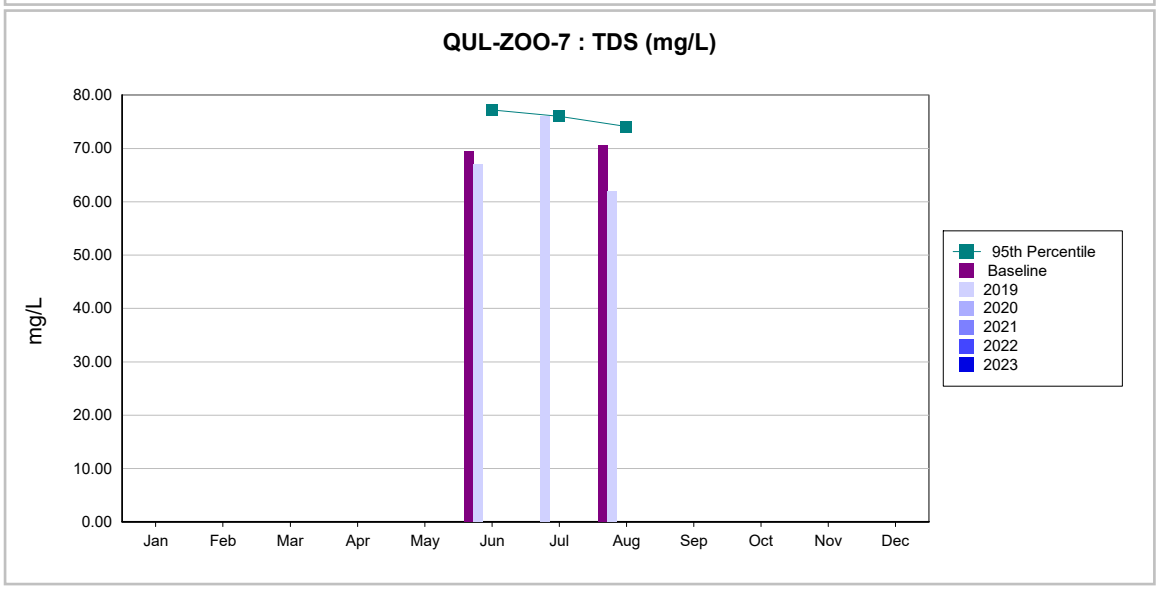

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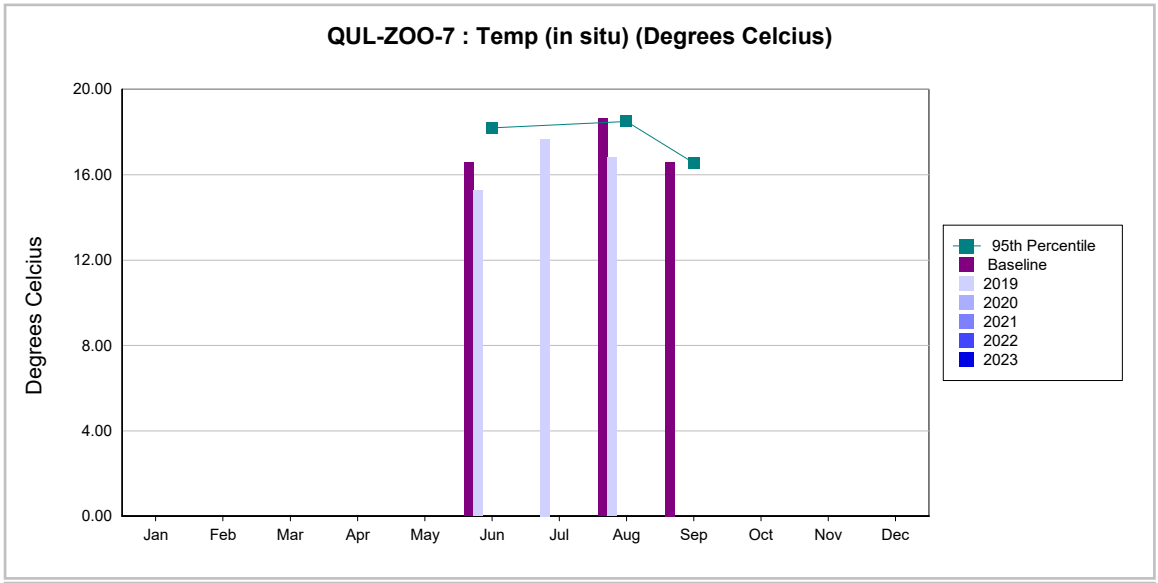

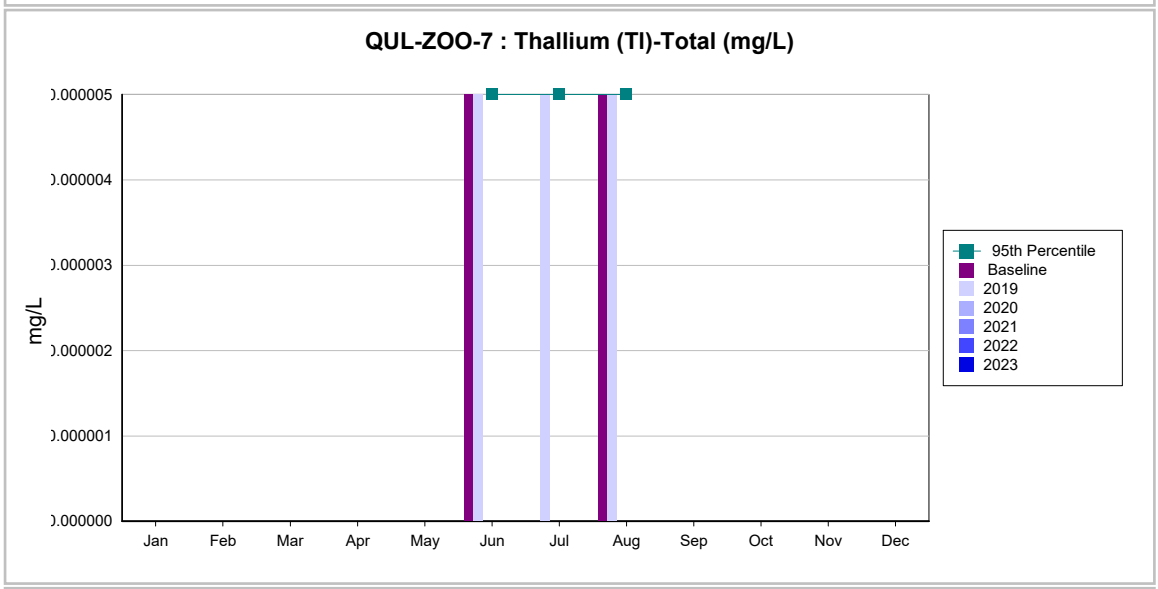

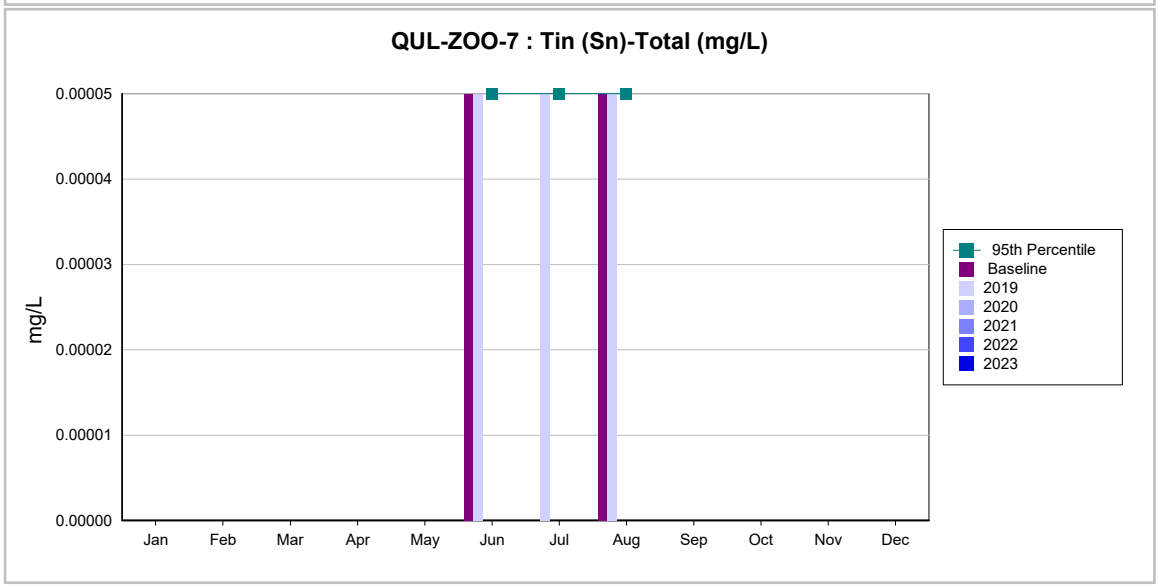

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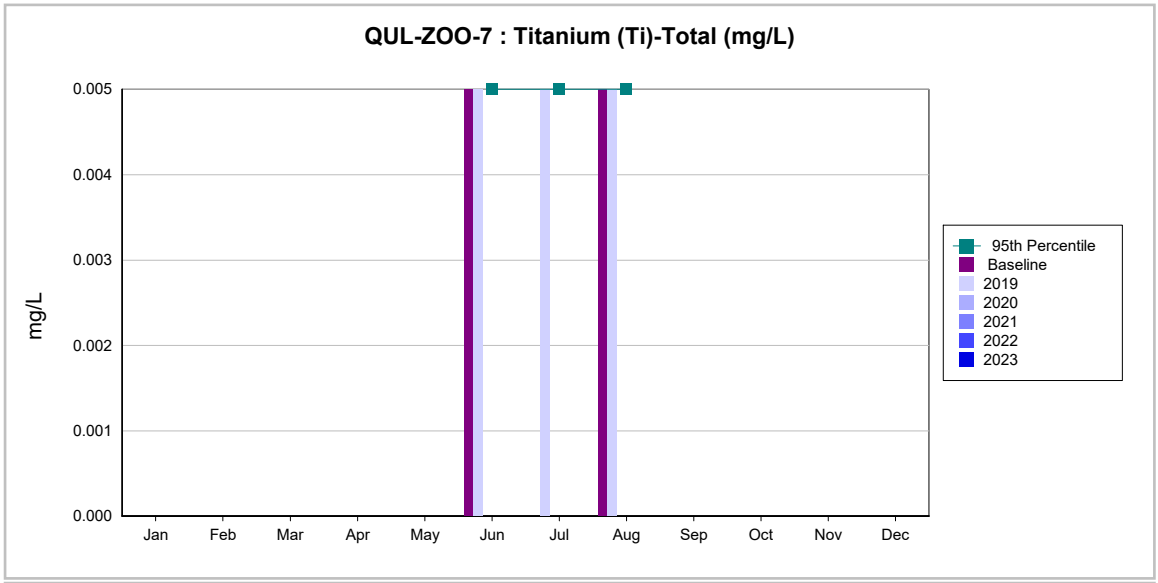

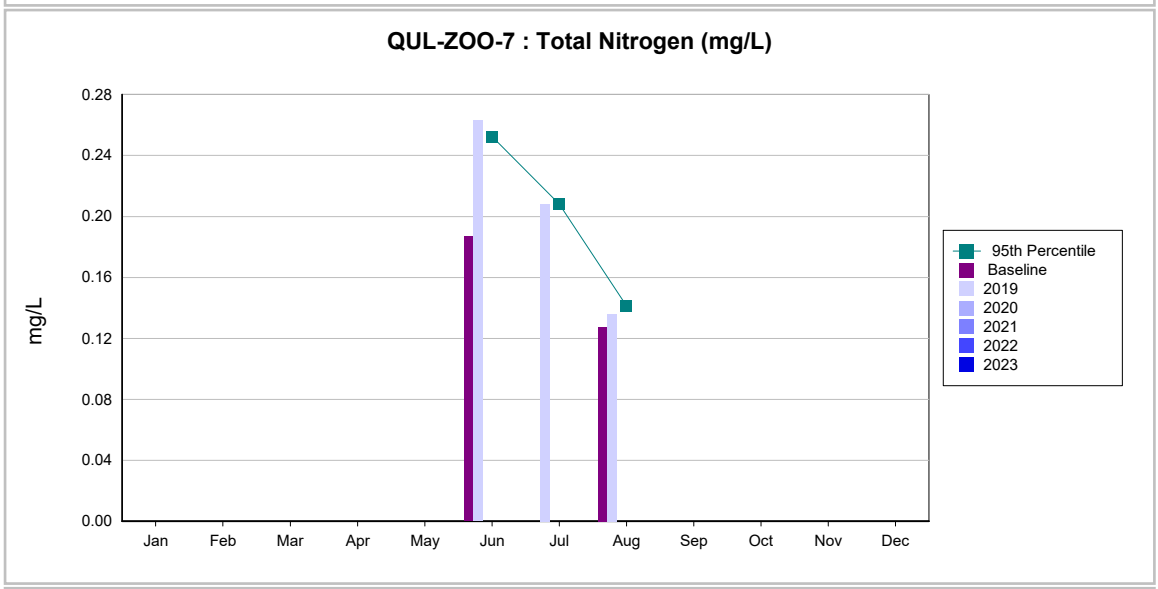

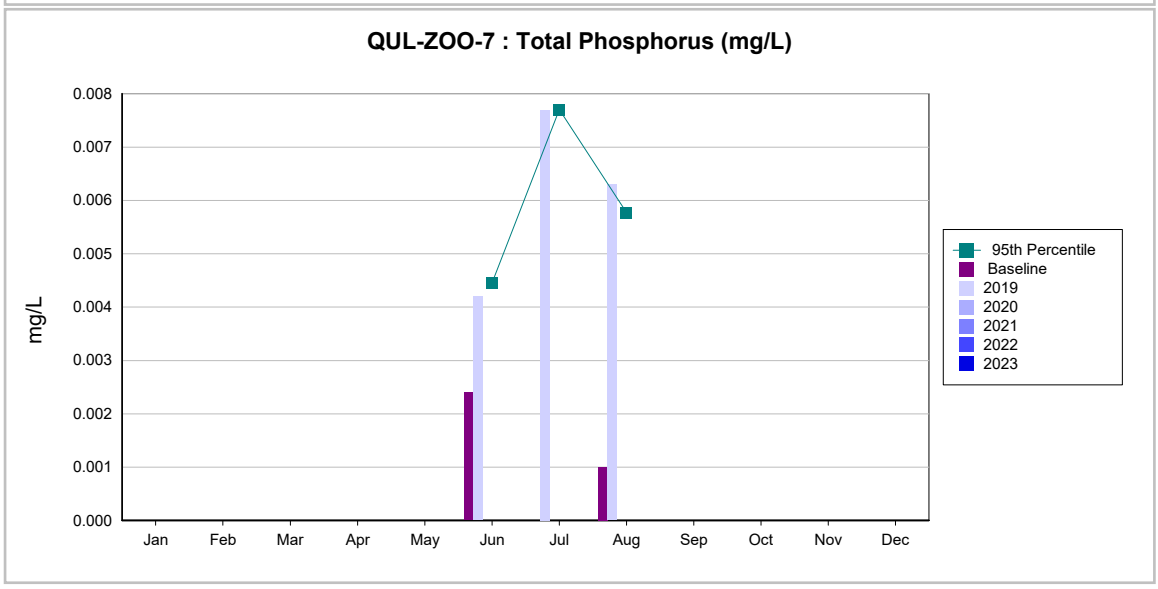

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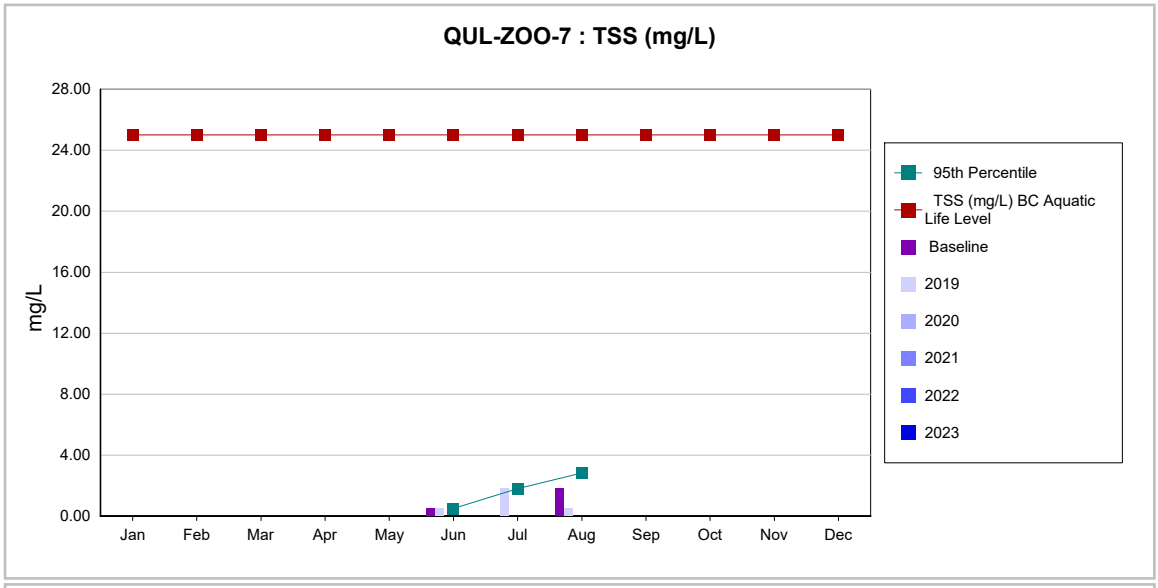

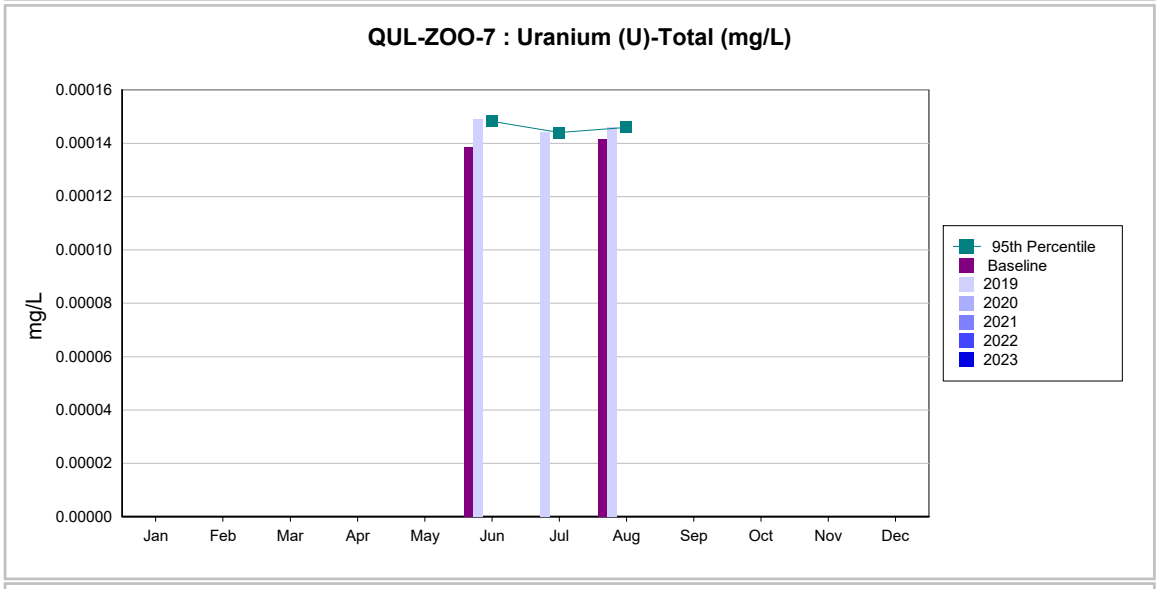

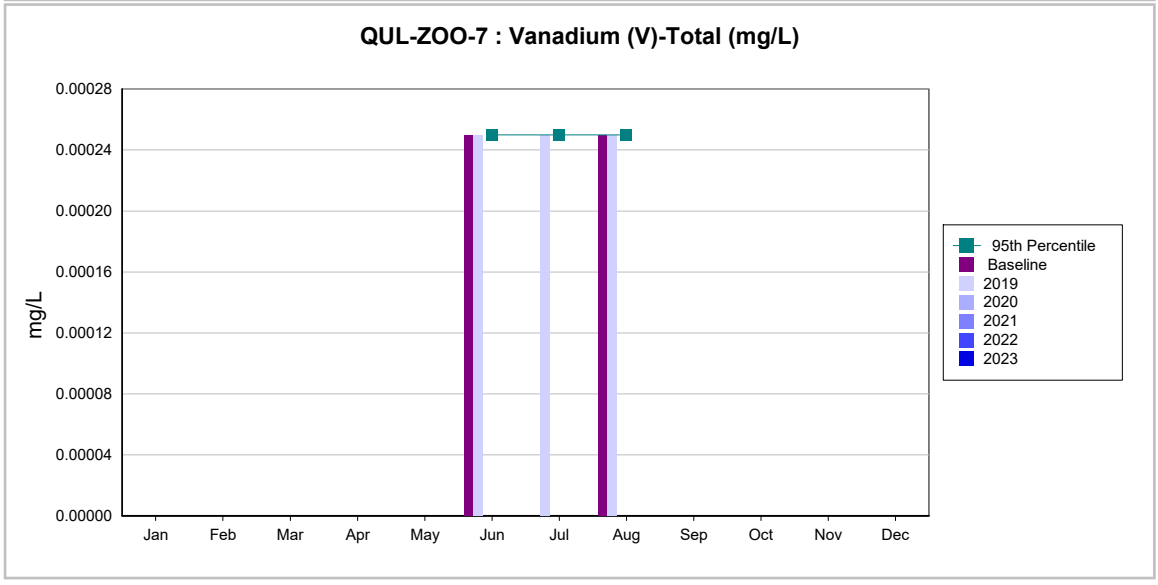

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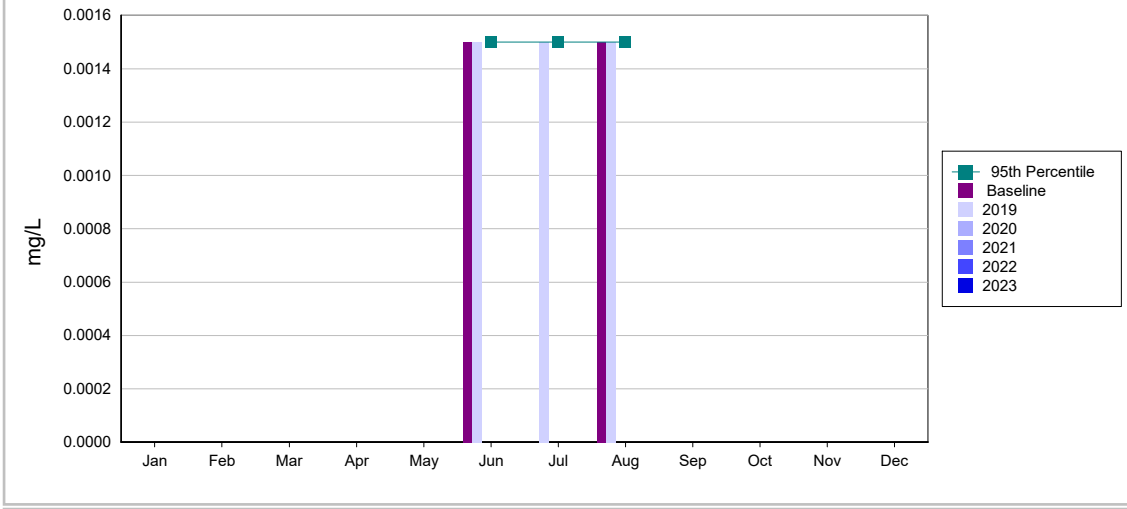

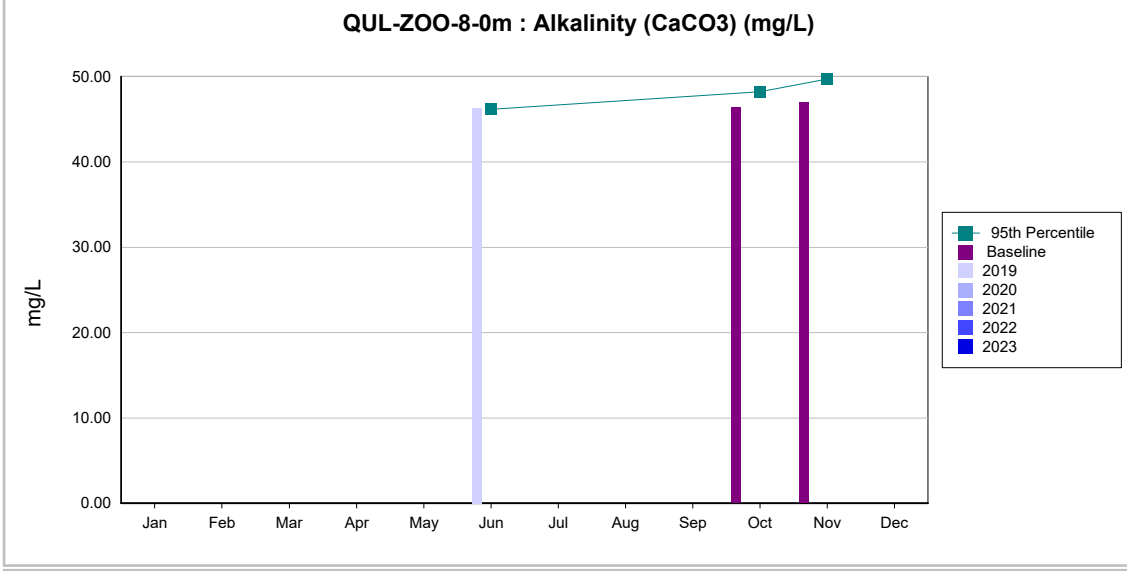

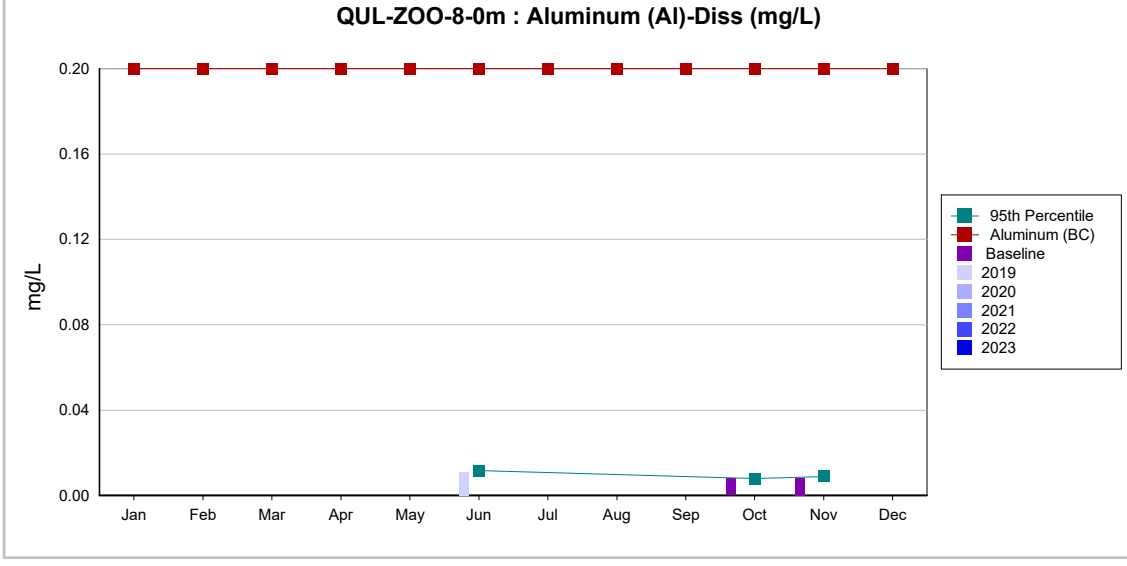

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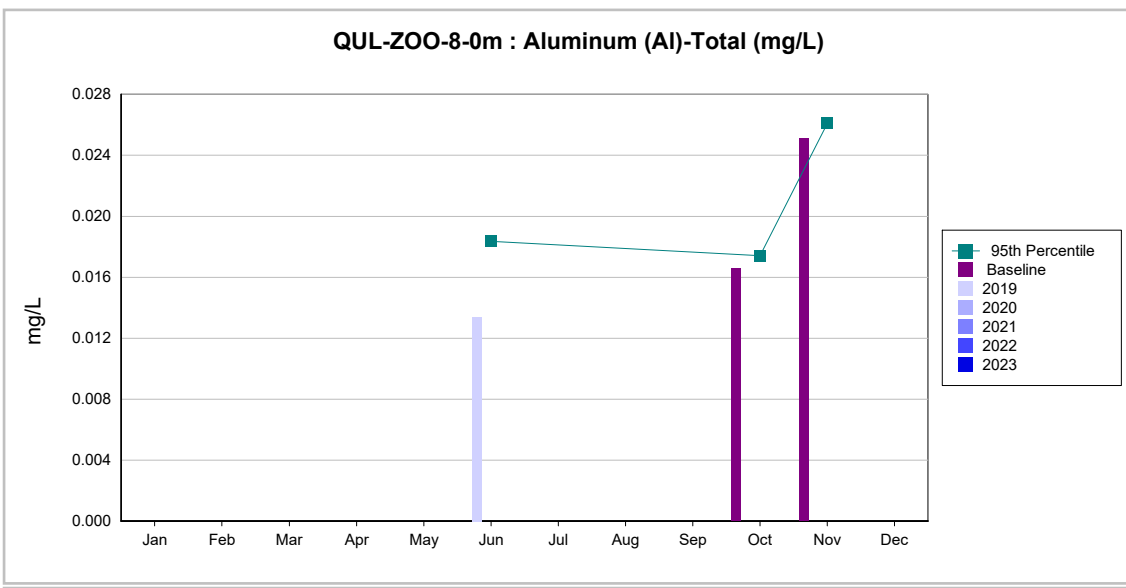

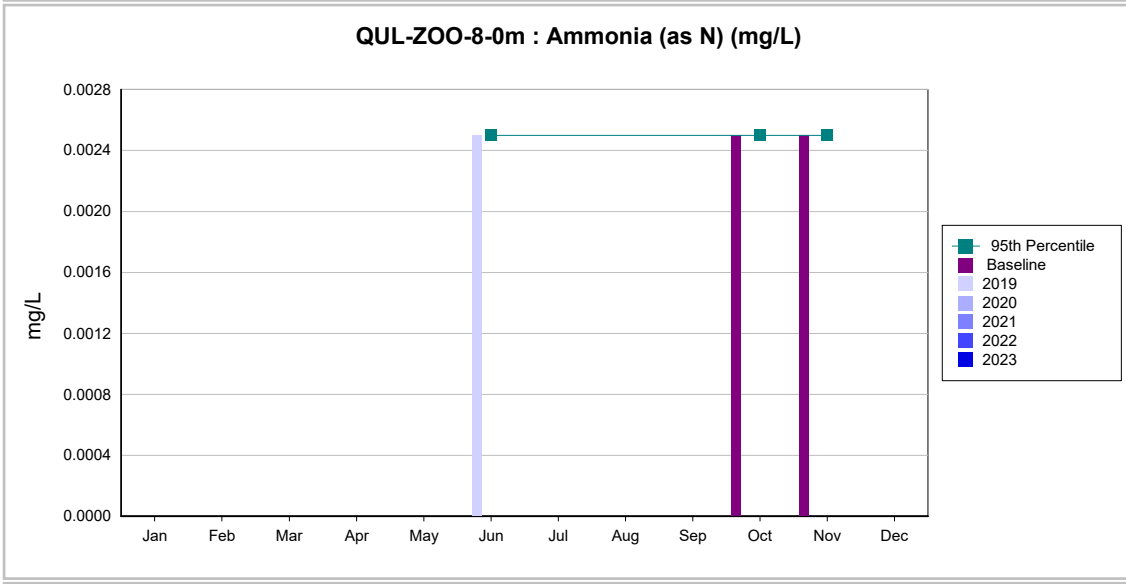

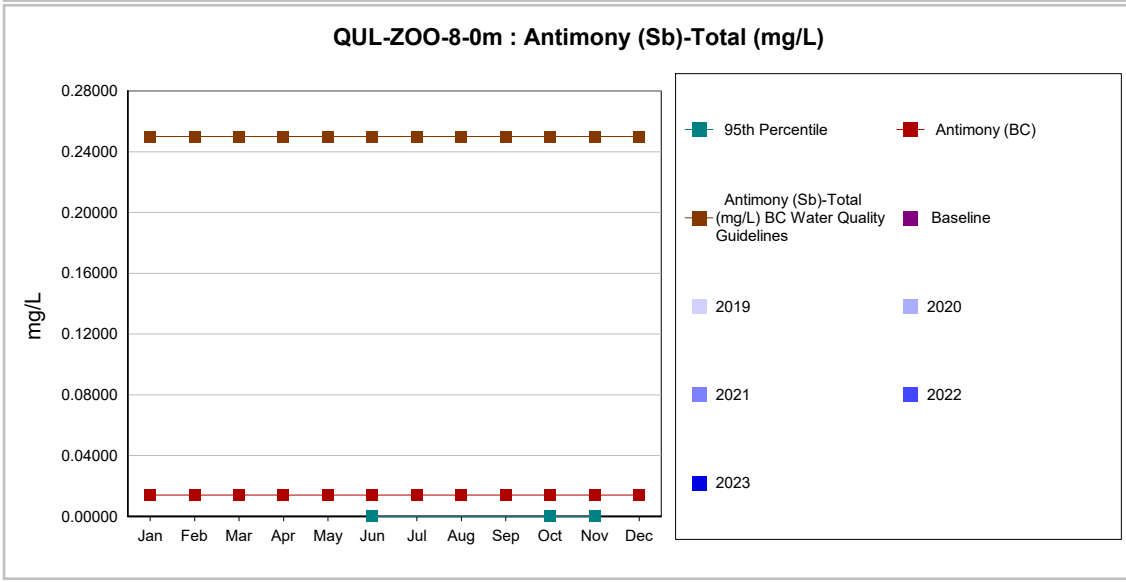

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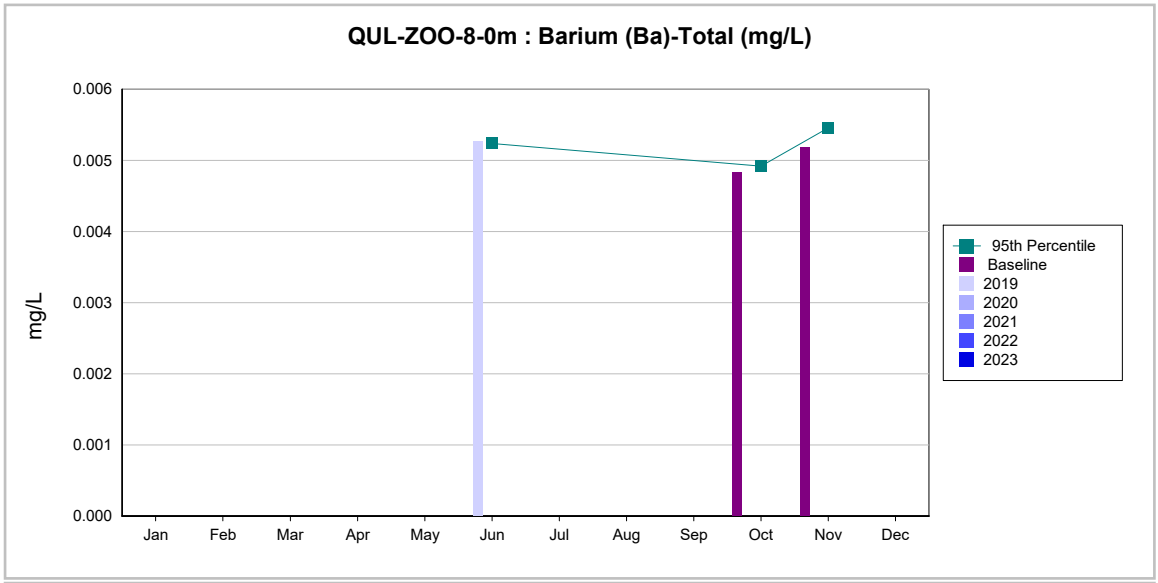

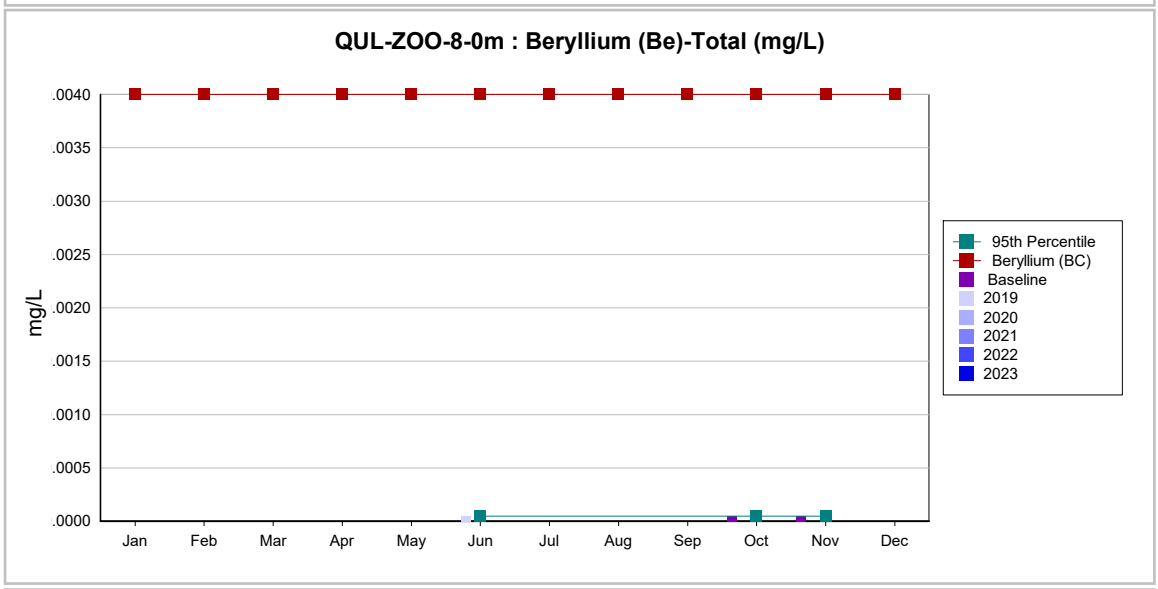

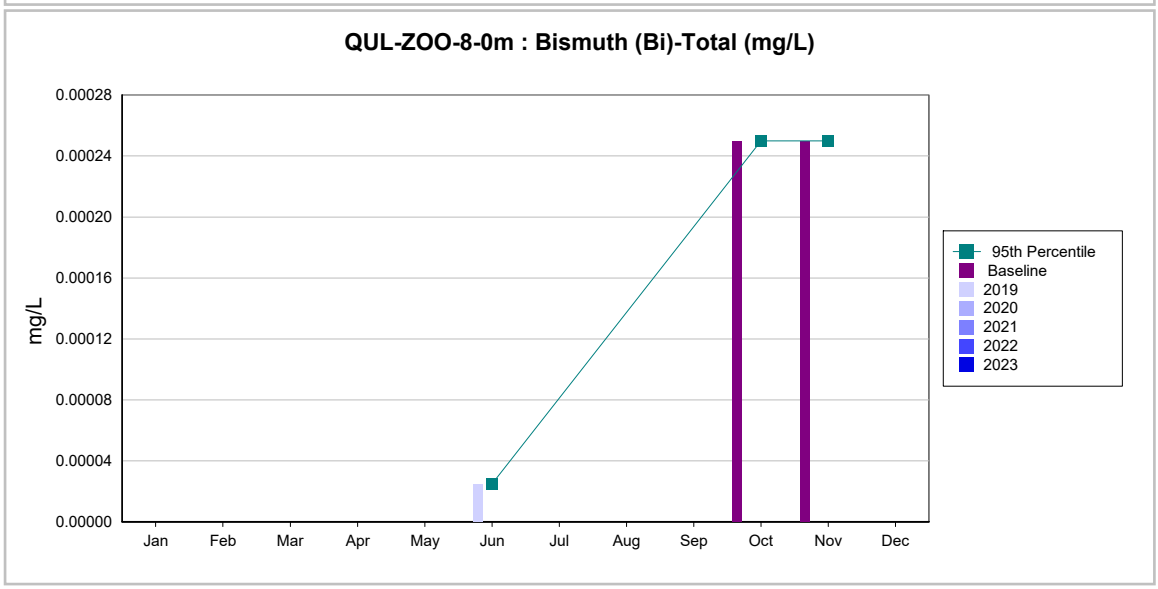

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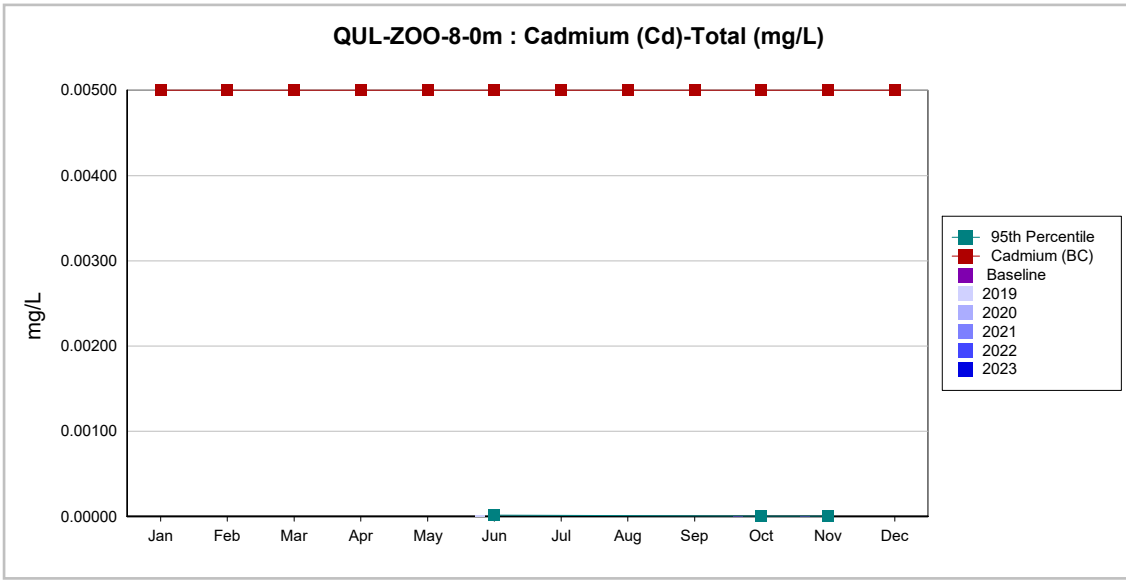

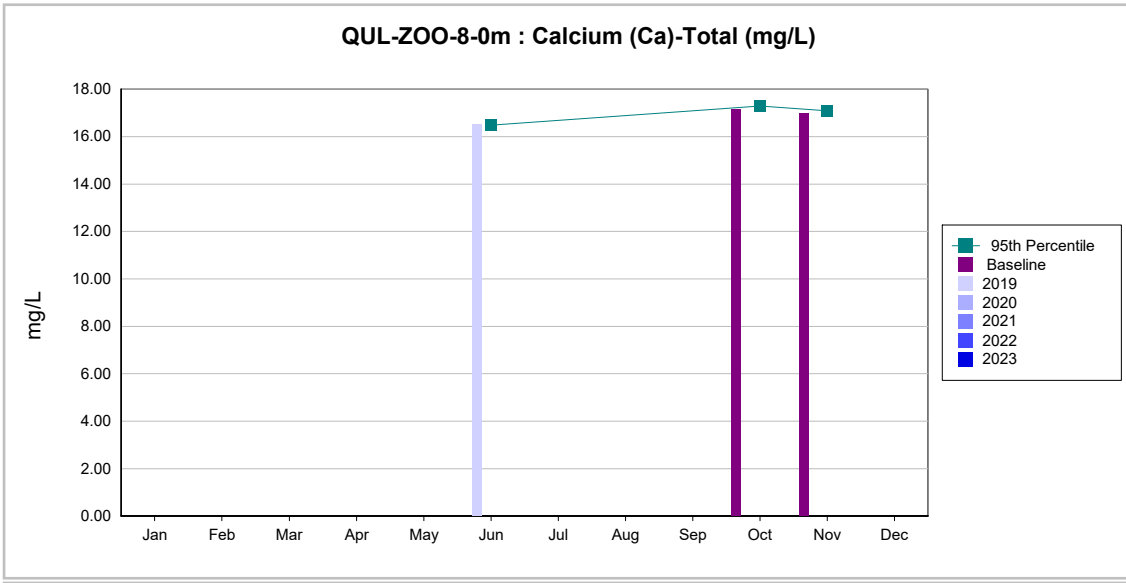

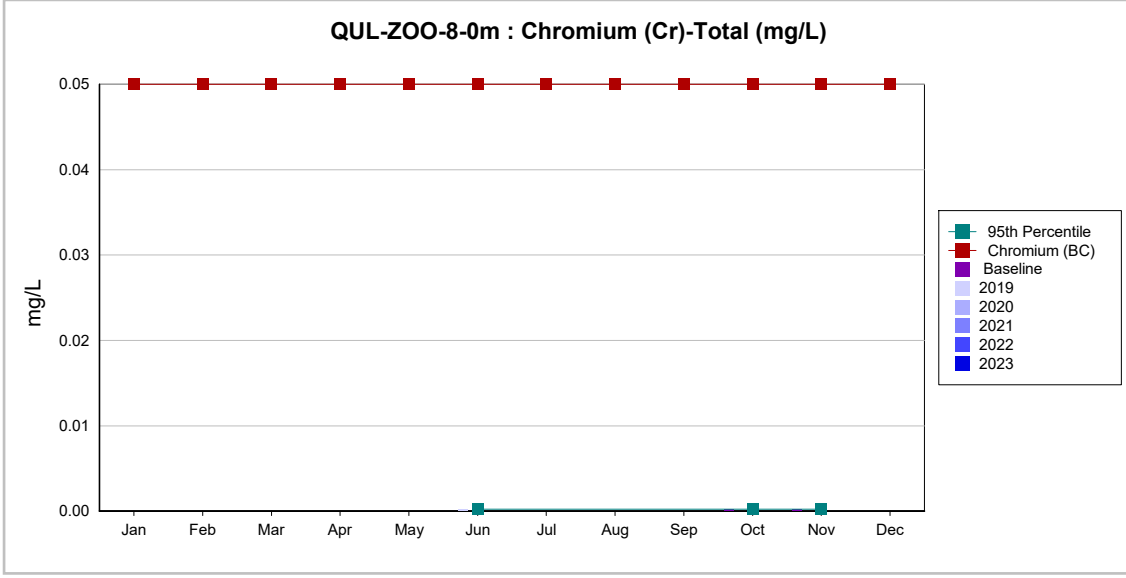

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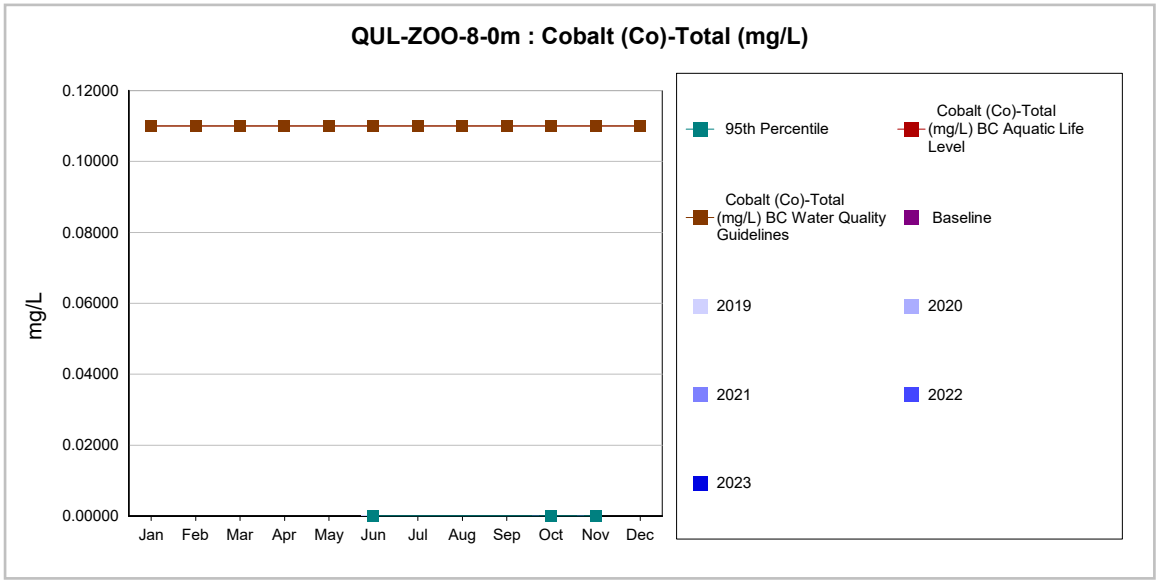

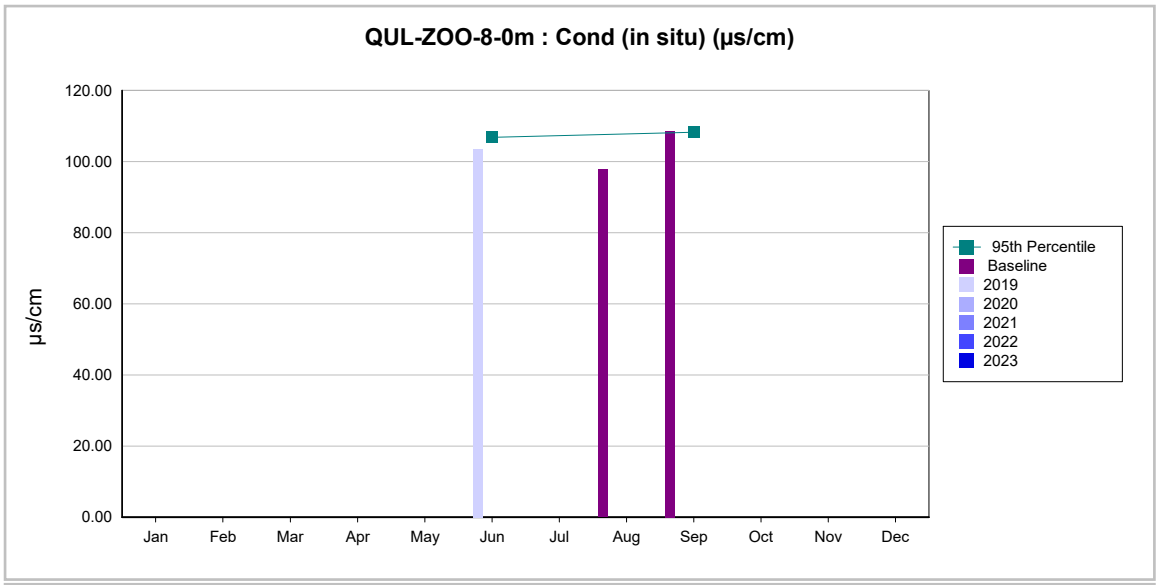

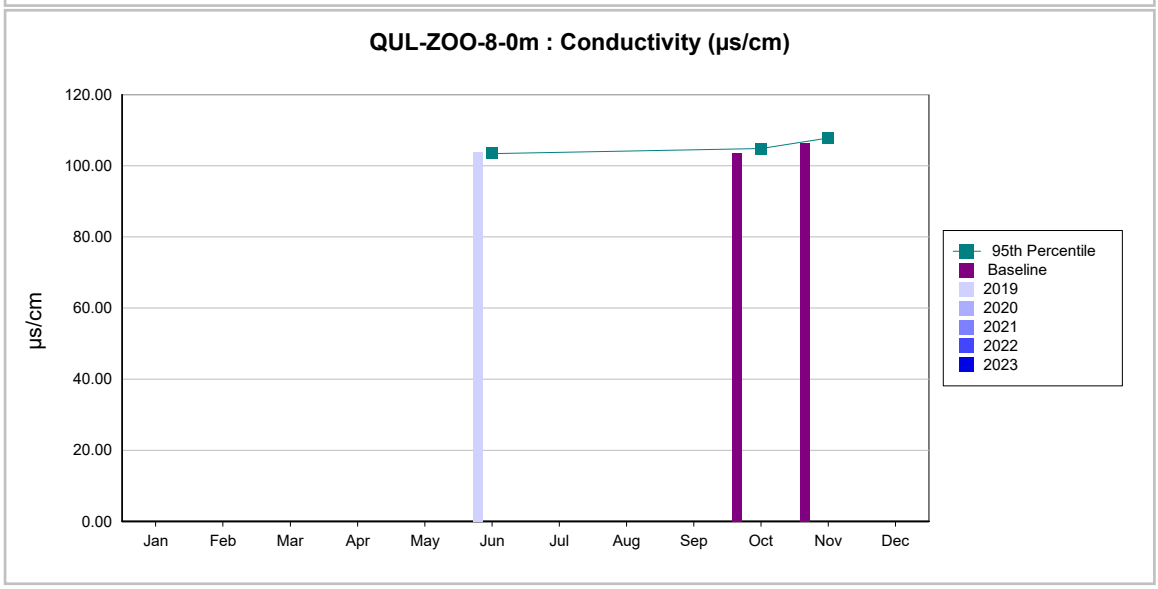

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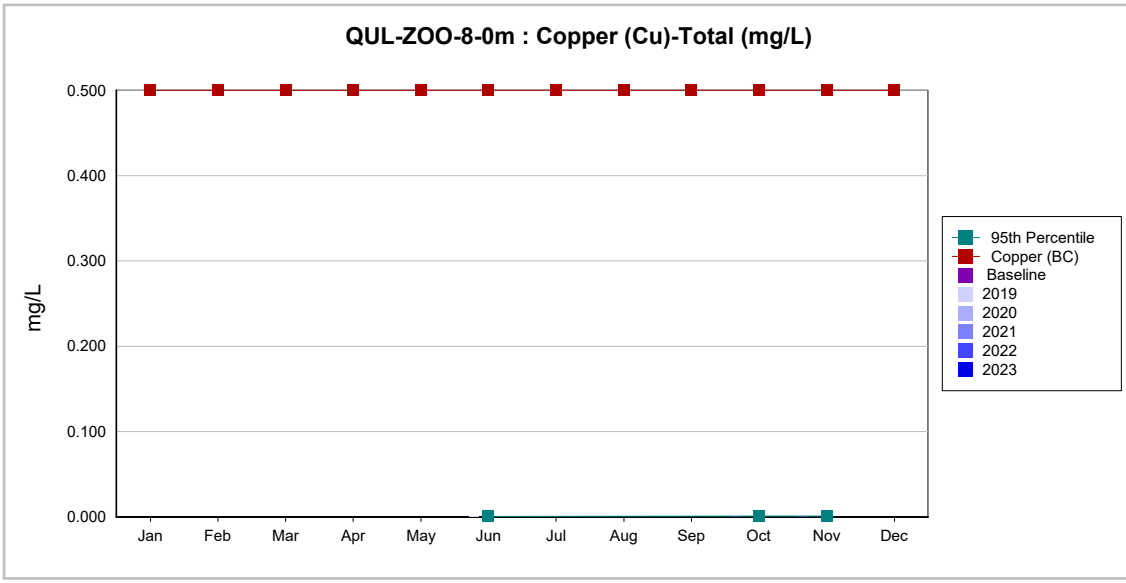

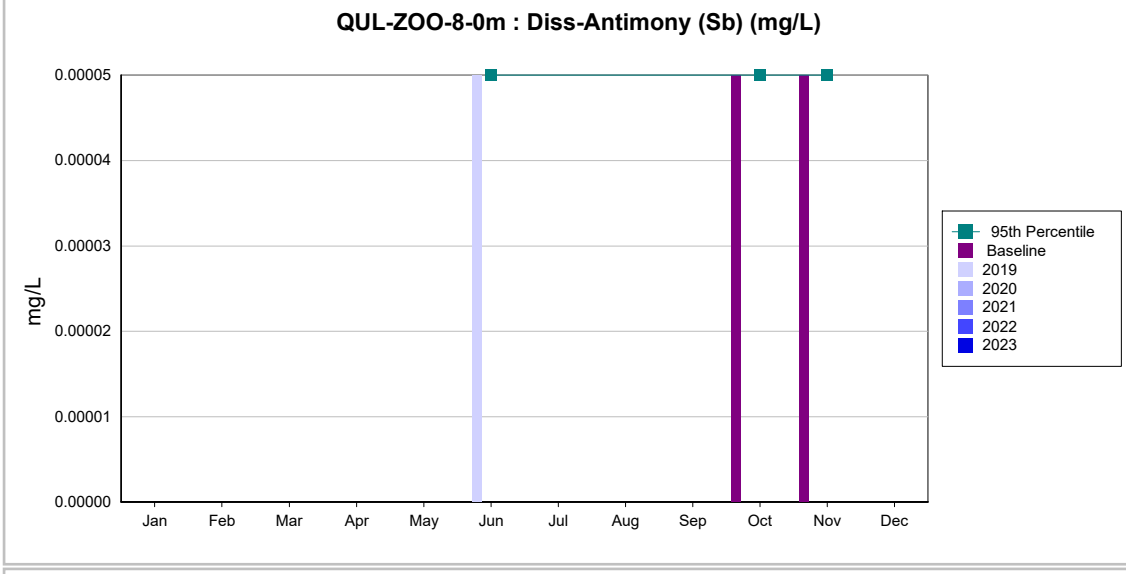

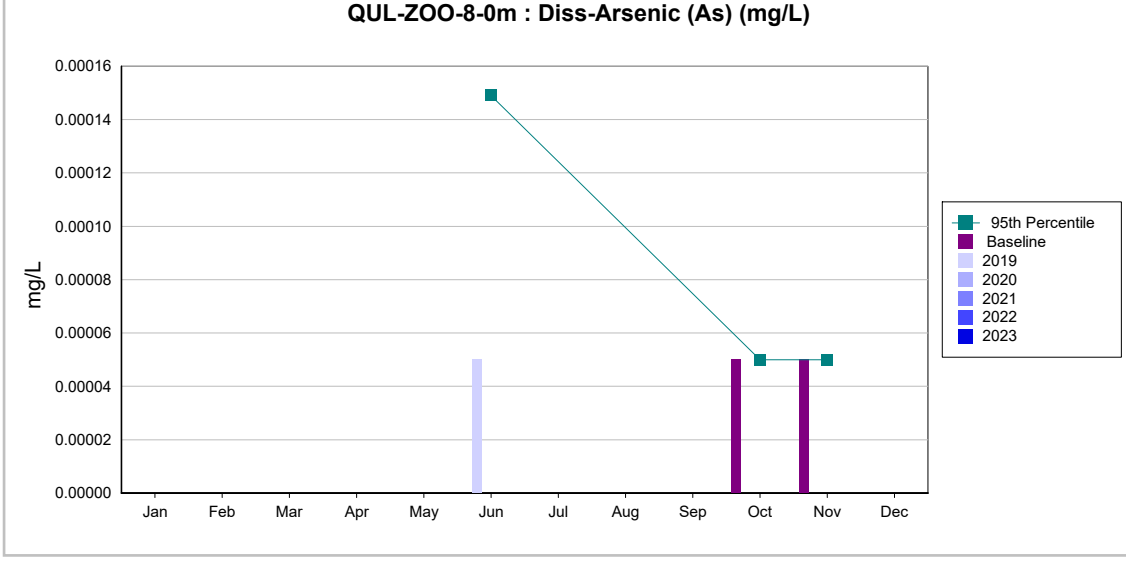

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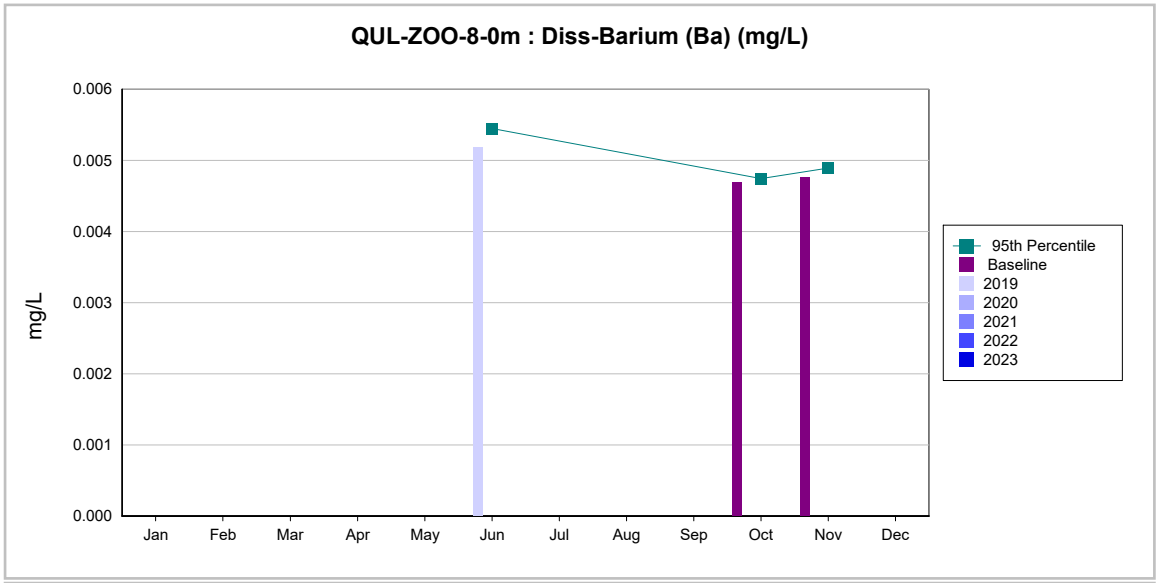

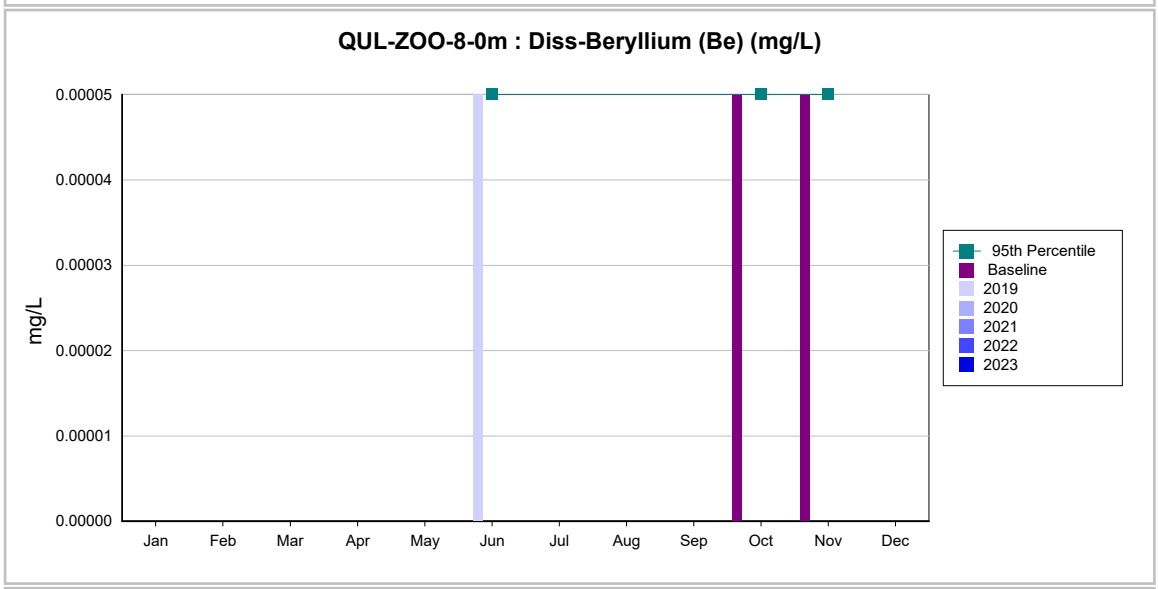

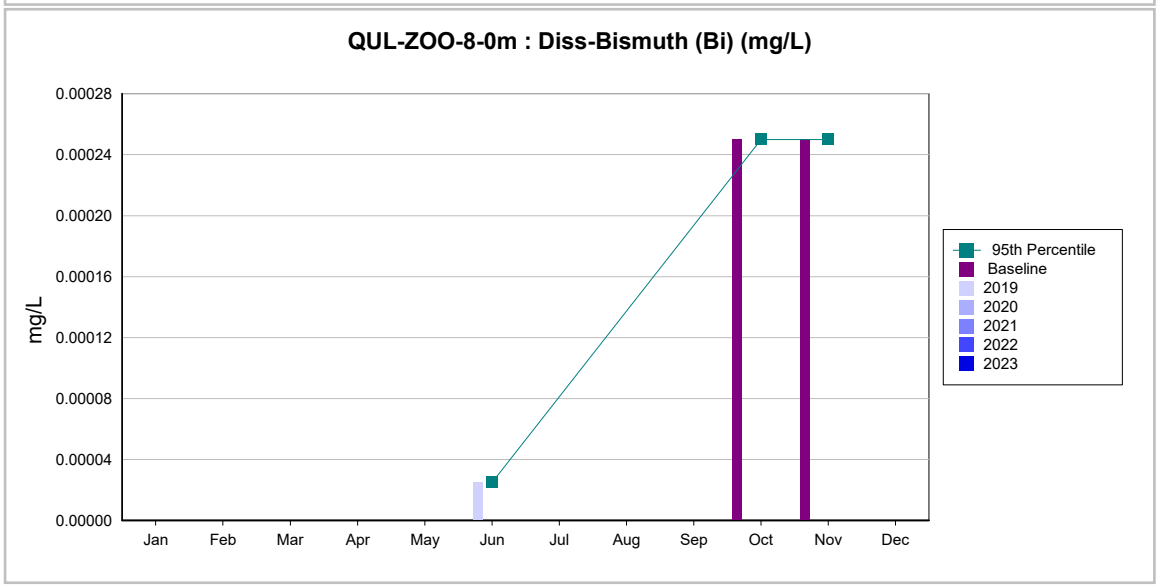

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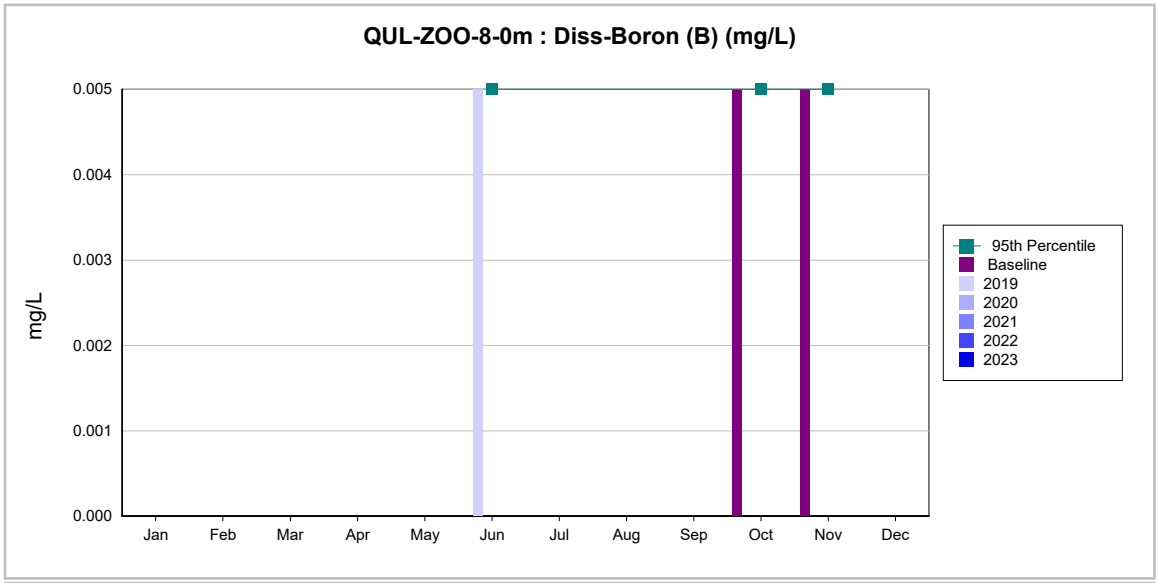

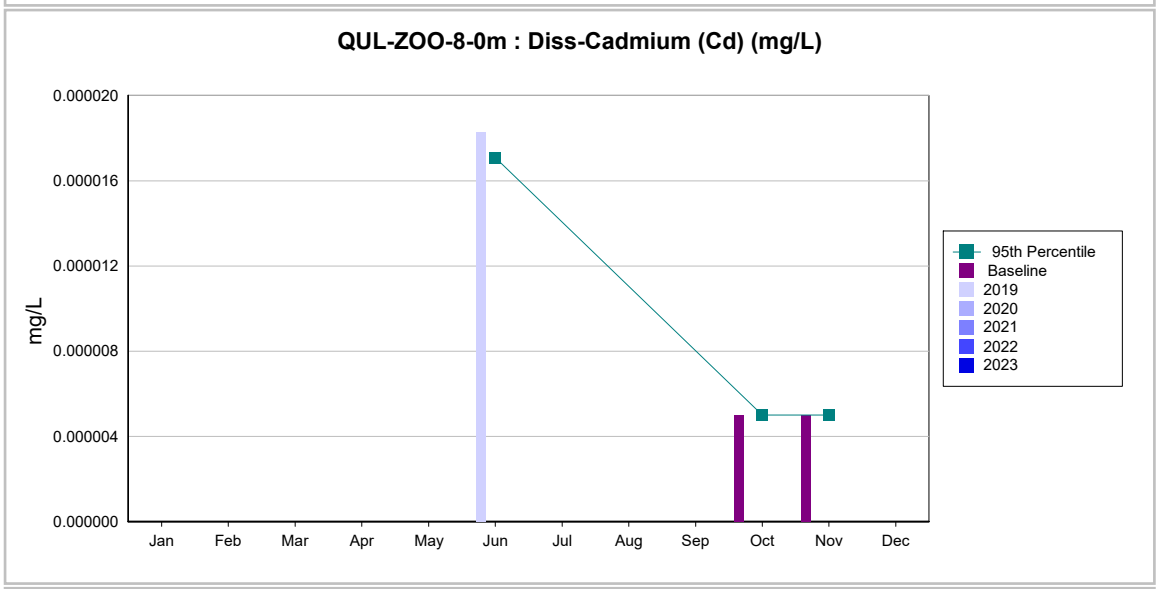

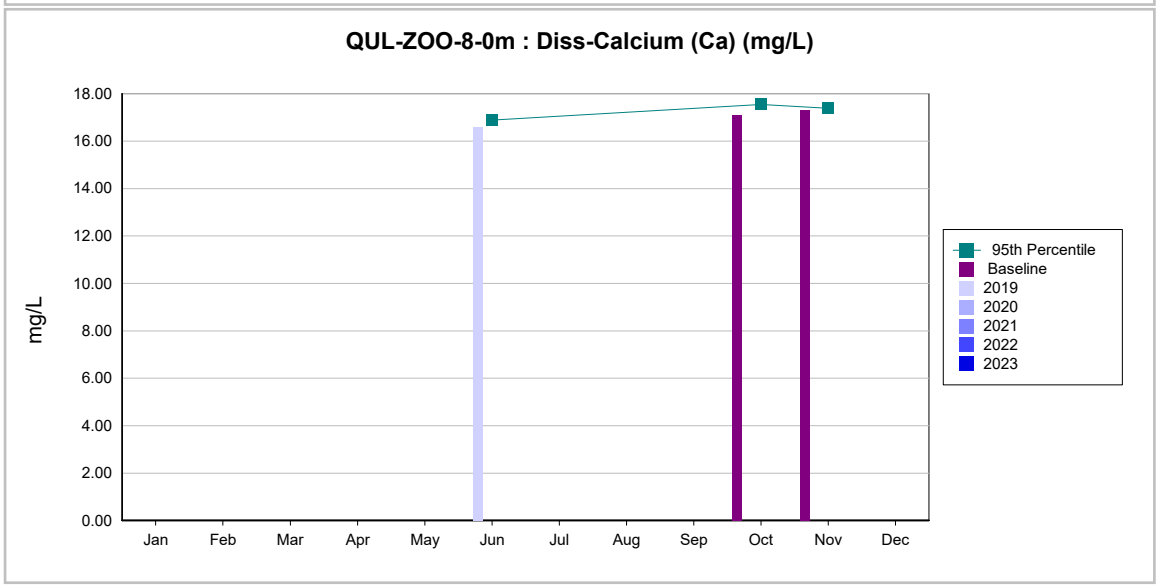

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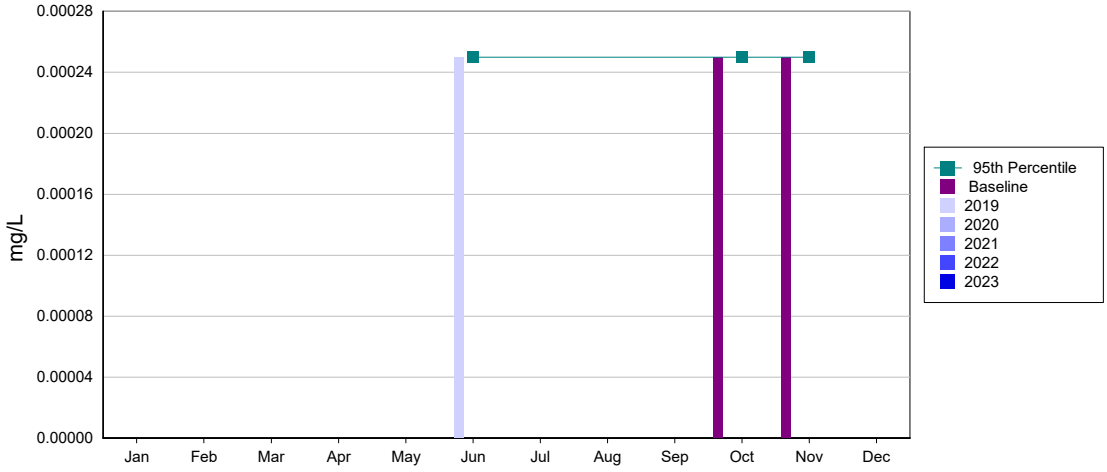

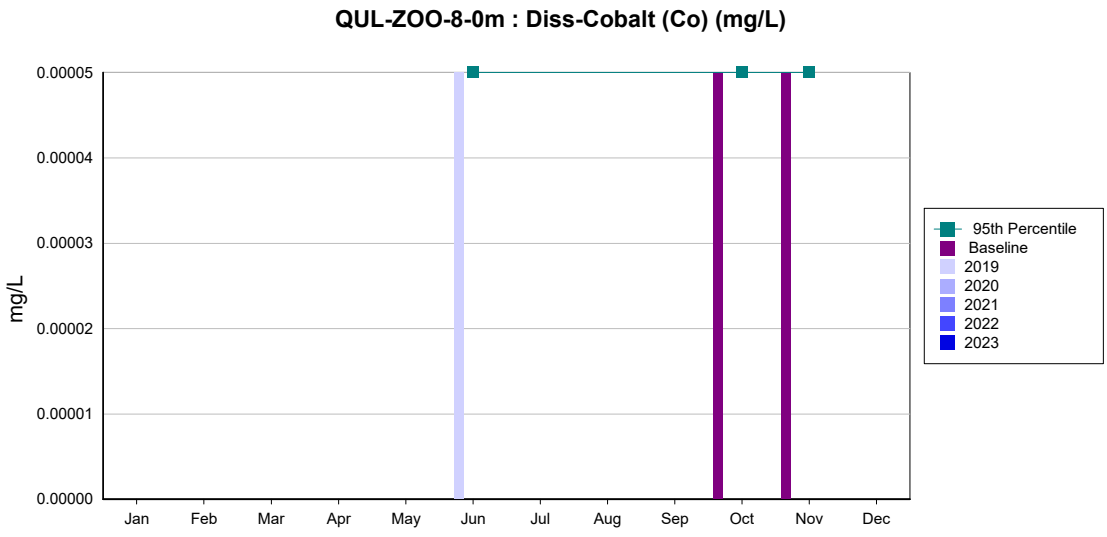

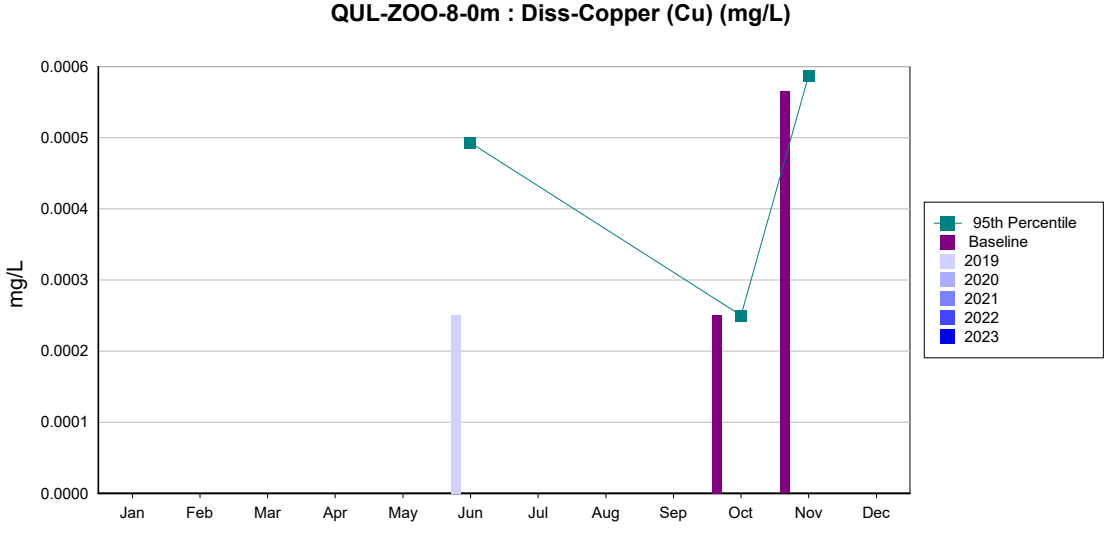

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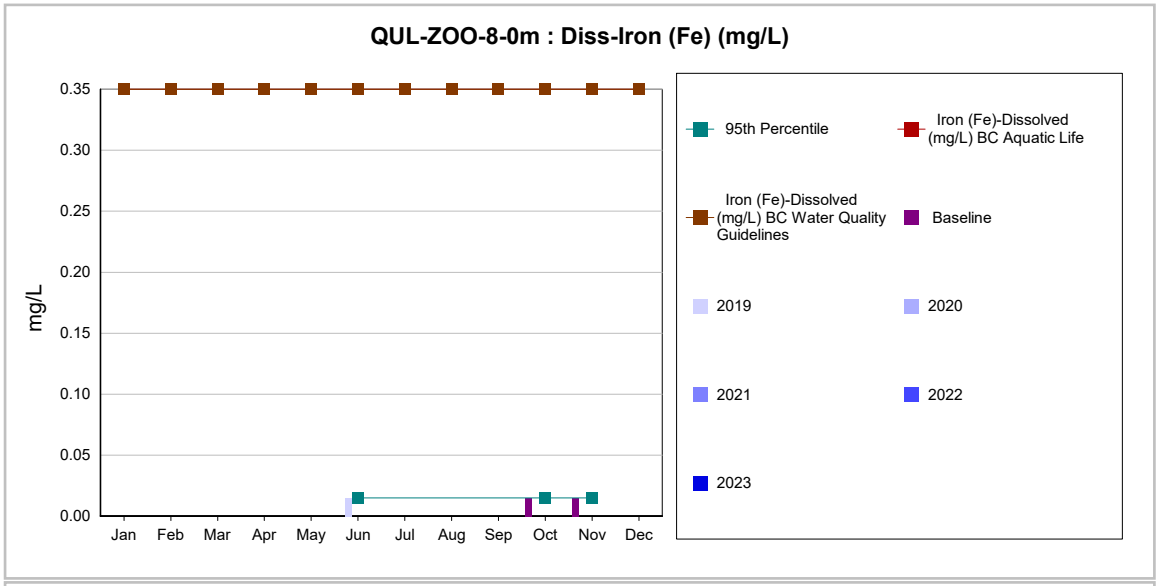

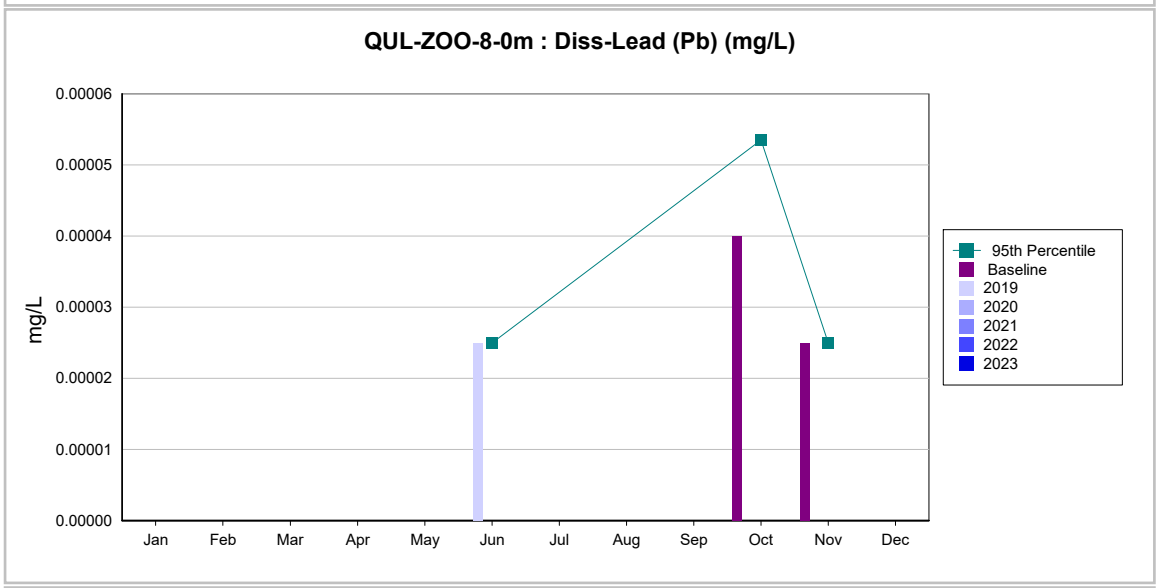

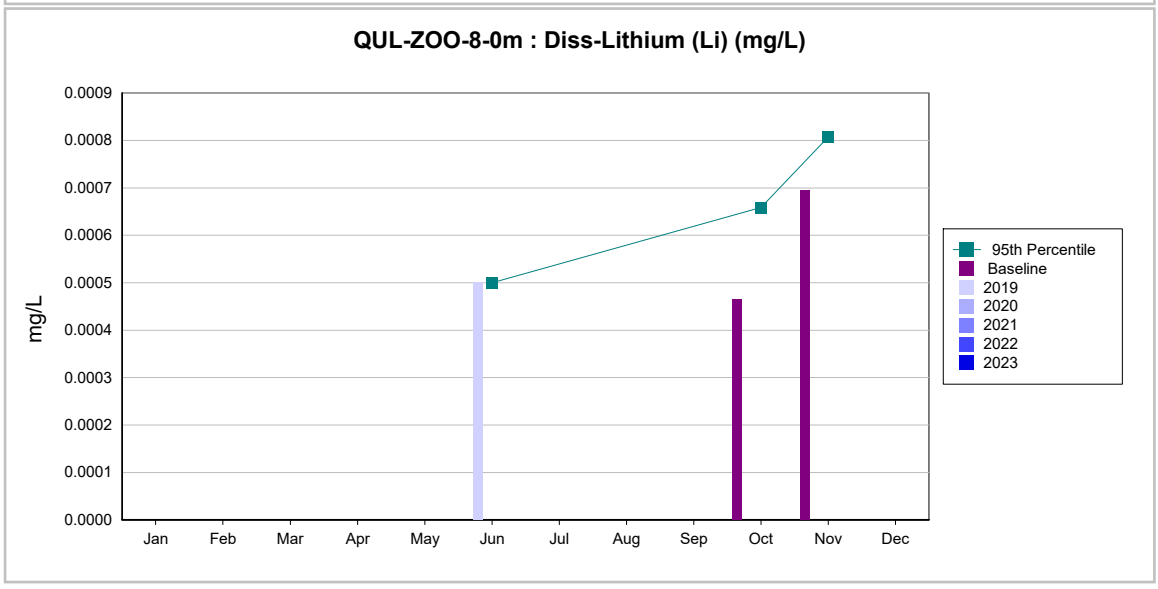

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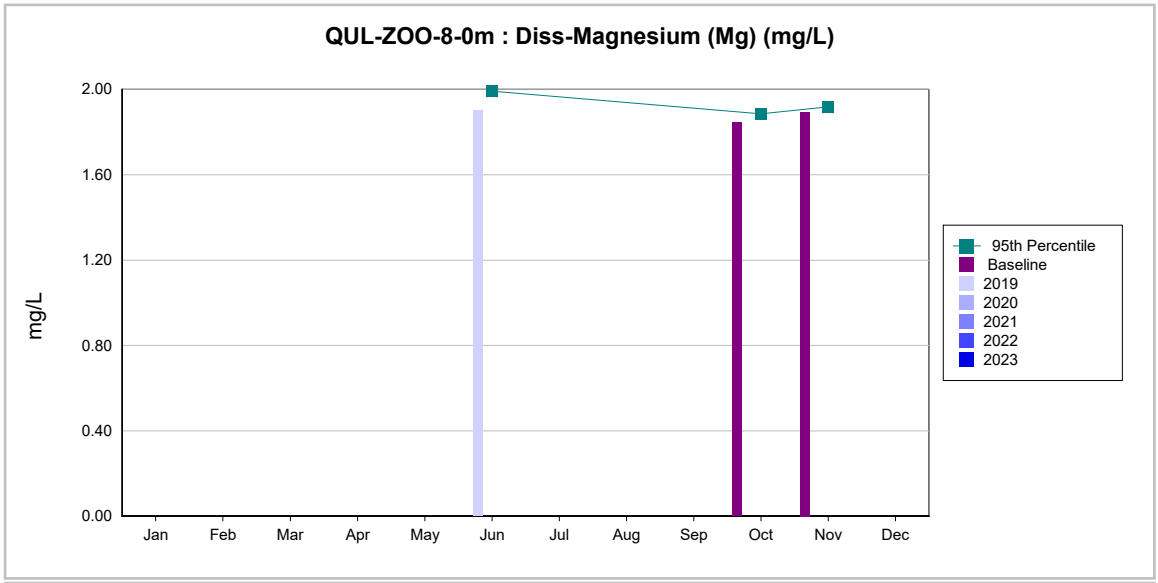

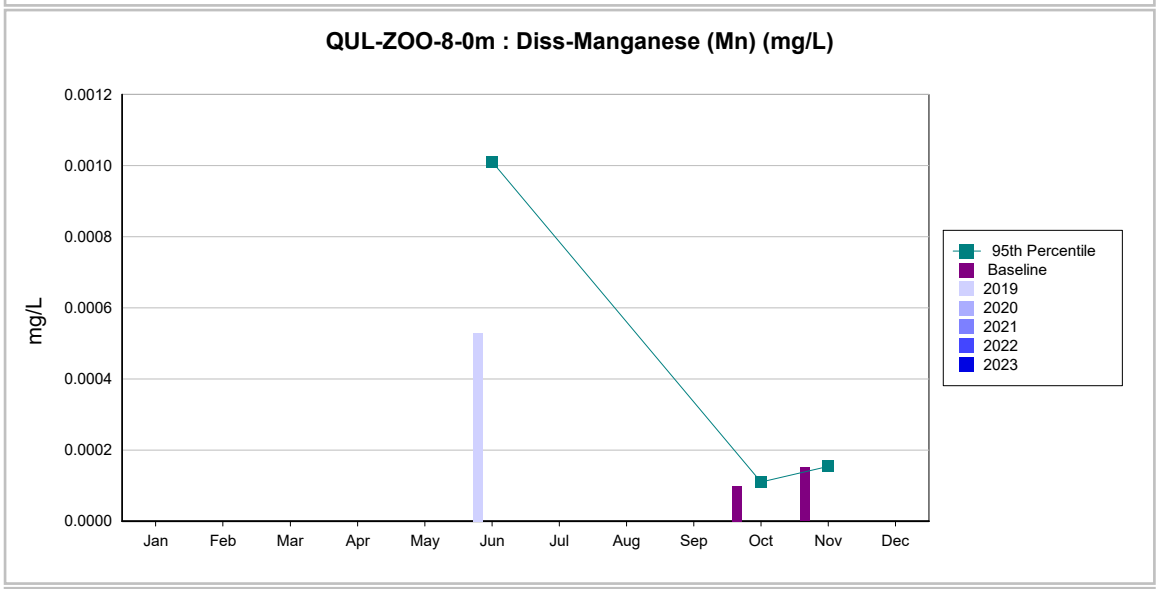

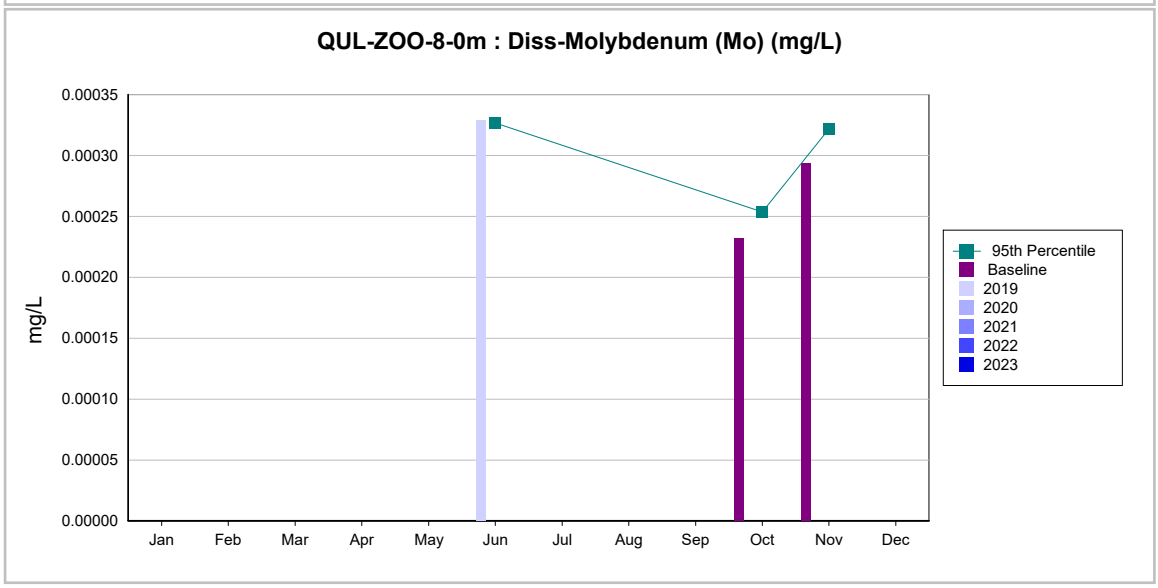

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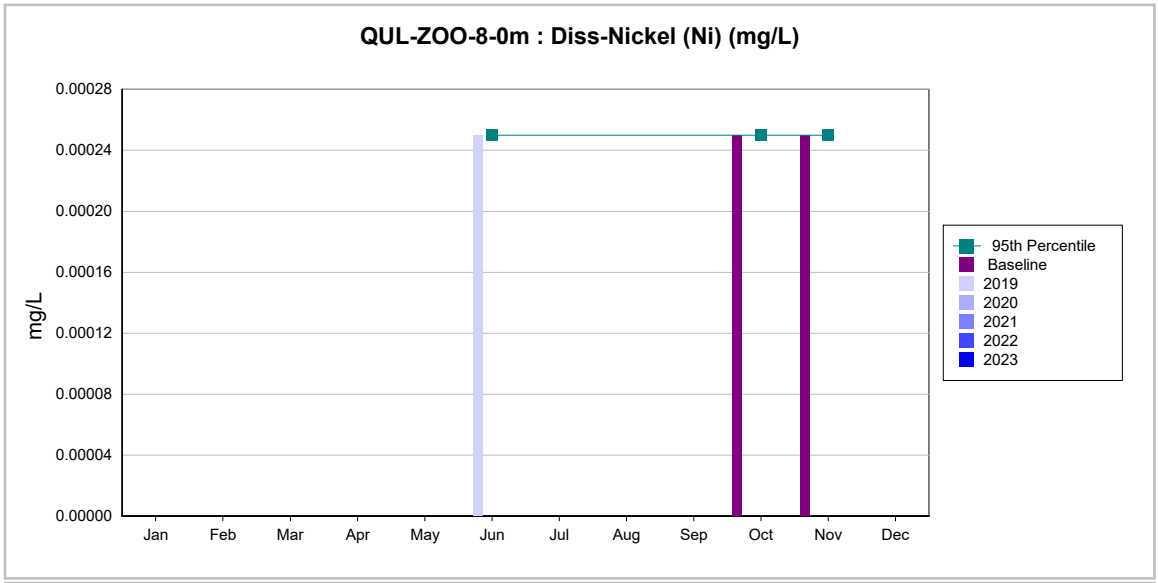

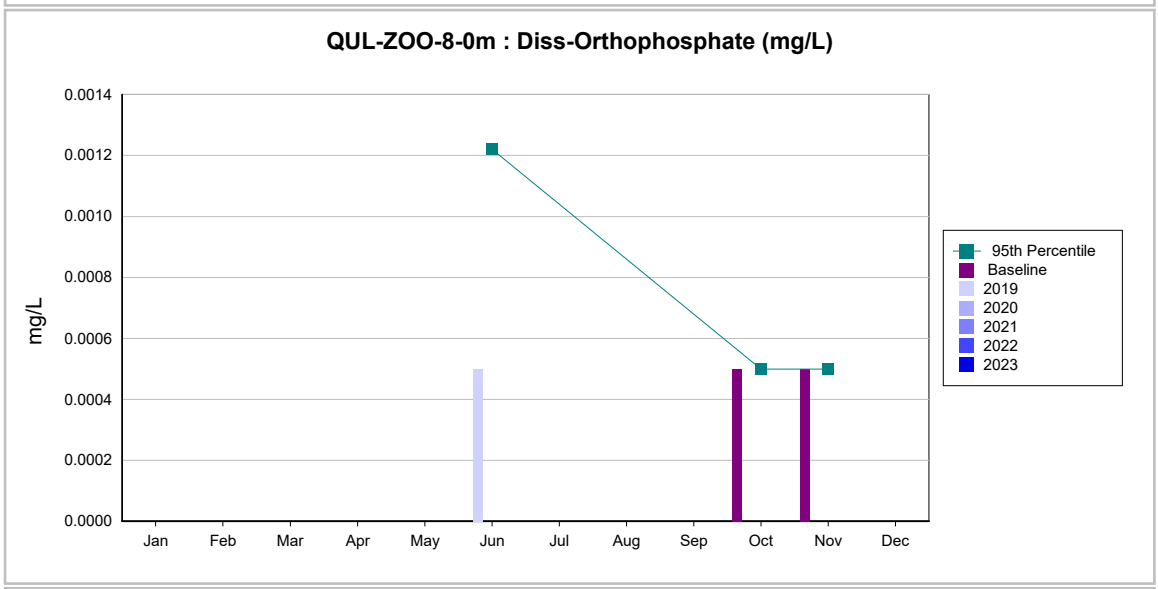

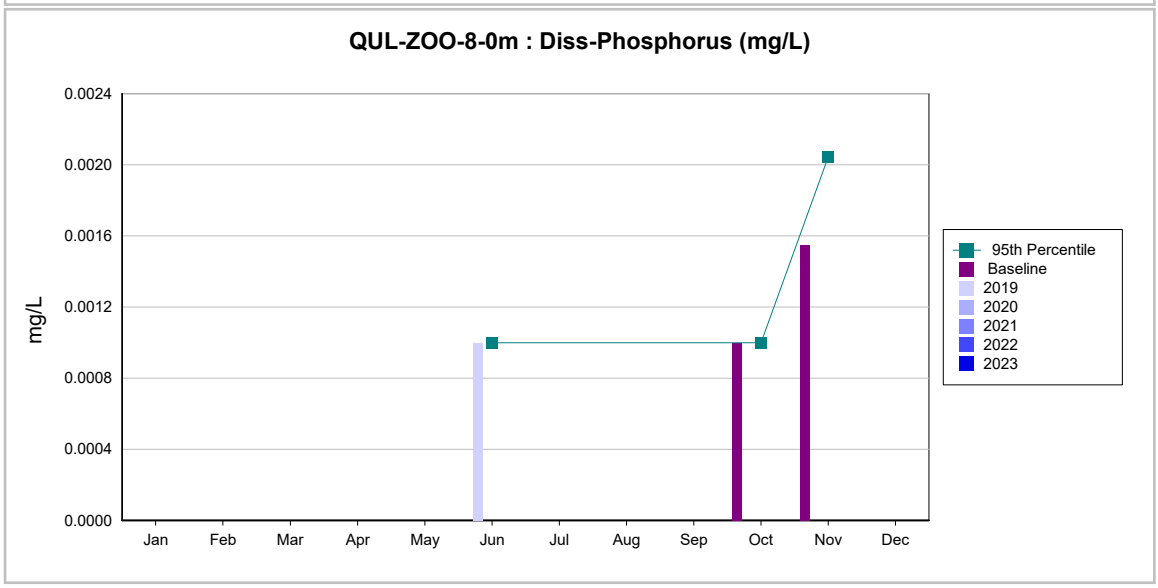

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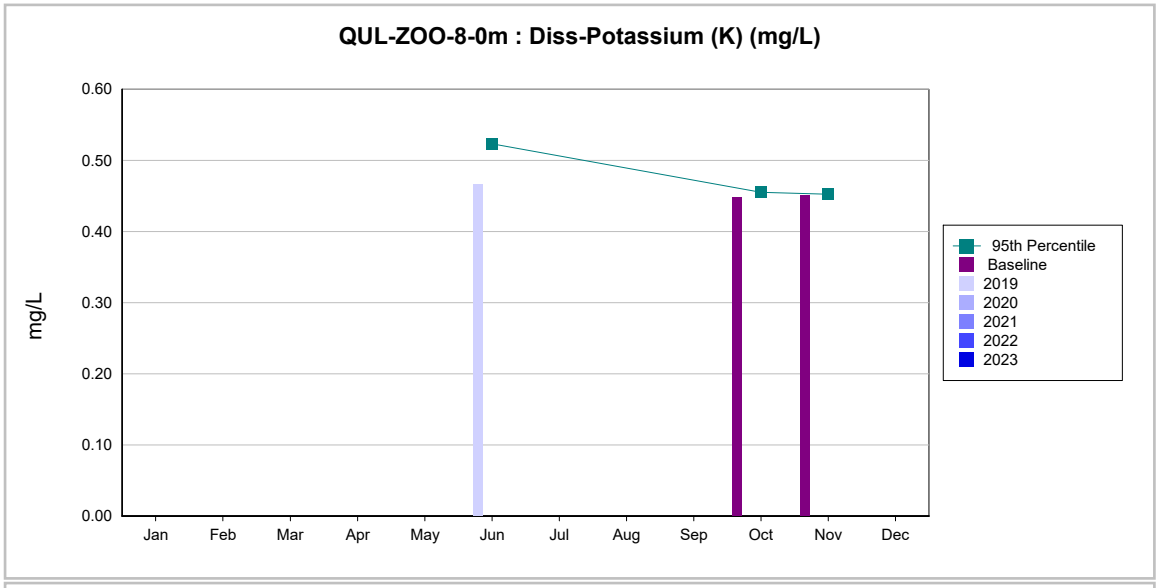

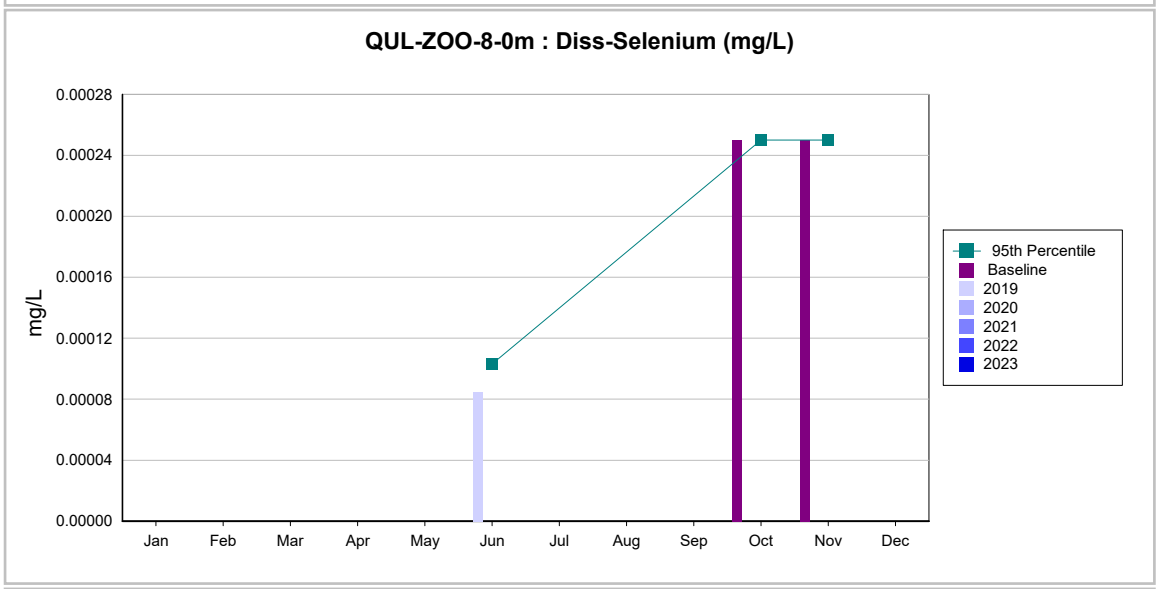

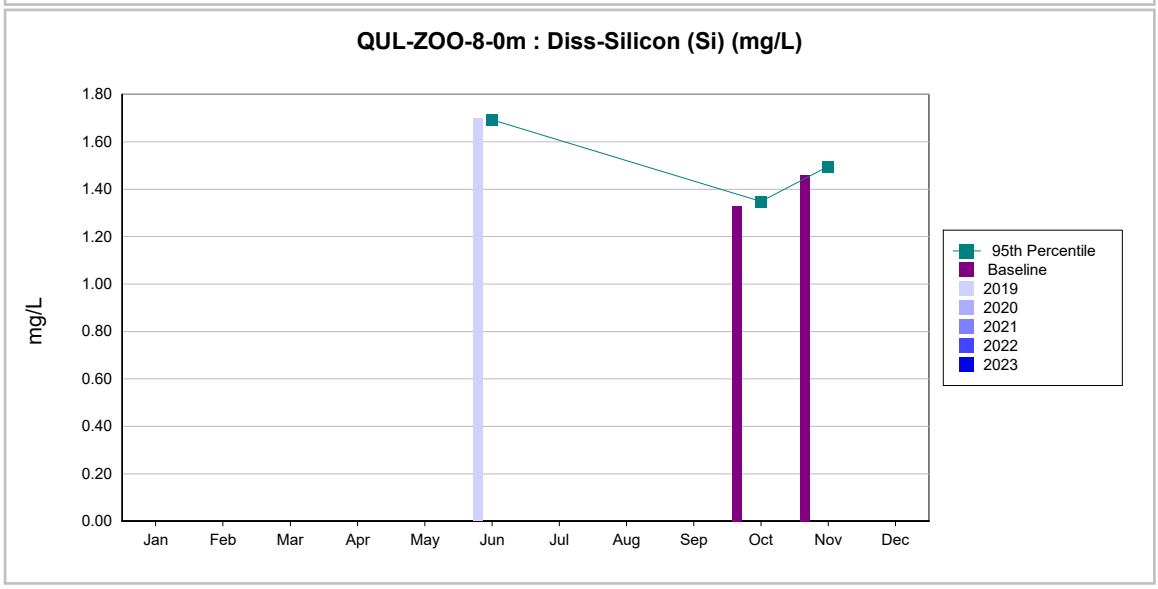

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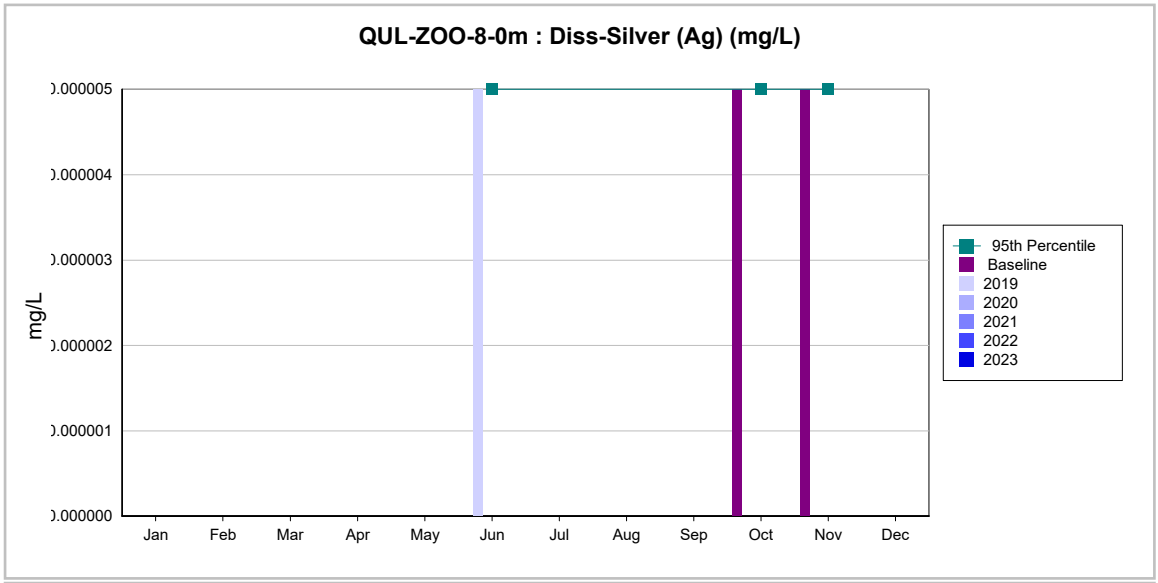

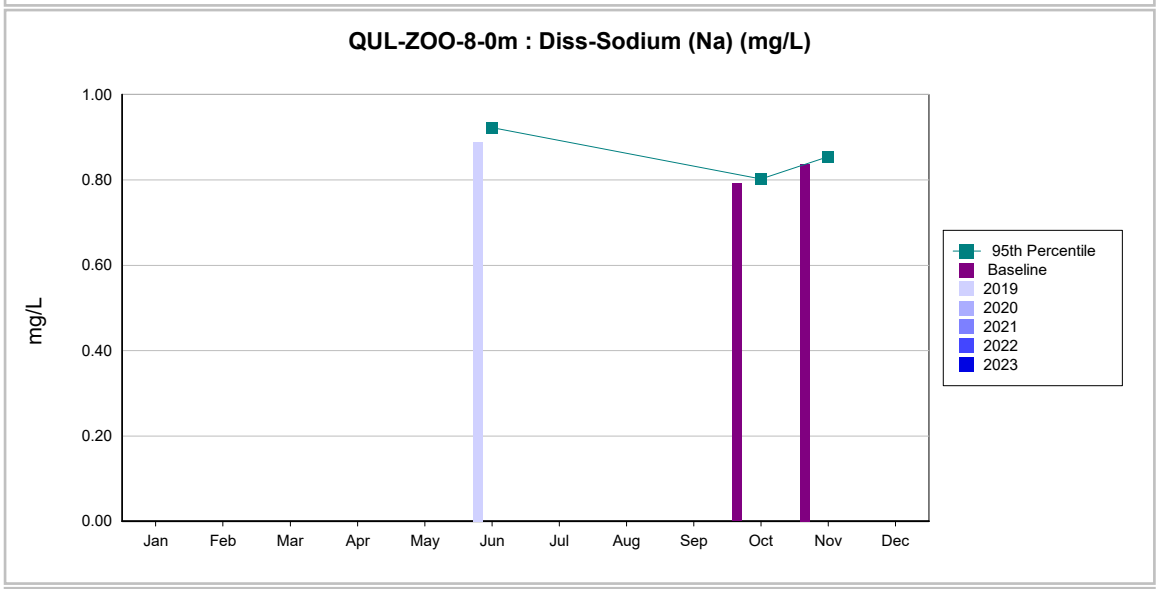

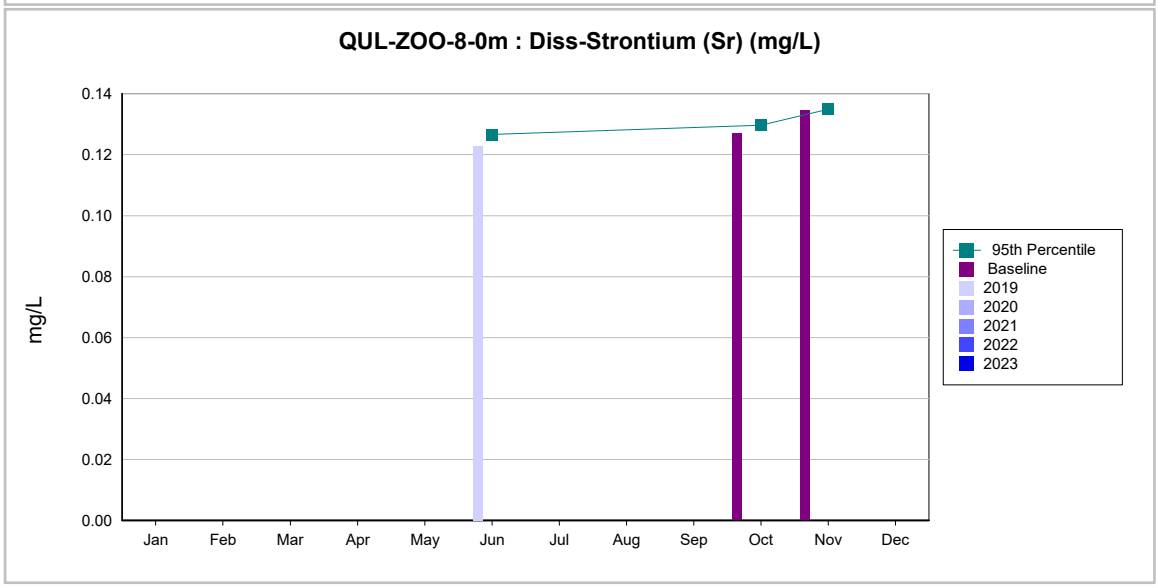

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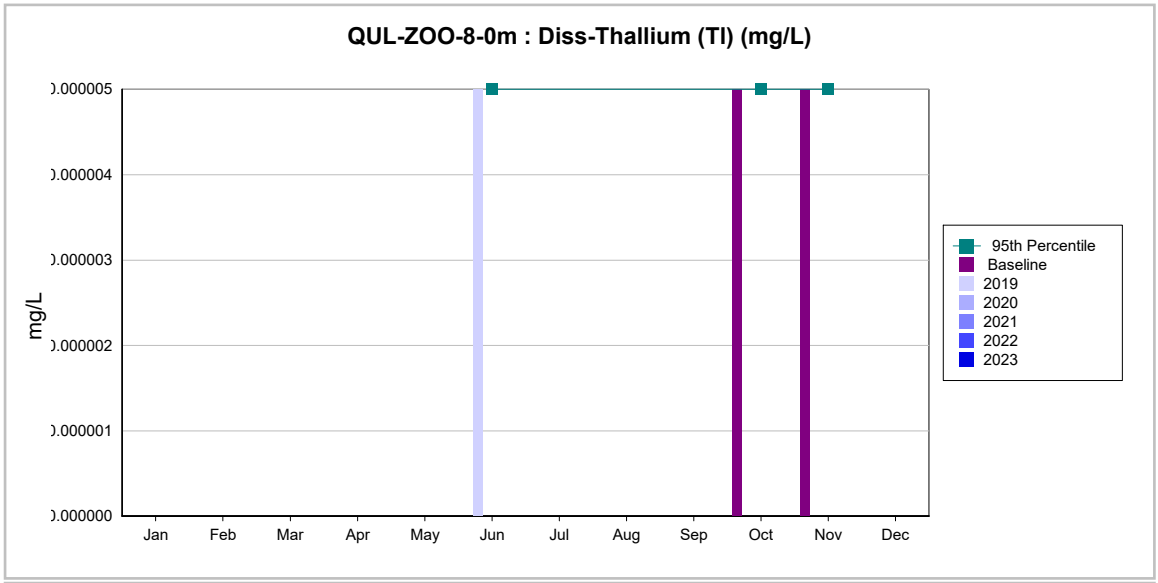

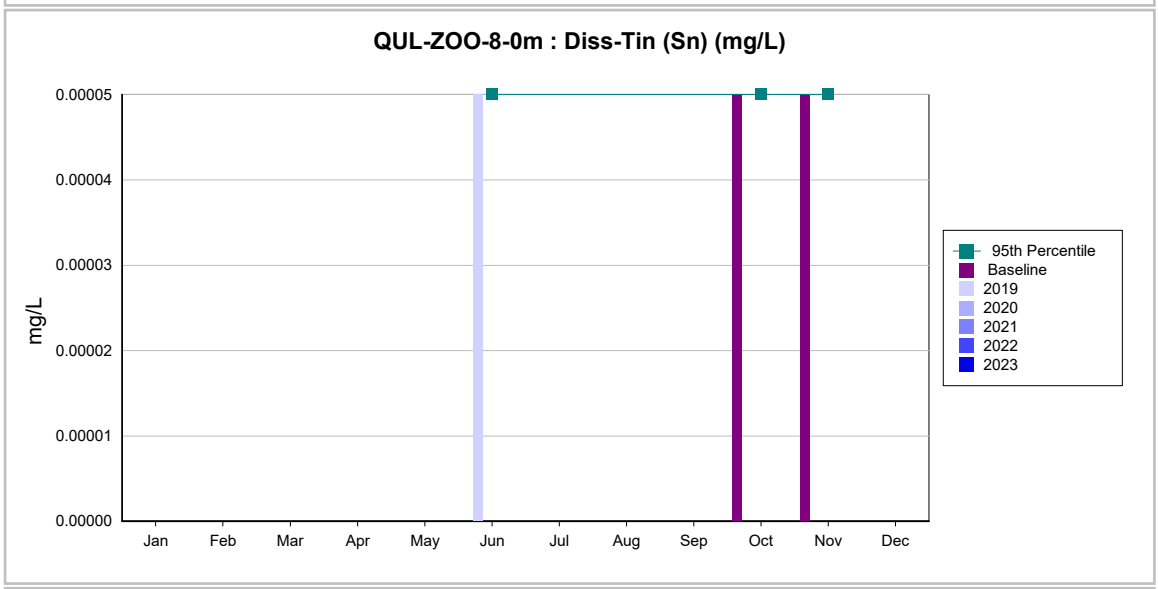

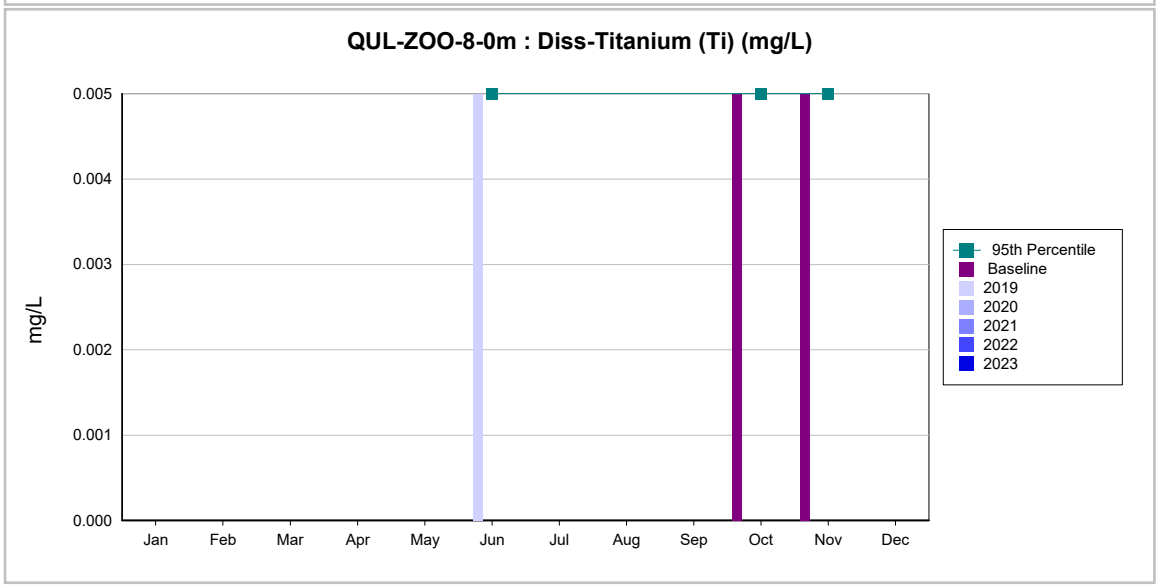

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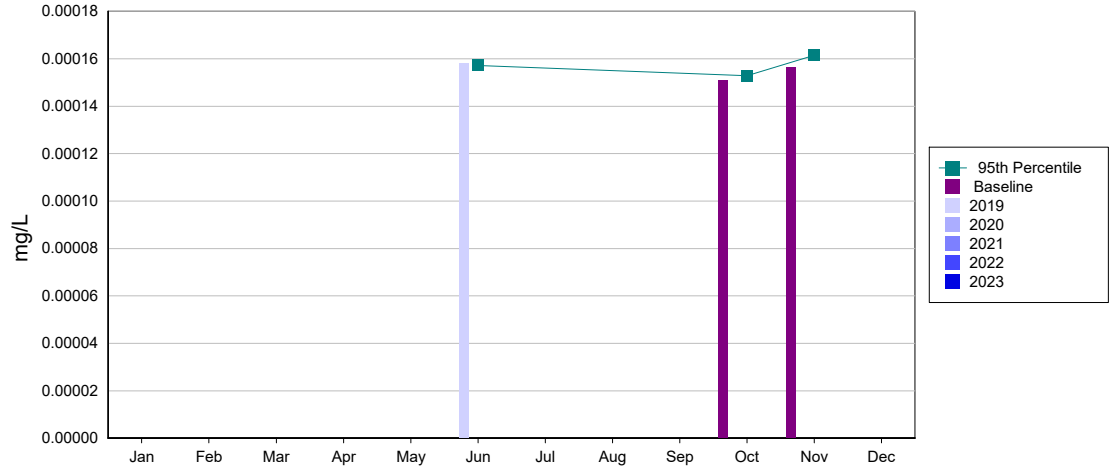

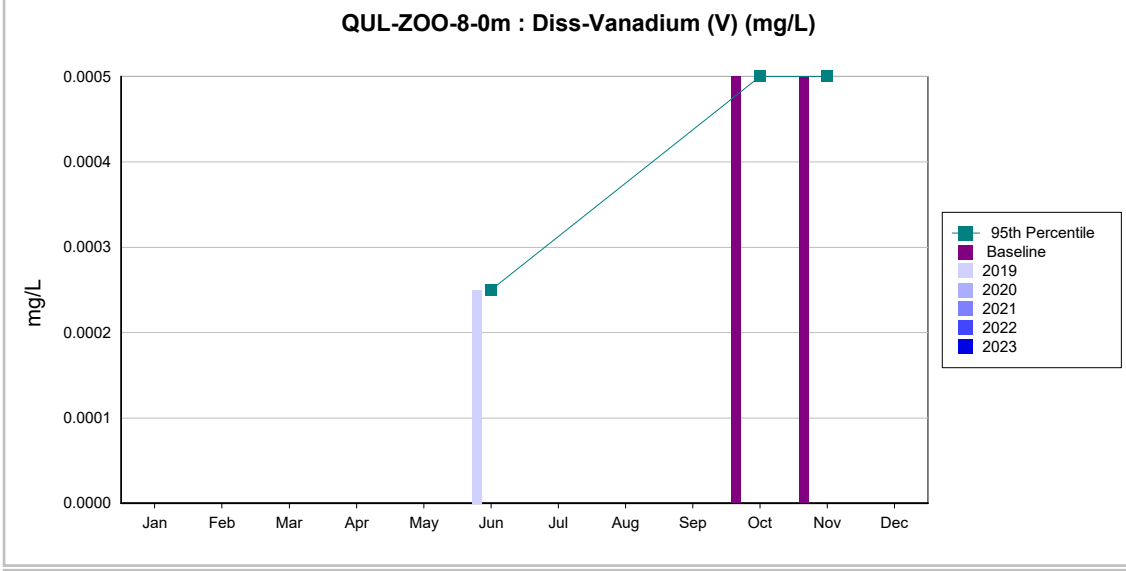

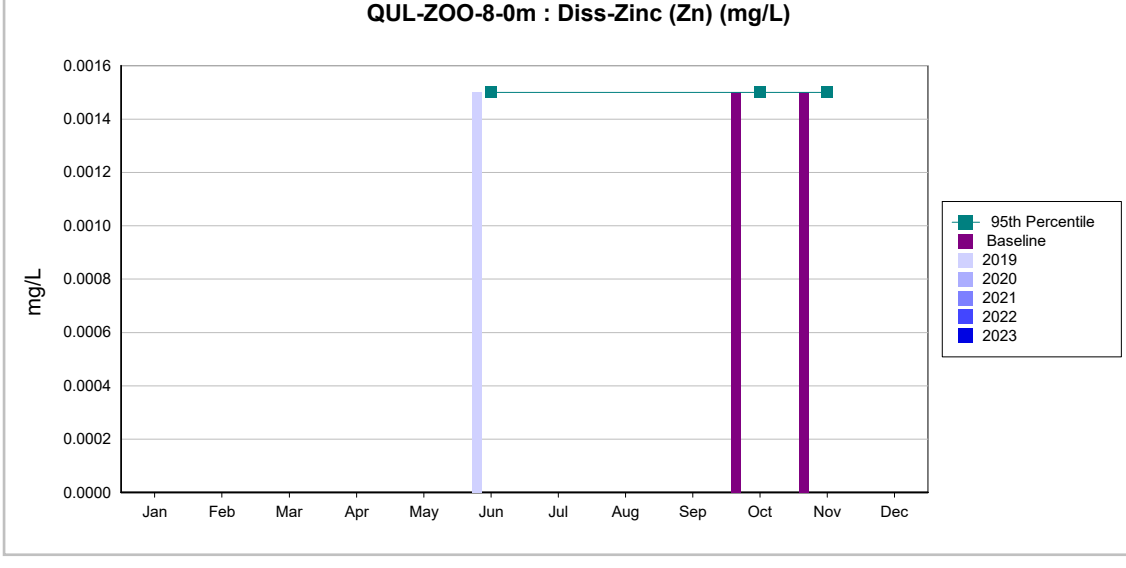

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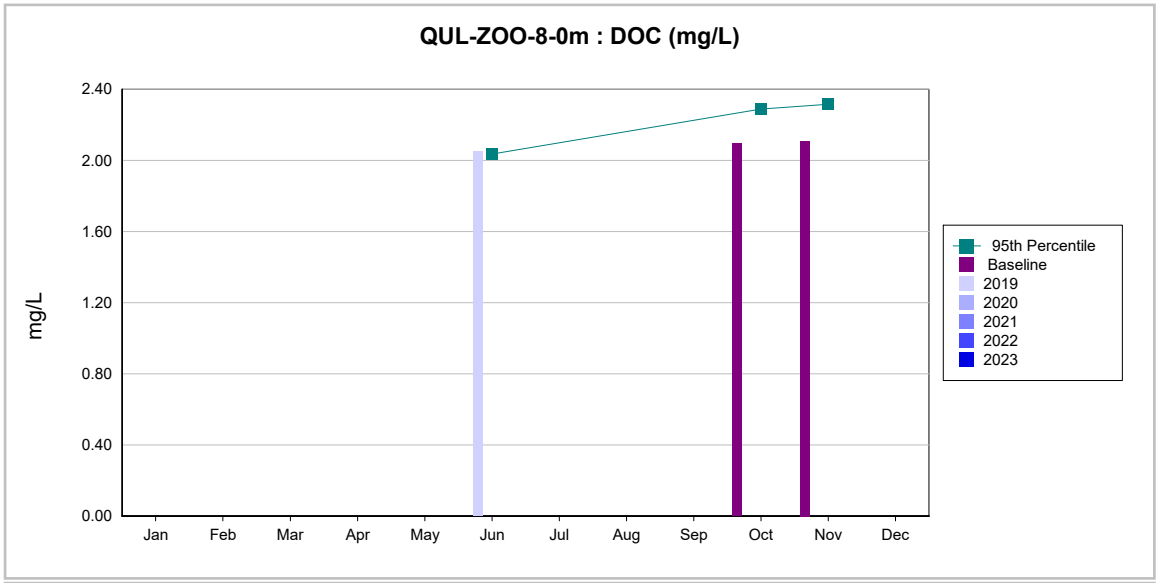

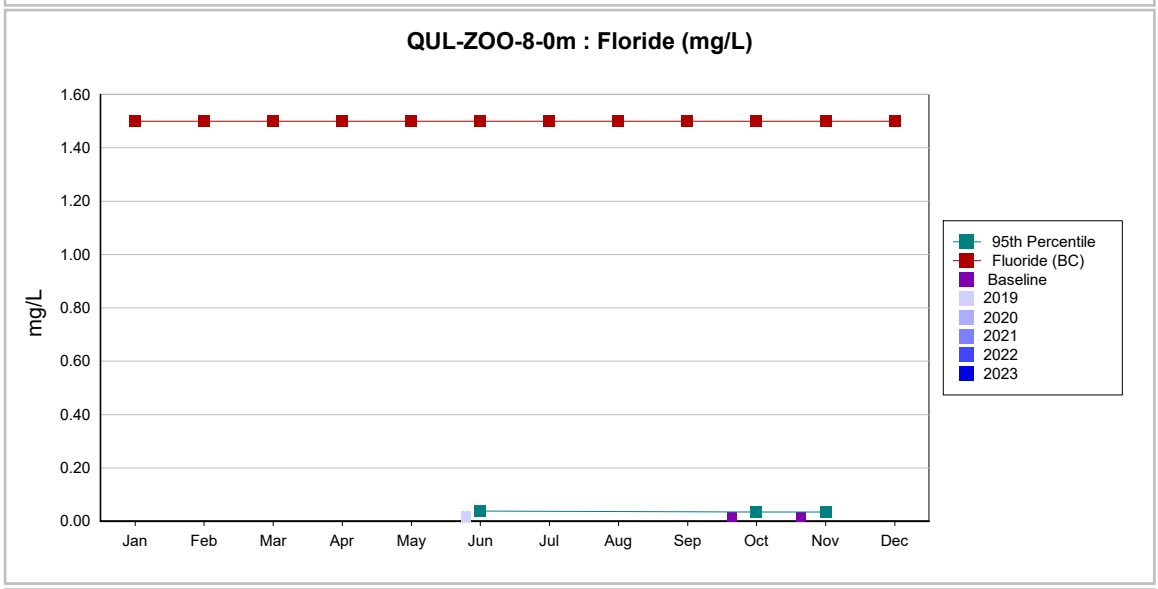

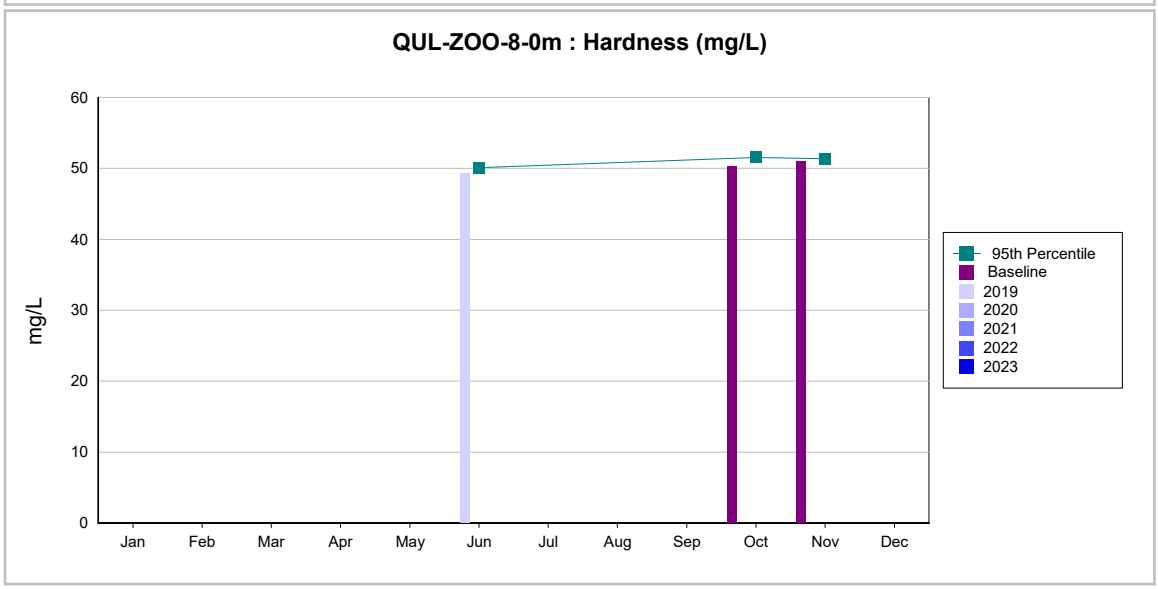

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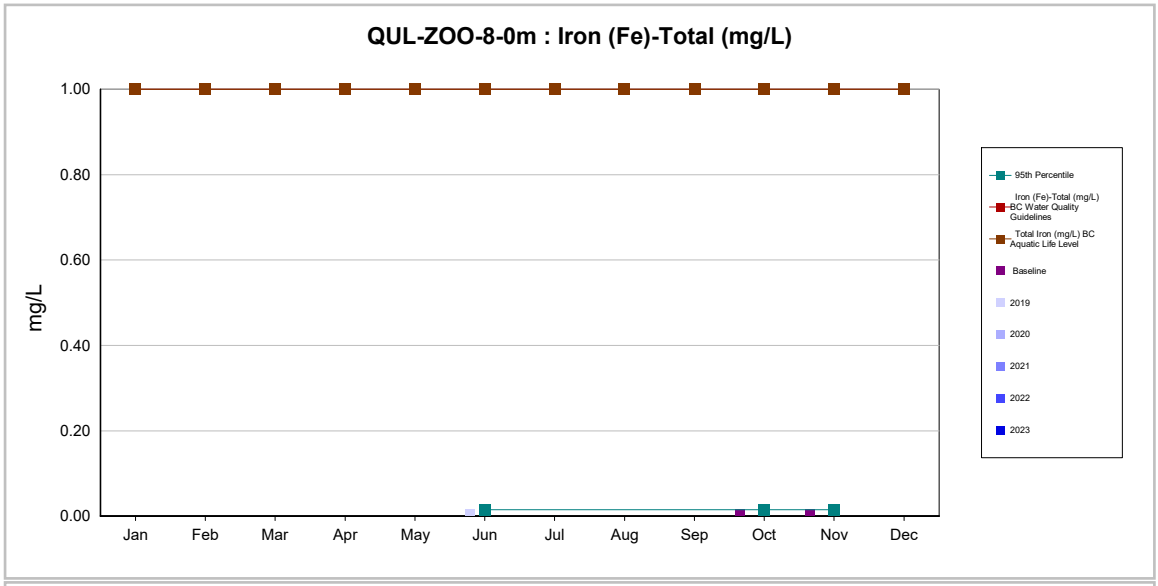

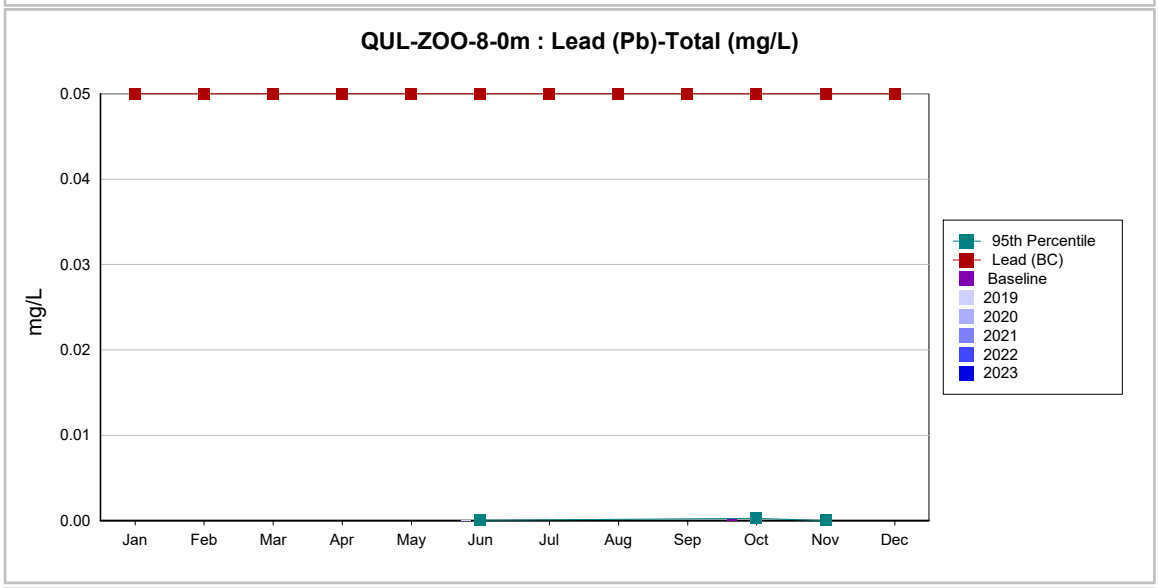

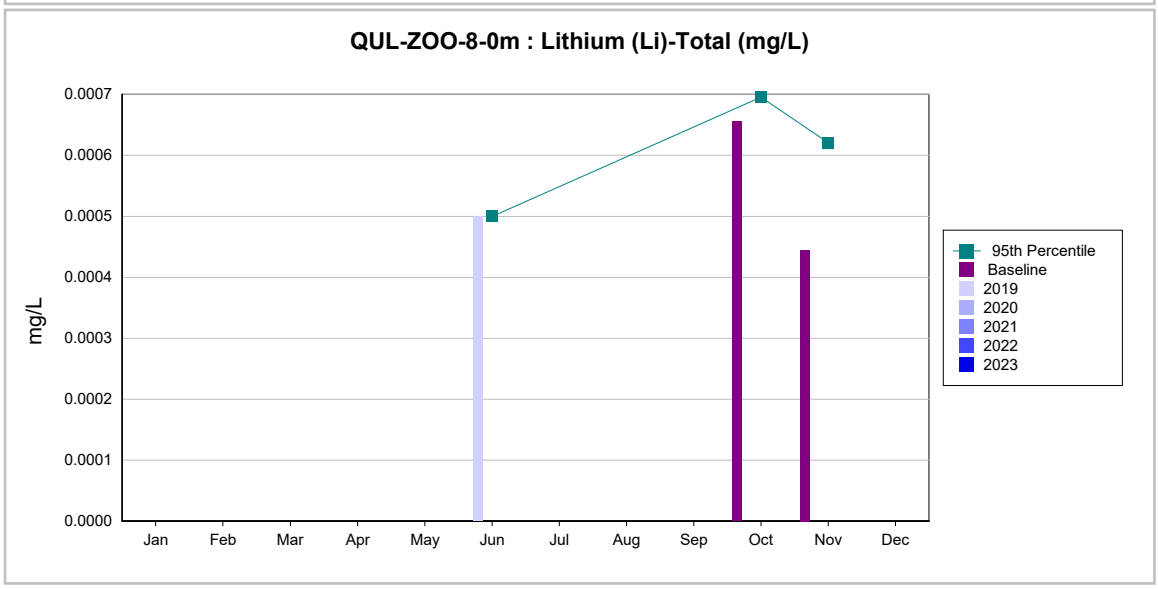

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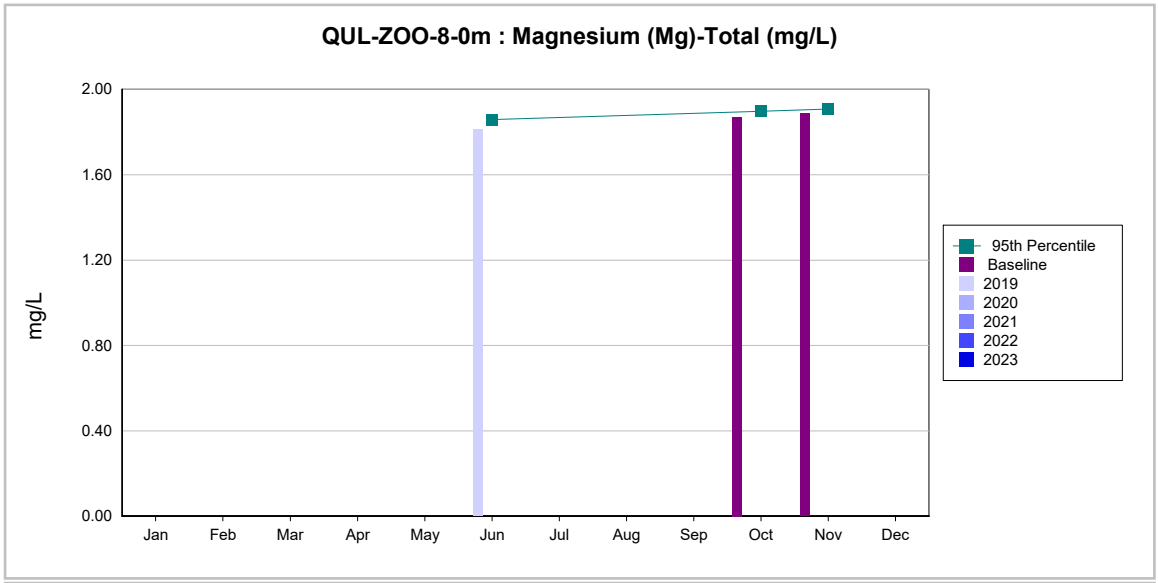

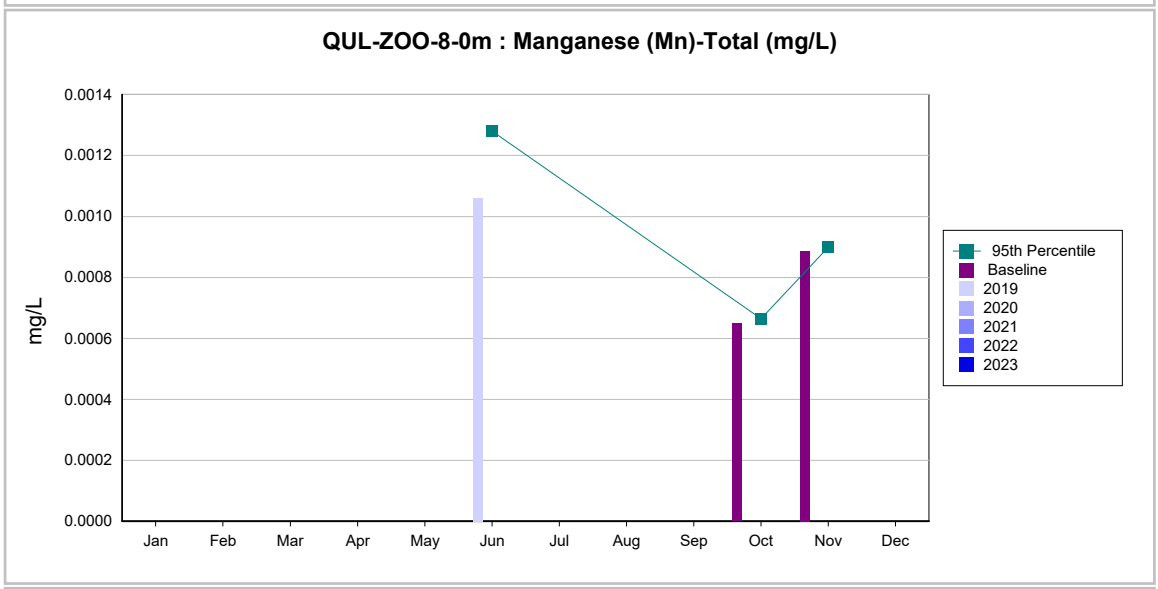

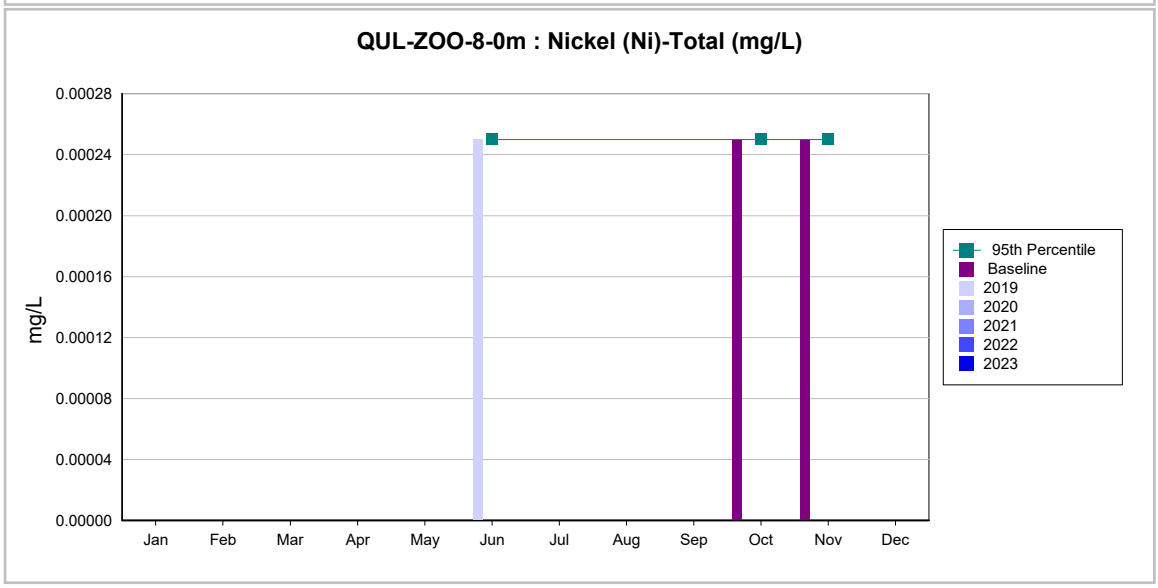

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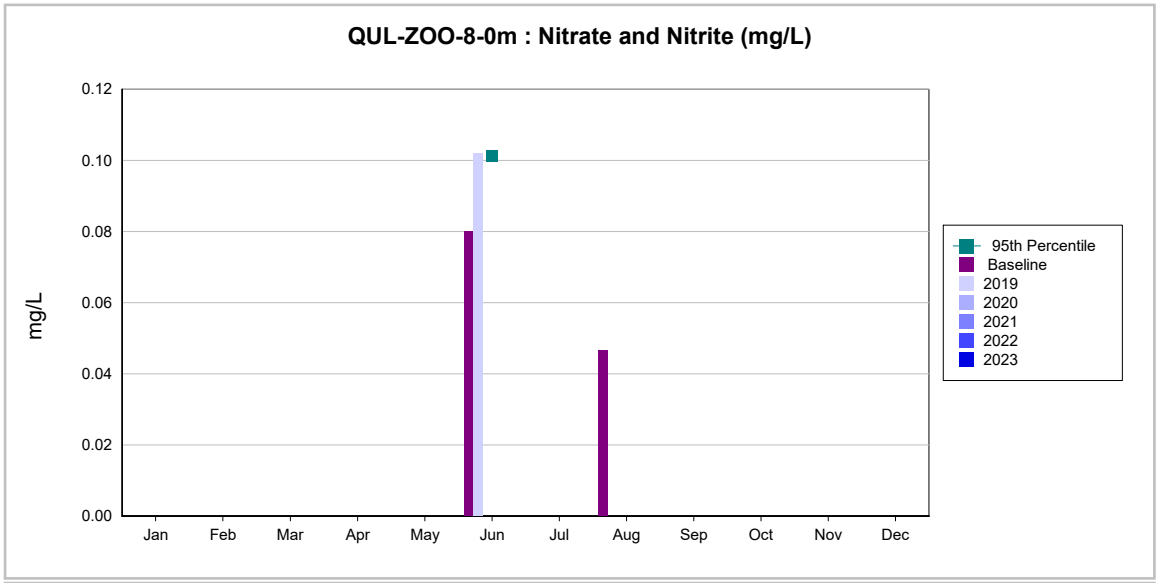

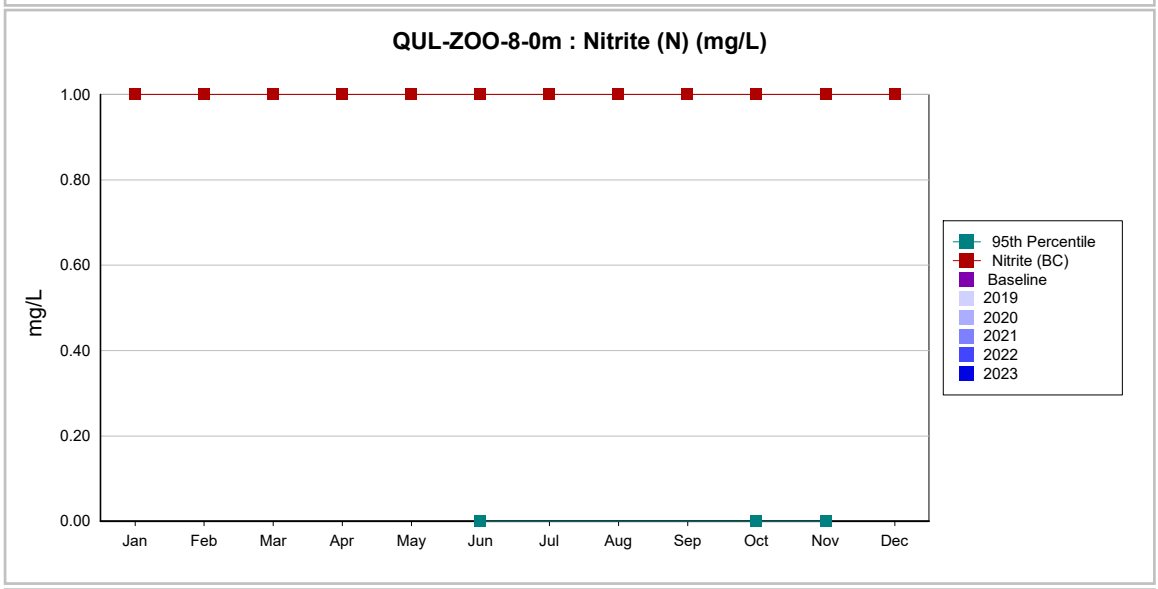

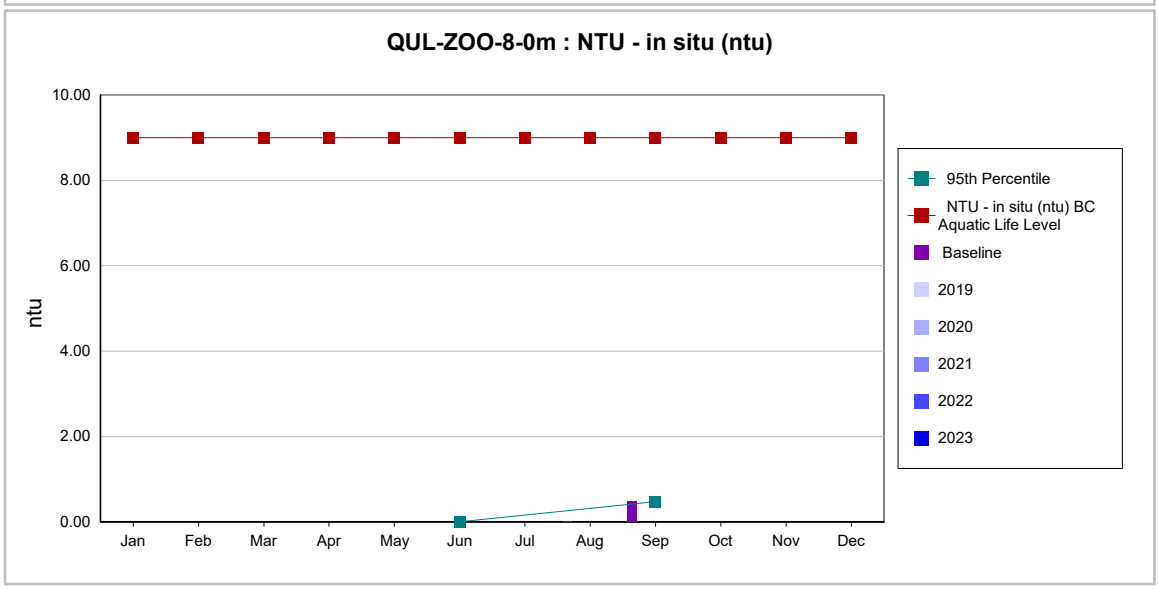

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Annual Report Quesnel Lake

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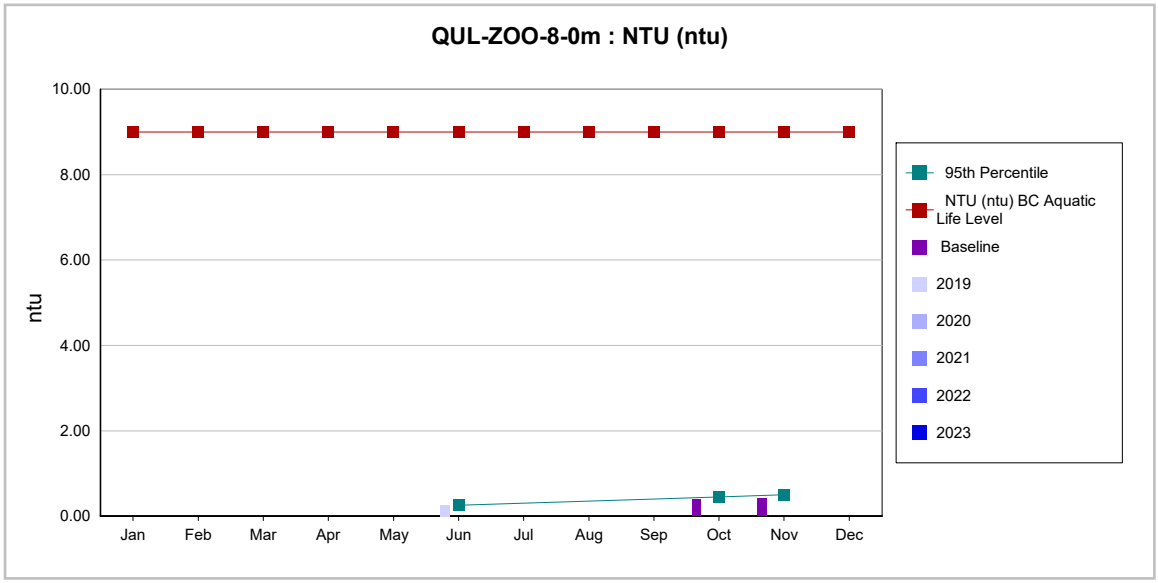

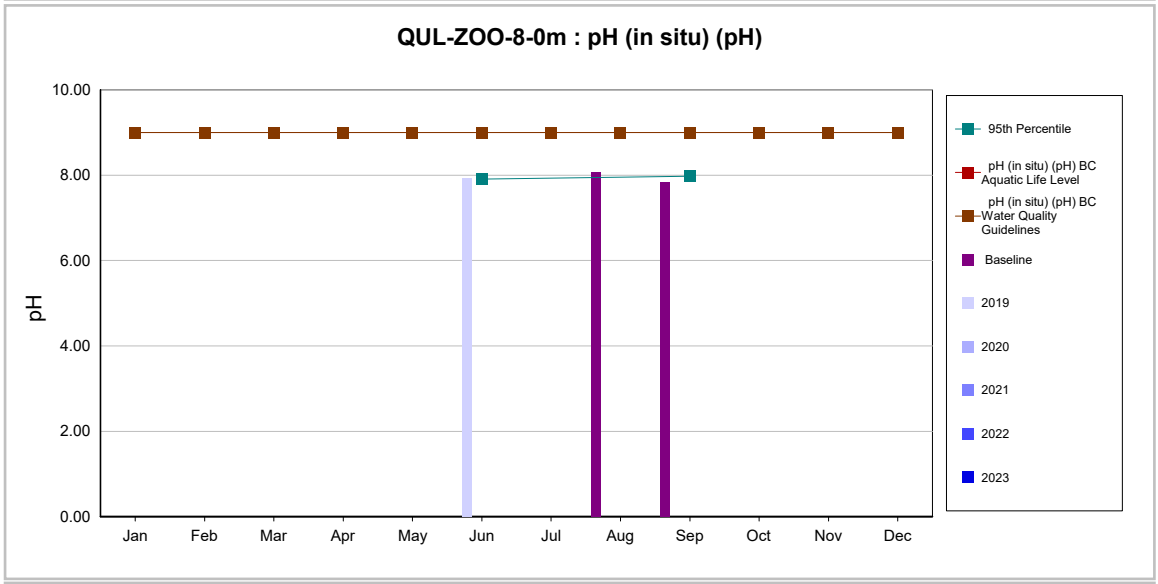

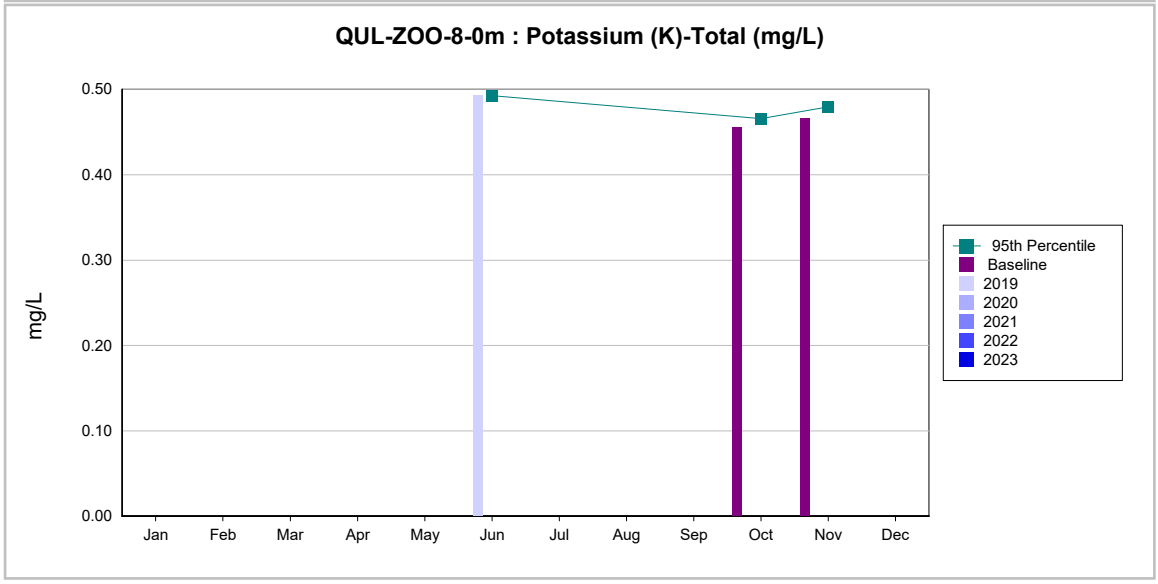

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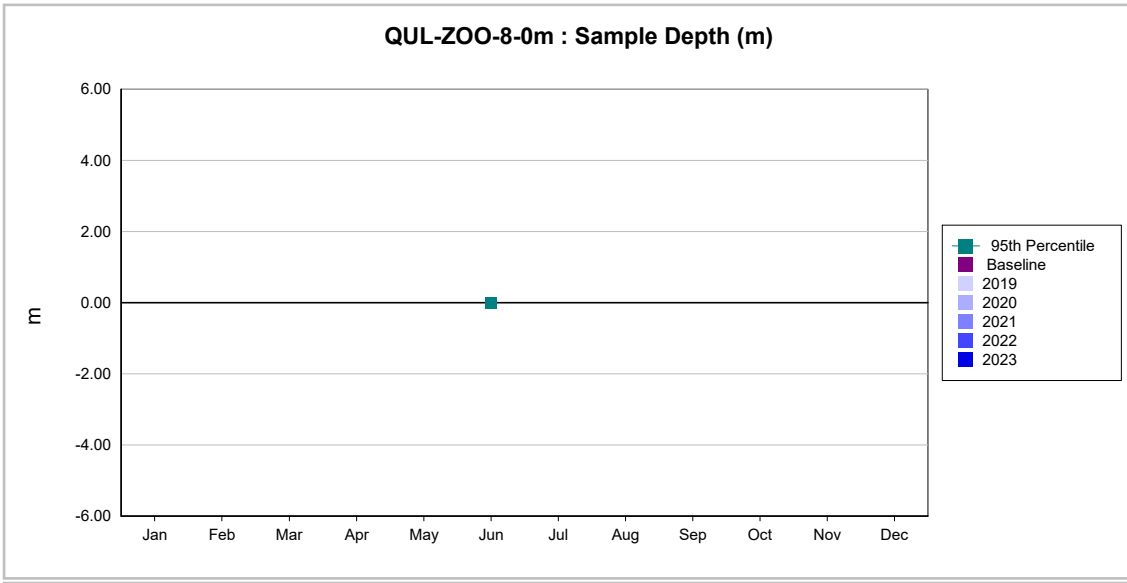

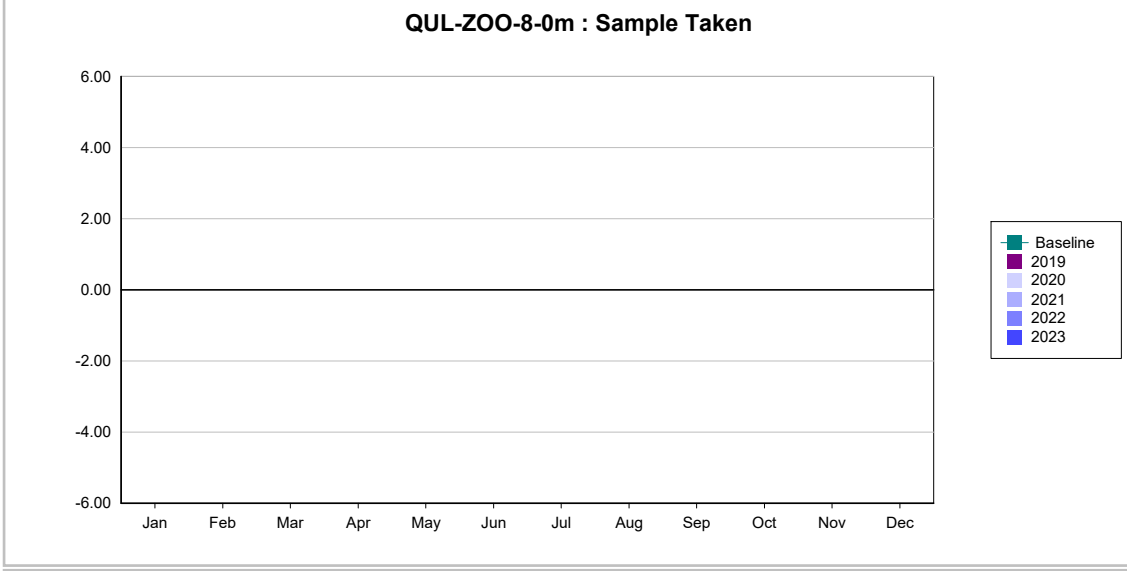

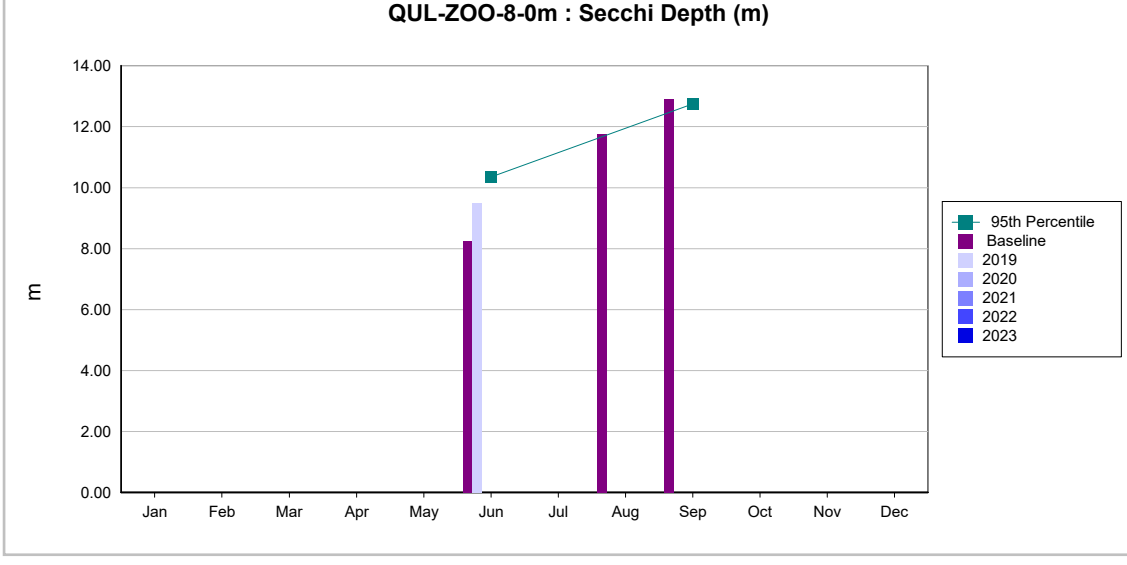

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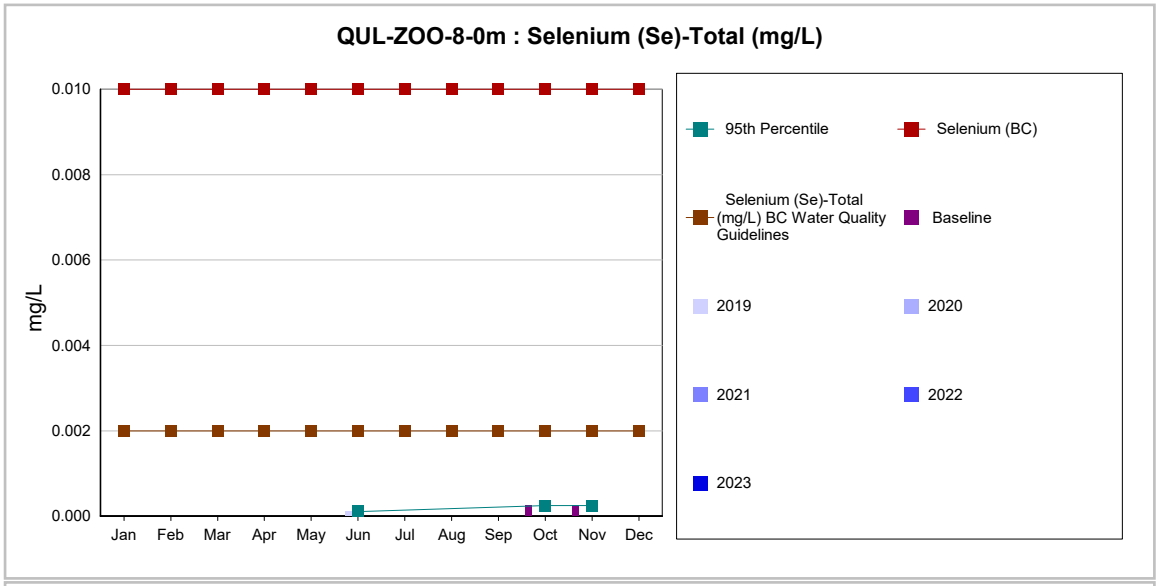

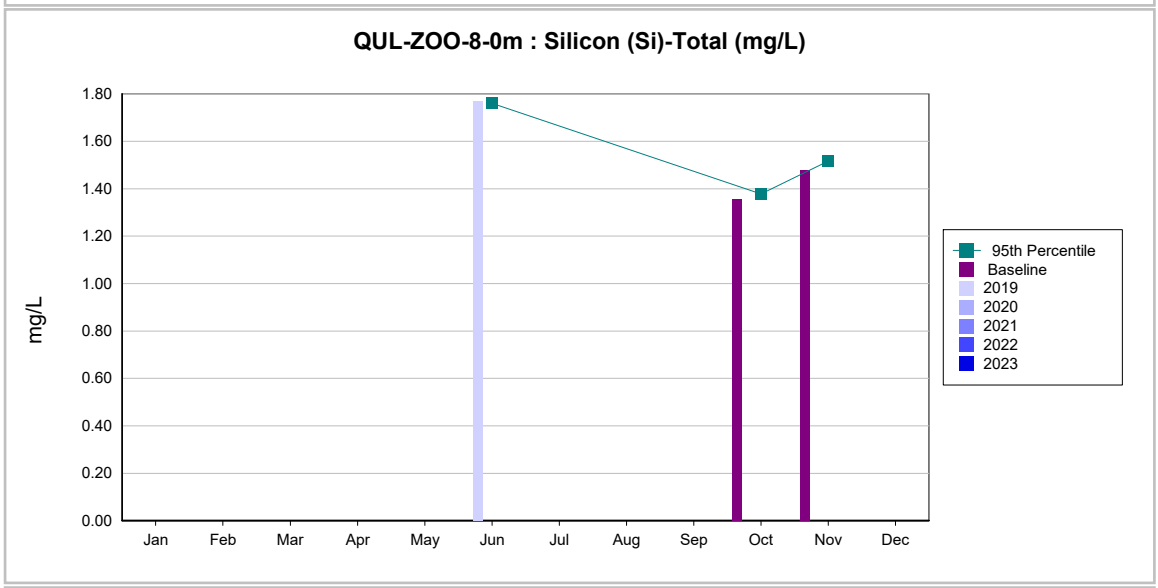

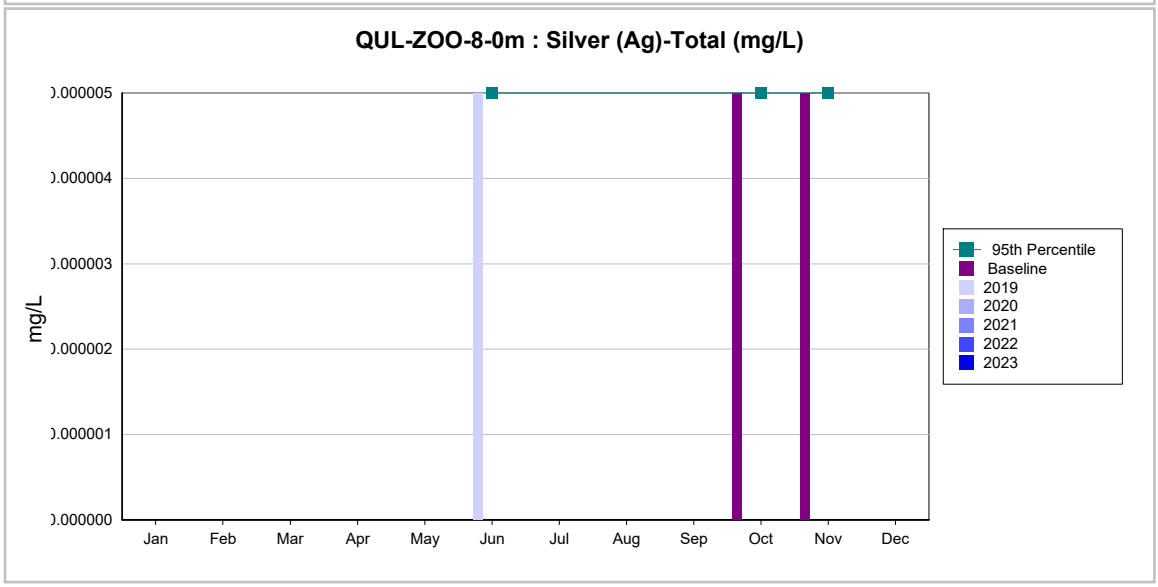

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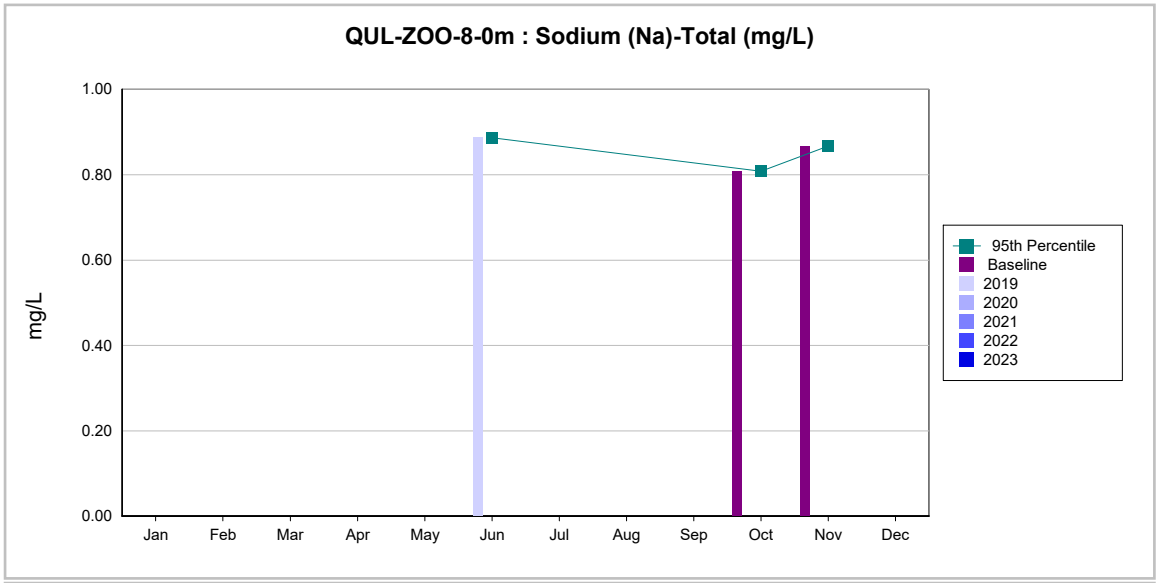

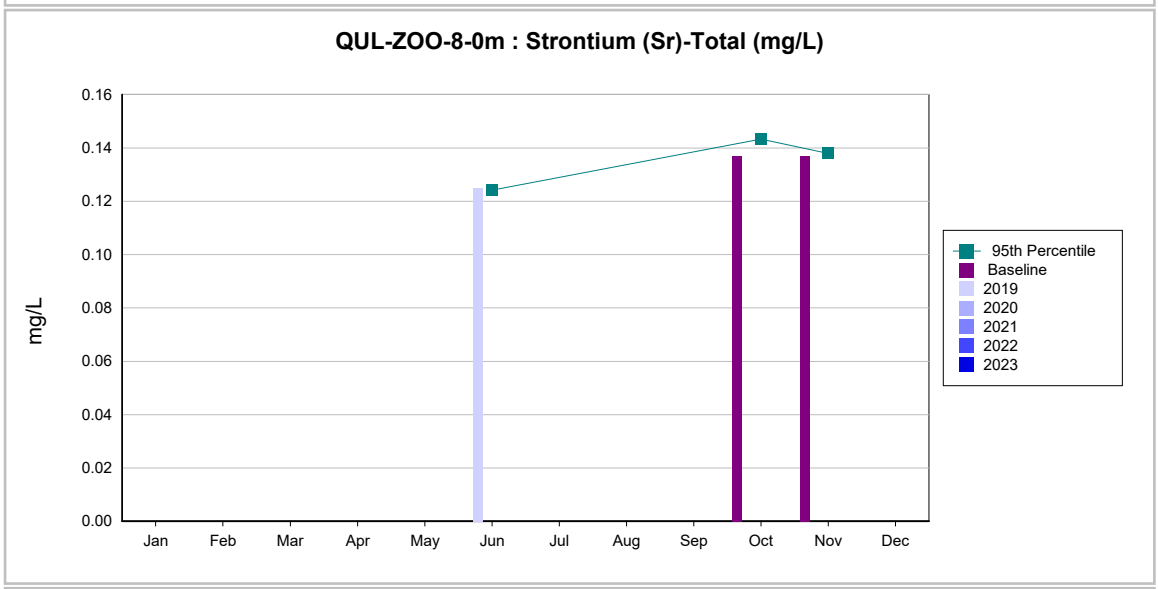

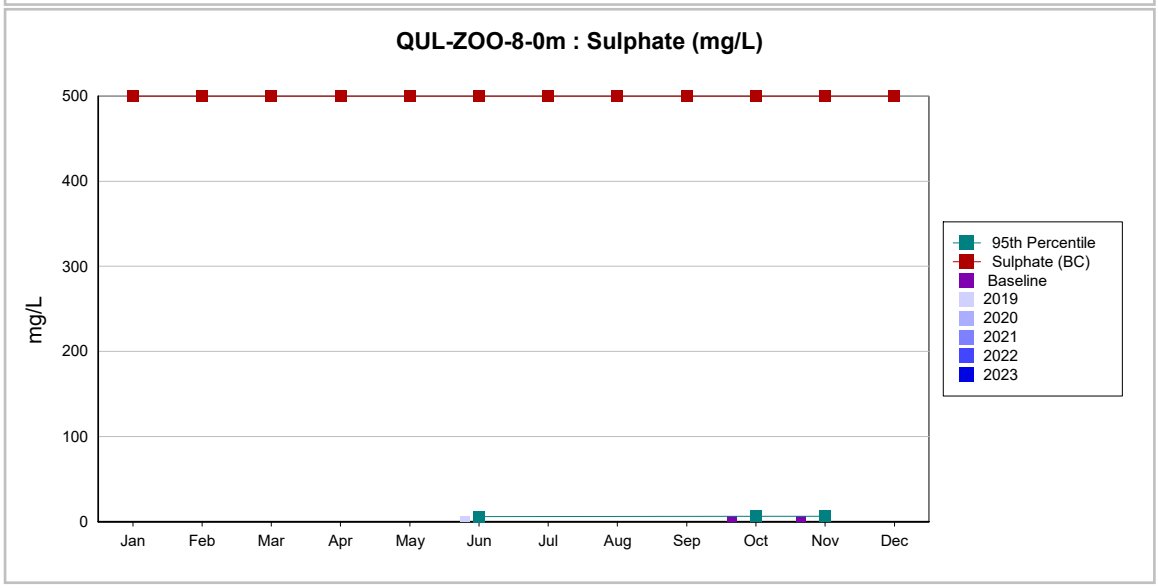

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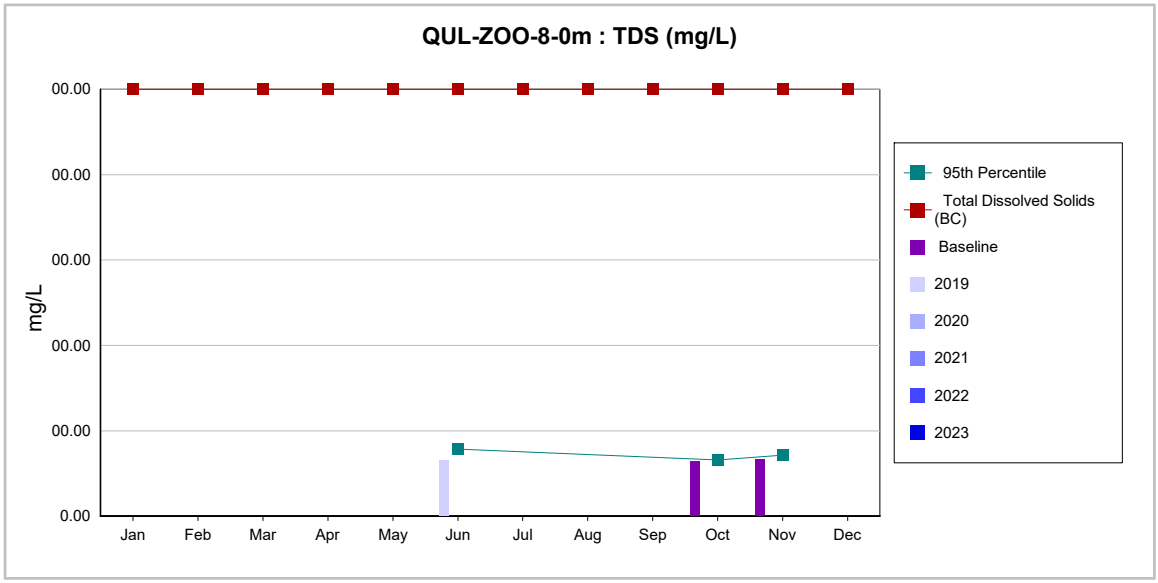

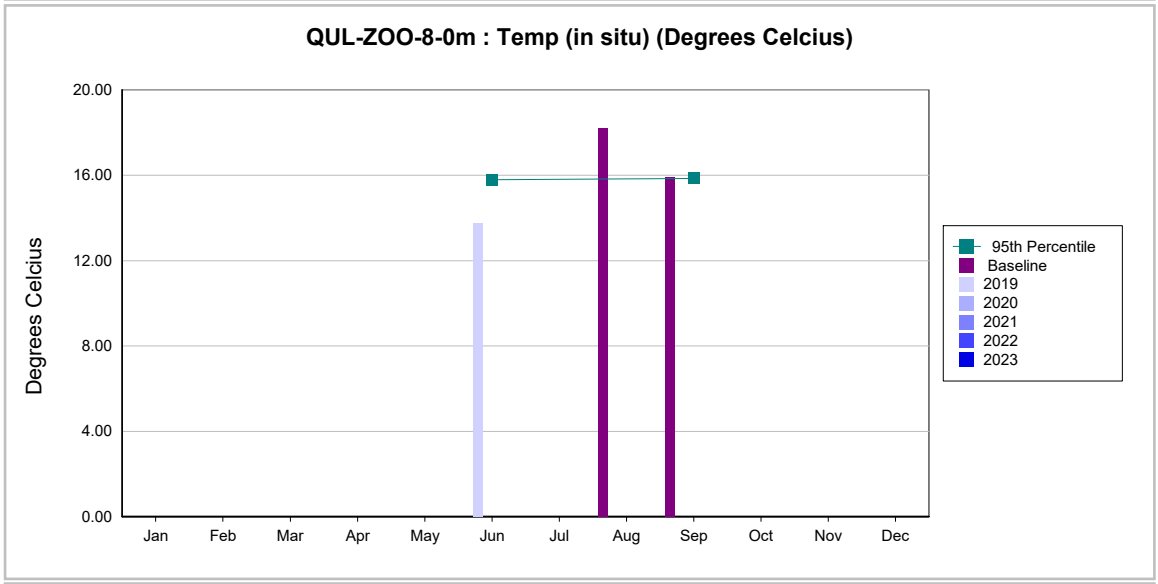

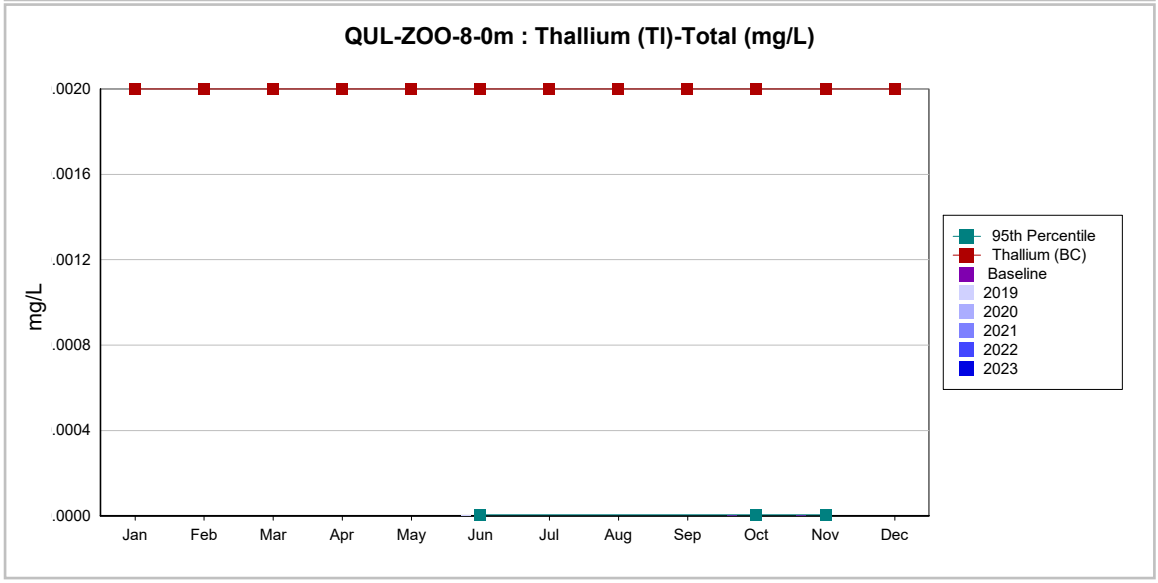

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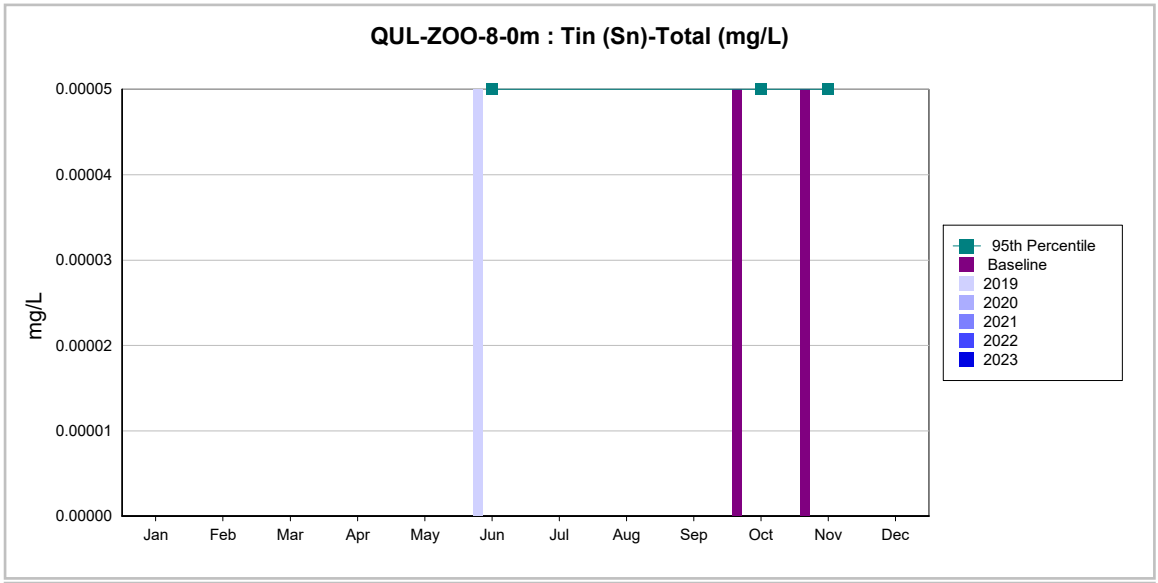

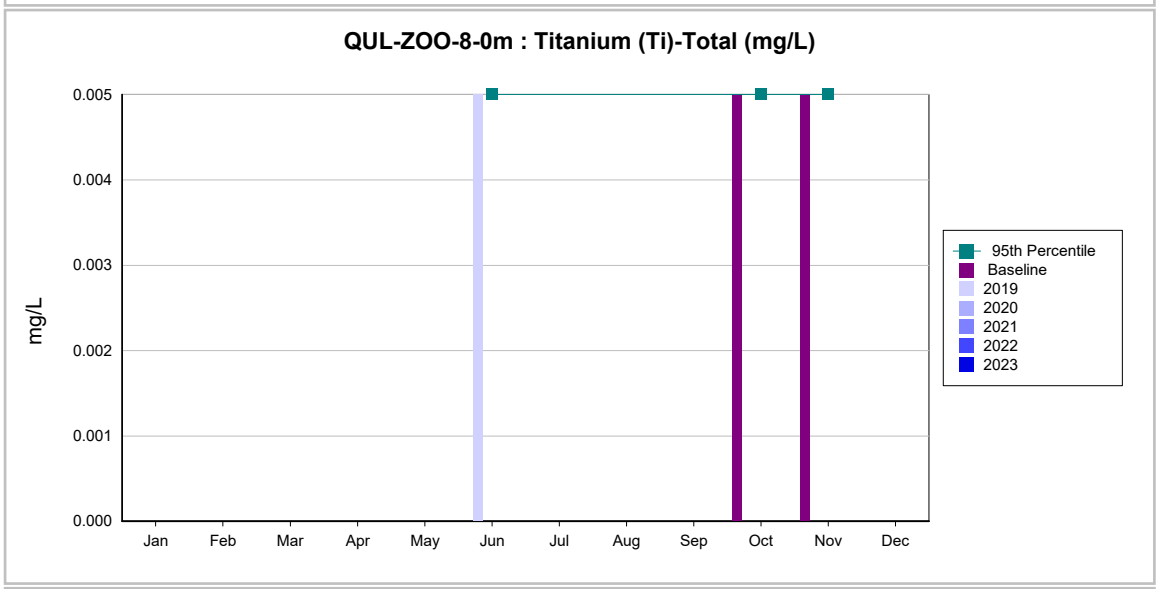

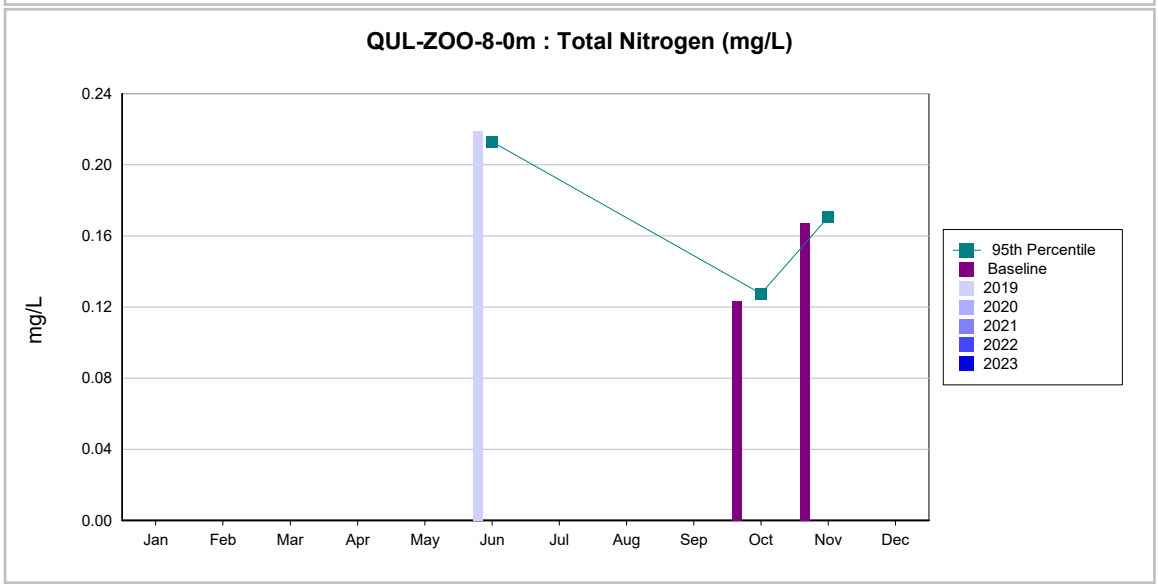

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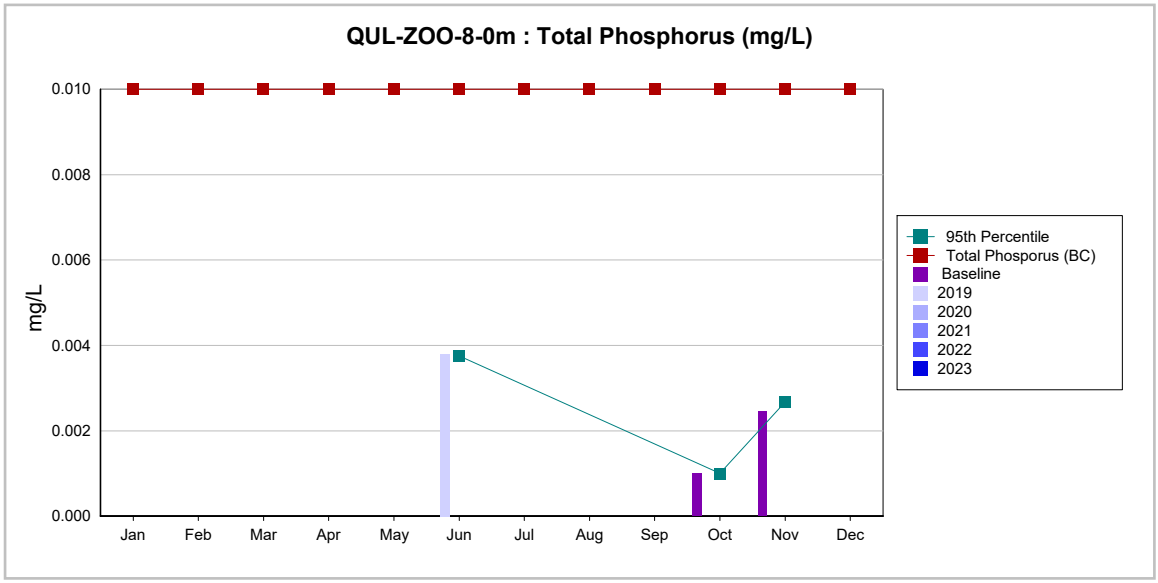

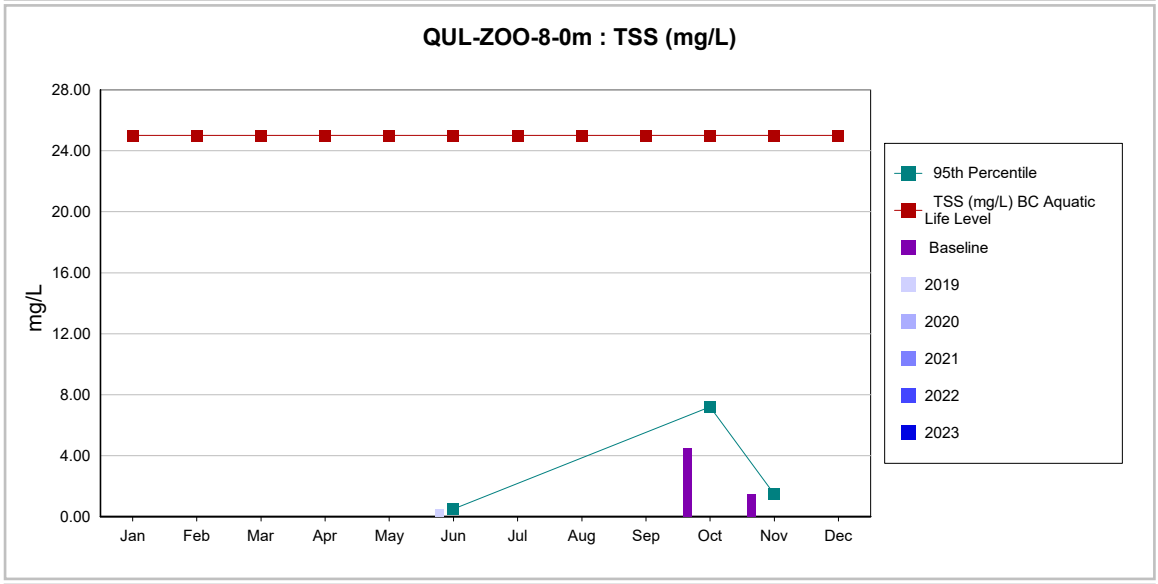

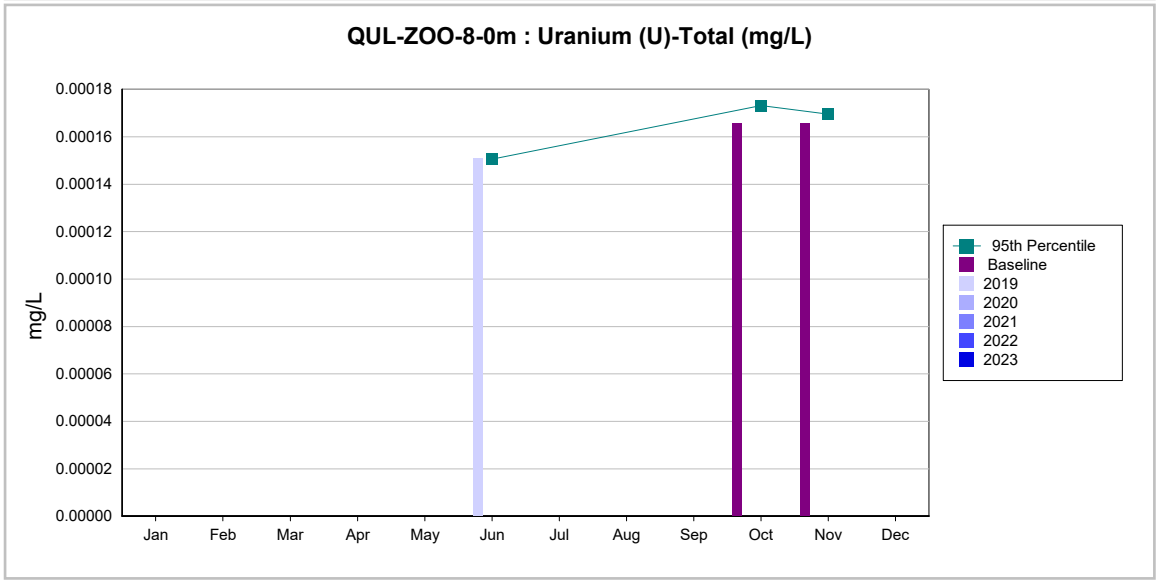

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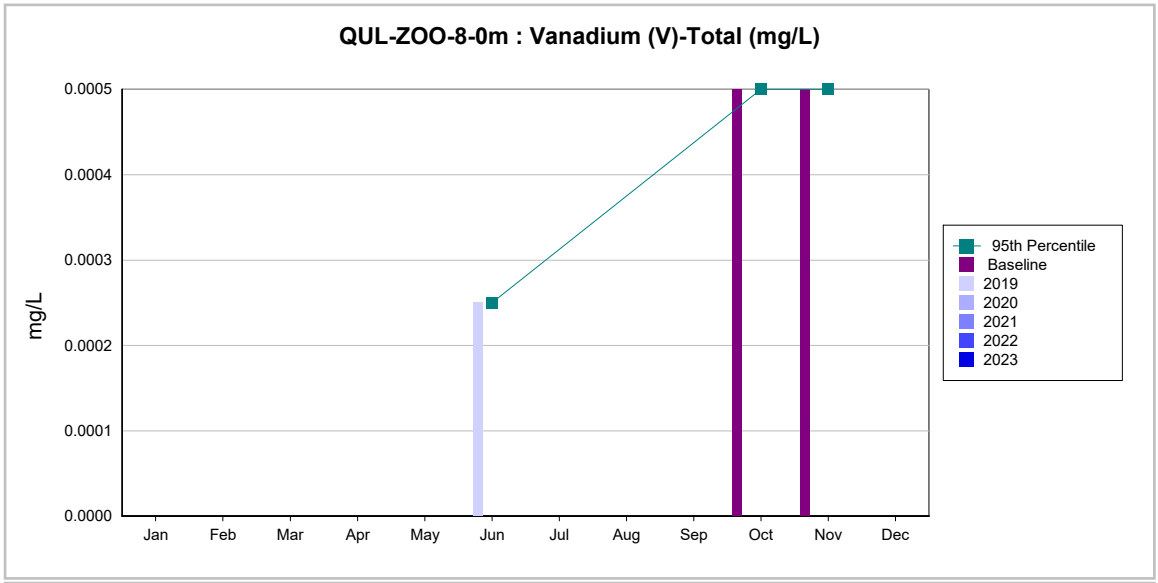

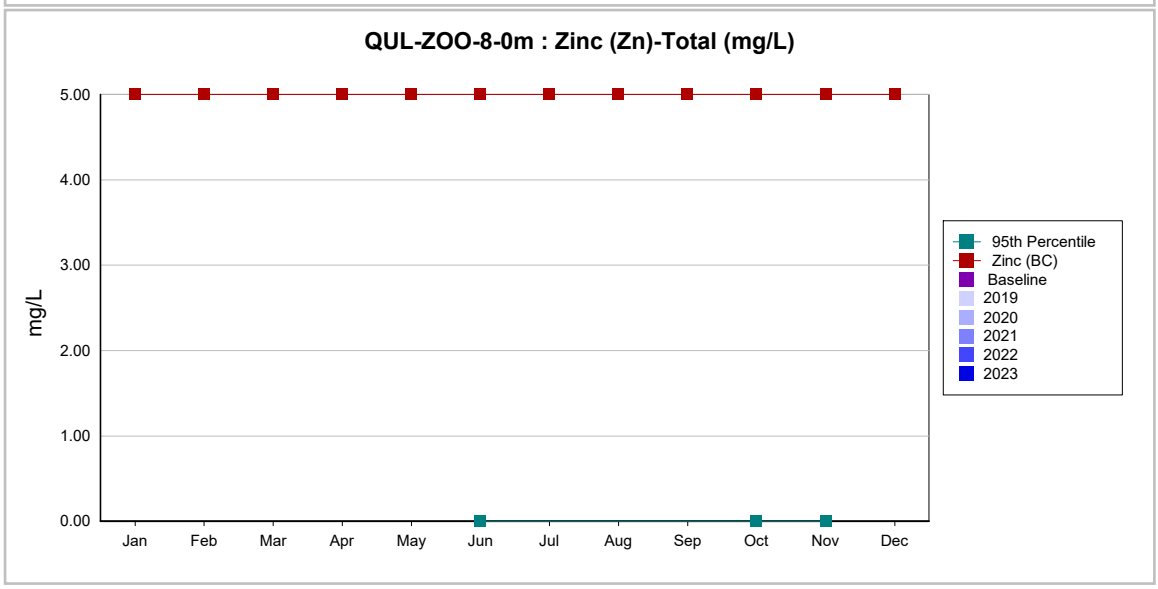

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley Mining Corporation
IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-0m														
	19-Jun-19	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	45.9	45.2	46.8	43.1	46.5	47.5	47.3	45.0	51.7	47.7	50.5	44.2	41.9	44.0	50.6
Ammonia (as N) (mg/L)	<0.0050	<0.0050	0.0066	<0.0050	<0.0050	<0.0050	<0.0050	0.0052	0.0059	<0.0050	<0.0050	<0.0050	0.0061	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	0.0057	0.0024	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.037	0.032	0.037	0.034	0.034	0.034	0.037	0.030	0.033	0.035	0.035	0.032	0.029	0.035	0.034
Nitrate (N) (mg/L)	0.111	0.0509	0.110	0.0300	0.0273	0.104	0.129	0.0509	0.0439	0.0870	0.134	0.0807	0.0207	0.0366	0.142
Nitrate and Nitrite (mg/L)	0.111	0.0509	0.110	0.0302	0.0274	0.104	0.129	0.0509	0.0439	0.0870	0.134	0.0807	0.0207	0.0366	0.142
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.44	5.76	6.09	5.43	5.85	6.74	6.33	5.85	6.38	6.80	6.40	5.15	5.26	6.48	6.30
Total Nitrogen (mg/L)	0.181	0.145	0.193	0.138	0.102	0.158	0.184	0.119	0.118	0.141	0.220	0.143	0.088	0.113	0.176
Total Phosphorus (mg/L)	0.0045	0.0022	0.0086	0.0024	<0.0020	0.0021	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0047	<0.0020	0.0029	<0.0020
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0081	0.0101	0.0122	0.0133	0.0116	0.0079	0.0128	0.0108	0.0087	0.0100	0.0051	0.0203	0.0109	0.0085	0.0121
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	<0.00010	0.00010	0.00014	0.00011	<0.00010	0.00010	0.00012	<0.00010	<0.00010	<0.00010	0.00013	0.00013	0.00018	<0.00010
Diss-Barium (Ba) (mg/L)	0.00527	0.00478	0.00549	0.00579	0.00578	0.00460	0.00524	0.00527	0.00498	0.00513	0.00513	0.00531	0.00531	0.00524	0.00534
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.6	16.5	17.1	14.9	17.3	17.8	17.3	16.1	17.6	17.7	17.5	15.2	15.1	18.4	17.2
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	0.00050	0.00053	0.00058	<0.00050	0.00060	<0.00050	<0.00050	0.00069	0.00061	0.00064	<0.00050	<0.00050	0.00073
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.98	1.88	1.98	1.95	2.06	2.04	2.07	1.78	1.89	1.93	2.12	1.89	1.91	1.94	2.01
Diss-Manganese (Mn) (mg/L)	0.00049	<0.00010	0.00040	0.00012	0.00037	0.00035	0.00111	0.00075	0.00023	0.00104	0.00029	0.00087	0.00058	0.00023	0.00066
Diss-Molybdenum (Mo) (mg/L)	0.000332	0.000274	0.000316	0.000388	0.000302	0.000317	0.000350	0.000380	0.000280	0.000339	0.000345	0.000309	0.000331	0.000266	0.000345
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.521	0.447	0.505	0.484	0.495	0.496	0.529	0.484	0.467	0.482	0.502	0.483	0.508	0.466	0.486
Diss-Selenium (mg/L)	0.000133	0.000068	0.000084	0.000105	0.000084	0.000078	0.000109	0.000108	0.000117	0.000088	0.000086	0.000106	0.000117	0.000093	0.000104

	E303022 : QUL-120a-0m		
	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients			
Alkalinity (CaCO3) (mg/L)	48.3	50.1	51.7
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.029	0.036	0.029
Nitrate (N) (mg/L)	0.101	0.0140	0.0548
Nitrate and Nitrite (mg/L)	0.101	0.0140	0.0548
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	5.57	6.51	6.22
Total Nitrogen (mg/L)	0.153	0.102	0.125
Total Phosphorus (mg/L)	0.0024	0.0026	0.0024
Dissolved Metals			
Aluminum (Al)-Diss (mg/L)	0.0085	0.0070	0.0070
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00012	<0.00010	0.00010
Diss-Barium (Ba) (mg/L)	0.00511	0.00498	0.00467
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.2	17.3	18.6
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00058	<0.00050	0.00053
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.98	2.06	1.97
Diss-Manganese (Mn) (mg/L)	0.00042	0.00016	0.00019
Diss-Molybdenum (Mo) (mg/L)	0.000344	0.000320	0.000371
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.519	0.470	0.500
Diss-Selenium (mg/L)	0.000075	0.000086	0.000084

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-0m														
	19-Jun-19	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23
Diss-Silicon (Si) (mg/L)	1.68	1.45	1.87	1.80	1.66	1.53	1.89	1.62	1.36	1.48	1.74	1.90	1.52	1.30	1.78
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.985	0.817	0.908	0.919	0.954	0.893	1.01	0.820	0.864	0.853	0.986	0.848	0.866	0.846	0.928
Diss-Strontium (Sr) (mg/L)	0.126	0.129	0.127	0.109	0.125	0.147	0.131	0.120	0.130	0.136	0.139	0.107	0.110	0.142	0.136
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000160	0.000143	0.000139	0.000119	0.000152	0.000156	0.000142	0.000135	0.000148	0.000160	0.000162	0.000133	0.000134	0.000150	0.000160
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	82	67	64	62	69	77	67	76	85	70	78	66	62	79	73
Field Tests															
Cond (in situ) (µs/cm)	102.2	102.8	110.2	98.6	104.9	107.5	106	117.9	109.2	106.5	111.7	95.4	97.1	104.6	112.4
NTU - in situ (ntu)	0.29	0.11	0.4	0	0.11	0.13	0.22	0.05	0.06	0.19	0	0.68	0	0	0.32
pH (in situ) (pH)	7.43	8.01	7.73	7.94	8.27	7.97	8.32	7.99	8.88	7.88	7.74	8.04	7.94	8.06	6.42
Sample Depth (m)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample Taken	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Secchi Depth (m)	4	10.5	6	6.75	8	6.3	6	8	7	10.25	8	5.75	10.5	8.25	12.3
Temp (in situ) (Degrees Celcius)	8.874	18.102	10.025	17.212	16.001	7.018	7.142	20.347	15.747	8.989	3.314	12.84	20.664	13.362	3.617
Organic / Inorganic															
DOC (mg/L)	1.81	1.72	2.36	2.83	2.32	12.7	2.37	2.23	1.72	1.65	1.96	2.72	2.32	1.67	2.01
Physical Test															
Conductivity (µs/cm)	104	100	104	98.6	104	108	107	98.5	112	107	112	94.5	99.5	105	111
Hardness (mg/L)	52.2	49.1	50.9	45.3	51.7	52.8	51.7	47.5	51.7	52.1	52.4	45.7	45.6	53.9	51.2
NTU (ntu)	0.23	0.24	0.37	0.33	0.19	0.16	0.42	0.16	0.13	0.16	0.19	0.75	0.28	0.19	0.14
pH (pH)	7.98	7.93	7.80	7.95	7.99	7.85	7.84	7.95	7.91	7.94	7.90	7.80	7.88	7.86	7.91
TDS (mg/L)	82	67	64	62	69	77	67	76	85	70	78	66	62	79	73
TSS (mg/L)	<1.0	<1.0	<1.0	<1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	1.2	<1.0	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0149	0.0141	0.0250	0.0211	0.0136	0.0128	0.0222	0.0149	0.0119	0.0123	0.0327	0.0358	0.0181	0.0138	0.0113
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00010	<0.00010	0.00015	0.00016	0.00015	<0.00010	0.00015	0.00014	0.00010	0.00012	0.00011	0.00011	0.00012	0.00010	<0.00010
Barium (Ba)-Total (mg/L)	0.00513	0.00449	0.00538	0.00544	0.00494	0.00482	0.00516	0.00553	0.00456	0.00501	0.00613	0.00548	0.00540	0.00489	0.00514
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

	E303022 : QUL-120a-0m		
	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.78	0.756	1.08
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.966	0.899	0.929
Diss-Strontium (Sr) (mg/L)	0.129	0.137	0.144
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000154	0.000163	0.000168
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030
TDS (mg/L)	68	74	64
Field Tests			
Cond (in situ) (µs/cm)	20.7	104.8	110.2
NTU - in situ (ntu)	1.82	3.47	
pH (in situ) (pH)	7.65	8.22	7.52
Sample Depth (m)	0	0	0
Sample Taken	Yes	Yes	
Secchi Depth (m)	10.25	5.2	6.5
Temp (in situ) (Degrees Celcius)	16.358	16.593	8.635
Organic / Inorganic			
DOC (mg/L)	2.34	2.34	1.93
Physical Test			
Conductivity (µs/cm)	104	110	112
Hardness (mg/L)	51.1	51.7	54.6
NTU (ntu)	0.29	0.67	0.42
pH (pH)	7.83	7.97	7.89
TDS (mg/L)	68	74	64
TSS (mg/L)	<1.0	1.5	1.3
Total Metals			
Aluminum (Al)-Total (mg/L)	0.0146	0.0148	0.0145
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00012	0.00012
Barium (Ba)-Total (mg/L)	0.00550	0.00498	0.00494
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

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	E303022 : QUL-120a-0m														
	19-Jun-19	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	15.7	15.8	16.4	15.7	17.9	17.4	15.7	16.0	18.8	18.0	18.1	16.3	14.7	17.0	16.8
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00055	0.00062	0.00078	0.00067	0.00058	0.00089	0.00063	0.00053	0.00053	0.00053	0.00110	0.00465	0.00055	0.00051	0.00054
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	<0.030	<0.030	<0.030	0.039	0.040	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000058	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.85	1.80	1.95	2.13	2.00	1.97	1.96	1.94	1.95	2.00	2.12	1.84	1.88	2.00	2.09
Manganese (Mn)-Total (mg/L)	0.00135	0.00066	0.00163	0.00163	0.00117	0.00088	0.00188	0.00181	0.00063	0.00112	0.00288	0.00232	0.00147	0.00152	0.00122
Molybdenum (Mo)-Tota (mg/L)	0.000369	0.000264	0.000343	0.000382	0.000301	0.000300	0.000383	0.000370	0.000304	0.000349	0.000354	0.000330	0.000350	0.000284	0.000357
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.432	0.436	0.507	0.492	0.425	0.458	0.470	0.506	0.481	0.496	0.502	0.476	0.489	0.480	0.492
Selenium (Se)-Total (mg/L)	0.000108	0.000105	0.000107	0.000130	0.000126	0.000095	0.000114	0.000127	0.000100	0.000089	0.000125	0.000084	0.000117	0.000110	0.000124
Silicon (Si)-Total (mg/L)	1.77	1.37	1.93	1.98	1.66	1.64	2.12	1.80	1.40	1.67	1.86	1.93	1.64	1.36	1.82
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.862	0.778	0.934	0.918	0.846	0.897	0.958	0.901	0.882	0.905	0.995	0.832	0.862	0.849	0.949
Strontium (Sr)-Total (mg/L)	0.124	0.116	0.125	0.113	0.134	0.139	0.120	0.111	0.132	0.141	0.136	0.117	0.117	0.139	0.137
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000153	0.000148	0.000153	0.000139	0.000146	0.000155	0.000149	0.000136	0.000148	0.000173	0.000167	0.000139	0.000134	0.000157	0.000174
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0031	<0.0030	<0.0030	<0.0030

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	26-Jun-23	11-Sep-23	30-Oct-23
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.6	17.5	17.9
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00059	0.00053	0.00051
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.10	2.12	2.13
Manganese (Mn)-Total (mg/L)	0.00092	0.00075	0.00080
Molybdenum (Mo)-Tota (mg/L)	0.000331	0.000313	0.000370
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.510	0.486	0.489
Selenium (Se)-Total (mg/L)	0.000120	0.000104	0.000104
Silicon (Si)-Total (mg/L)	1.69	0.82	1.12
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.900	0.955	0.958
Strontium (Sr)-Total (mg/L)	0.130	0.142	0.139
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000140	0.000180	0.000167
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030

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	E303022 : QUL-120a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	18	18	41.90000	51.70000	47.11111	52.78000	2.95155
Ammonia (as N) (mg/L)	18	4	0.00250	0.00660	0.00327	0.01150	0.00150
Chloride (mg/L)	18	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	18	0	0.00050	0.00050	0.00050	0.00148	0.00000
Diss-Phosphorus (mg/L)	18	3	0.00100	0.00570	0.00140	0.00284	0.00115
Floride (mg/L)	18	18	0.02900	0.03700	0.03344	0.03480	0.00275
Nitrate (N) (mg/L)	18	18	0.01400	0.14200	0.07377	0.13680	0.04205
Nitrate and Nitrite (mg/L)	18	18	0.01400	0.14200	0.07378	0.13605	0.04203
Nitrite (N) (mg/L)	18	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	18	18	5.15000	6.80000	6.08667	6.50800	0.49579
Total Nitrogen (mg/L)	18	18	0.08800	0.22000	0.14439	0.19960	0.03579
Total Phosphorus (mg/L)	18	10	0.00100	0.00860	0.00238	0.00812	0.00194
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	18	18	0.00510	0.02030	0.01027	0.01340	0.00337
Diss-Antimony (Sb) (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	18	11	0.00005	0.00018	0.00009	0.00013	0.00004
Diss-Barium (Ba) (mg/L)	18	18	0.00460	0.00579	0.00519	0.00622	0.00032
Diss-Beryllium (Be) (mg/L)	18	0	0.00005	0.00050	0.00015	0.00005	0.00019
Diss-Bismuth (Bi) (mg/L)	18	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	18	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	18	18	14.90000	18.60000	17.02222	18.18000	1.06526
Diss-Chromium (Cr) (mg/L)	18	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	18	10	0.00025	0.00073	0.00044	0.00073	0.00019
Diss-Iron (Fe) (mg/L)	18	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	18	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Lithium (Li) (mg/L)	18	0	0.00050	0.00050	0.00050	0.00094	0.00000
Diss-Magnesium (Mg) (mg/L)	18	18	1.78000	2.12000	1.96889	2.09400	0.08366
Diss-Manganese (Mn) (mg/L)	18	17	0.00005	0.00111	0.00046	0.00183	0.00031
Diss-Molybdenum (Mo) (mg/L)	18	18	0.00027	0.00039	0.00033	0.00042	0.00003
Diss-Nickel (Ni) (mg/L)	18	1	0.00025	0.00052	0.00027	0.00025	0.00006
Diss-Potassium (K) (mg/L)	18	18	0.44700	0.52900	0.49133	0.54460	0.02128

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	E303022 : QUL-120a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	18	18	0.00007	0.00013	0.00010	0.00025	0.00002
Diss-Silicon (Si) (mg/L)	18	18	0.75600	1.90000	1.56644	1.82200	0.30099
Diss-Silver (Ag) (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	18	18	0.81700	1.01000	0.90506	0.97460	0.05901
Diss-Strontium (Sr) (mg/L)	18	18	0.10700	0.14700	0.12911	0.13580	0.01173
Diss-Thallium (Tl) (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	18	18	0.00012	0.00017	0.00015	0.00016	0.00001
Diss-Vanadium (V) (mg/L)	18	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	18	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	18	18	62.00000	85.00000	71.27778	83.40000	7.00257
Field Tests							
Cond (in situ) (µs/cm)	18	18	20.70000	117.90000	101.26111	150.12000	20.87859
NTU - in situ (ntu)	17	17	0.00000	3.47000	0.46176	1.07400	0.88984
pH (in situ) (pH)	18	18	6.42000	8.88000	7.88944	8.29400	0.49234
Sample Depth (m)	18	18	0.00000	0.00000	0.00000	0.00000	0.00000
Sample Taken							
Secchi Depth (m)	18	18	4.00000	12.30000	7.75278	12.32000	2.23189
Temp (in situ) (Degrees Celcius)	18	18	3.31400	20.66400	12.49111	18.88080	5.45406
Organic / Inorganic							
DOC (mg/L)	18	18	1.65000	12.70000	2.72222	2.26800	2.51460
Physical Test							
Conductivity (µs/cm)	18	18	94.50000	112.00000	105.06111	111.00000	5.30063
Hardness (mg/L)	18	18	45.30000	54.60000	50.62222	53.56000	2.81039
NTU (ntu)	18	18	0.13000	0.75000	0.29556	0.71250	0.17694
pH (pH)	18	18	7.80000	7.99000	7.89889	7.98000	0.05950
TDS (mg/L)	18	18	62.00000	85.00000	71.27778	83.40000	7.00257
TSS (mg/L)	18	4	0.50000	1.50000	0.69722	1.50000	0.37826
Total Metals							
Aluminum (Al)-Total (mg/L)	18	18	0.01130	0.03580	0.01769	0.03956	0.00709
Antimony (Sb)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00011	0.00000
Arsenic (As)-Total (mg/L)	18	14	0.00005	0.00016	0.00011	0.00017	0.00004
Barium (Ba)-Total (mg/L)	18	18	0.00449	0.00613	0.00516	0.00661	0.00039
Beryllium (Be)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000

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Mount Polley

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	E303022 : QUL-120a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	18	0	0.00003	0.00003	0.00003	0.00025	0.00000
Boron (B)-Total (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	18	1	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	18	18	14.70000	18.80000	16.79444	18.42000	1.09999
Chromium (Cr)-Total (mg/L)	18	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	18	18	0.00051	0.00465	0.00085	0.00132	0.00096
Iron (Fe)-Total (mg/L)	18	3	0.01500	0.04000	0.01856	0.04440	0.00840
Lead (Pb)-Total (mg/L)	18	1	0.00003	0.00006	0.00003	0.00003	0.00001
Lithium (Li)-Total (mg/L)	18	3	0.00050	0.00110	0.00059	0.00100	0.00021
Magnesium (Mg)-Total (mg/L)	18	18	1.80000	2.13000	1.99056	2.07000	0.10647
Manganese (Mn)-Total (mg/L)	18	18	0.00063	0.00288	0.00137	0.00302	0.00060
Molybdenum (Mo)-Tota (mg/L)	18	18	0.00026	0.00038	0.00034	0.00045	0.00004
Nickel (Ni)-Total (mg/L)	18	0	0.00025	0.00025	0.00025	0.00047	0.00000
Potassium (K)-Total (mg/L)	18	18	0.42500	0.51000	0.47928	0.55520	0.02588
Selenium (Se)-Total (mg/L)	18	18	0.00008	0.00013	0.00011	0.00025	0.00001
Silicon (Si)-Total (mg/L)	18	18	0.82000	2.12000	1.64333	1.91400	0.32474
Silver (Ag)-Total (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	18	18	0.77800	0.99500	0.89894	1.01800	0.05472
Strontium (Sr)-Total (mg/L)	18	18	0.11100	0.14200	0.12844	0.13980	0.01061
Thallium (Tl)-Total (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	18	18	0.00013	0.00018	0.00015	0.00017	0.00001
Vanadium (V)-Total (mg/L)	18	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	18	1	0.00150	0.00310	0.00159	0.00150	0.00038

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	E303022 : QUL-120a-120m														
	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23	26-Jun-23
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.5	50.5	47.5	48.7	48.4	49.0	50.3	53.5	48.6	50.9	50.8	48.0	46.8	49.8	50.8
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0084	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.035	0.036	0.034	0.030	0.039	0.038	0.032	0.032	0.036	0.037	0.034	0.032	0.038	0.033	0.033
Nitrate (N) (mg/L)	0.140	0.138	0.143	0.139	0.154	0.137	0.143	0.145	0.148	0.131	0.137	0.143	0.147	0.142	0.145
Nitrate and Nitrite (mg/L)	0.140	0.138	0.143	0.140	0.154	0.137	0.143	0.145	0.148	0.131	0.137	0.143	0.147	0.142	0.145
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.21	6.61	6.55	6.25	6.79	6.71	6.61	6.54	6.82	6.32	6.28	6.14	6.69	6.31	5.76
Total Nitrogen (mg/L)	0.204	0.200	0.199	0.180	0.205	0.176	0.218	0.191	0.186	0.215	0.160	0.176	0.190	0.184	0.179
Total Phosphorus (mg/L)	0.0053	0.0057	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0025	0.0029	<0.0020	0.0022	<0.0020	0.0028
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0042	0.0060	0.0046	0.0052	0.0041	0.0081	0.0055	0.0053	0.0056	0.0064	0.0077	0.0051	0.0053	0.0060	0.0055
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	0.00011
Diss-Barium (Ba) (mg/L)	0.00490	0.00526	0.00522	0.00526	0.00497	0.00521	0.00461	0.00520	0.00468	0.00527	0.00528	0.00505	0.00531	0.00496	0.00506
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	16.6	18.2	17.6	18.5	18.2	17.8	18.1	17.4	18.3	17.8	18.3	17.3	18.6	17.6	18.3
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	<0.00050	0.00076	0.00091	0.00057	<0.00050	0.00053	<0.00050	0.00065	<0.00050	0.00052	<0.00050	0.00050	0.00059
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.08	2.09	2.05	2.17	2.08	2.10	1.90	2.09	1.98	2.18	2.11	2.10	2.06	2.05	2.07
Diss-Manganese (Mn) (mg/L)	0.00011	0.00012	<0.00010	<0.00010	<0.00010	0.00028	0.00011	<0.00010	0.00013	0.00042	0.00016	0.00018	0.00013	0.00034	0.00020
Diss-Molybdenum (Mo) (mg/L)	0.000377	0.000336	0.000328	0.000316	0.000320	0.000341	0.000390	0.000294	0.000328	0.000357	0.000312	0.000329	0.000329	0.000352	0.000339
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00115	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.502	0.506	0.506	0.514	0.502	0.522	0.466	0.506	0.484	0.520	0.488	0.527	0.498	0.482	0.530
Diss-Selenium (mg/L)	0.000094	0.000100	0.000106	0.000130	0.000095	0.000081	0.000136	0.000079	0.000074	0.000088	0.000077	0.000080	0.000098	0.000082	0.000088

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Anions and Nutrients		
Alkalinity (CaCO3) (mg/L)	50.2	51.6
Ammonia (as N) (mg/L)	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020
Floride (mg/L)	0.035	0.028
Nitrate (N) (mg/L)	0.146	0.147
Nitrate and Nitrite (mg/L)	0.146	0.147
Nitrite (N) (mg/L)	<0.0010	<0.0010
Sulphate (mg/L)	6.48	6.03
Total Nitrogen (mg/L)	0.182	0.184
Total Phosphorus (mg/L)	<0.0020	<0.0020
Dissolved Metals		
Aluminum (Al)-Diss (mg/L)	0.0080	0.0048
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00555	0.00452
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.0	18.6
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00059	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.12	1.93
Diss-Manganese (Mn) (mg/L)	0.00018	<0.00010
Diss-Molybdenum (Mo) (mg/L)	0.000324	0.000320
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.486	0.481
Diss-Selenium (mg/L)	0.000092	0.000102

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	19-Aug-19	**16-Jun-20**	**11-Aug-20**	**16-Sep-20**	**4-Nov-20**	**19-May-21**	**21-Jul-21**	**15-Sep-21**	**27-Oct-21**	**9-May-22**	**27-Jun-22**	**15-Aug-22**	**19-Oct-22**	**10-May-23**	**26-Jun-23**
Diss-Silicon (Si) (mg/L)	1.72	1.80	1.75	1.89	1.58	1.82	1.72	1.62	1.60	1.80	1.92	1.76	1.75	1.86	1.84
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.973	0.936	1.00	1.04	0.960	0.993	0.892	1.01	0.909	1.02	0.950	0.987	0.985	0.929	1.00
Diss-Strontium (Sr) (mg/L)	0.141	0.144	0.138	0.140	0.154	0.135	0.150	0.131	0.142	0.142	0.132	0.131	0.144	0.136	0.140
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000147	0.000151	0.000161	0.000163	0.000162	0.000157	0.000165	0.000151	0.000164	0.000164	0.000153	0.000153	0.000152	0.000162	0.000162
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	71	73	75	73	71	72	84	71	71	76	70	66	92	78	70
Field Tests															
Cond (in situ) (µs/cm)	111.5	118	110.8	111.9	111.5	110.4	131.4	114.4	110.6	111.7	111.1	108.5	110.1	112.6	108.6
NTU - in situ (ntu)	0.12	0.29	0	0.01	0.16	0.08	0.03	0.03	0.05	0	0.33	0	0	0.29	0.35
pH (in situ) (pH)	7.46	7.64	7.7	7.82	7.97	8.36	7.31	8.65	7.63	7.68	7.7	7.54	7.5	6.42	7.23
Sample Depth (m)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Sample Taken	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Temp (in situ) (Degrees Celcius)	3.855	3.886	3.829	3.818	3.891	3.885	3.921	3.812	3.886	3.278	3.915	3.829	3.87	3.36	3.816
Organic / Inorganic															
DOC (mg/L)	1.68	1.89	1.72	1.74	12.5	2.06	1.86	1.77	1.64	2.15	2.21	1.95	1.89	2.01	2.13
Physical Test															
Conductivity (µs/cm)	111	110	113	111	111	112	109	118	110	113	109	112	111	112	105
Hardness (mg/L)	50.1	54.0	52.5	55.1	54.0	53.1	53.0	52.0	53.8	53.4	54.4	51.8	54.9	52.4	54.2
NTU (ntu)	<0.10	0.28	0.16	<0.10	<0.10	0.19	<0.10	<0.10	<0.10	0.24	0.18	0.14	<0.10	0.14	0.36
pH (pH)	7.98	7.82	7.90	7.95	7.83	7.86	7.91	7.86	7.91	7.90	7.87	7.85	7.88	7.92	7.85
TDS (mg/L)	71	73	75	73	71	72	84	71	71	76	70	66	92	78	70
TSS (mg/L)	<1.0	<1.0	<1.1	<1.1	<1.0	<1.0	<1.0	<1.1	<1.0	3.9	1.2	<1.1	<1.0	<1.1	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0102	0.0134	0.0110	0.0102	0.0080	0.0192	0.0097	0.0099	0.0094	0.0268	0.0106	0.0096	0.0070	0.0107	0.0112
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00011	<0.00010	0.00012	0.00010	0.00012	0.00010	<0.00010	0.00012	0.00011	<0.00010	0.00011	0.00013	<0.00010	<0.00010
Barium (Ba)-Total (mg/L)	0.00470	0.00514	0.00502	0.00484	0.00509	0.00527	0.00521	0.00490	0.00497	0.00565	0.00520	0.00520	0.00504	0.00504	0.00540
Beryllium (Be)-Total (mg/L)	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.77	1.73
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.979	0.930
Diss-Strontium (Sr) (mg/L)	0.142	0.144
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000159	0.000171
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030
TDS (mg/L)	71	74
Field Tests		
Cond (in situ) (µs/cm)	111.2	110.6
NTU - in situ (ntu)	0.05	
pH (in situ) (pH)	7.51	7.36
Sample Depth (m)	120	120
Sample Taken		
Temp (in situ) (Degrees Celcius)	3.705	3.802
Organic / Inorganic		
DOC (mg/L)	1.96	1.90
Physical Test		
Conductivity (µs/cm)	112	112
Hardness (mg/L)	53.7	54.4
NTU (ntu)	<0.10	<0.10
pH (pH)	7.92	7.77
TDS (mg/L)	71	74
TSS (mg/L)	<1.0	<1.1
Total Metals		
Aluminum (Al)-Total (mg/L)	0.0084	0.0069
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00010
Barium (Ba)-Total (mg/L)	0.00500	0.00467
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010

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	E303022 : QUL-120a-120m														
	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23	26-Jun-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	15.5	17.7	17.9	19.8	16.6	17.5	18.4	19.5	18.2	17.7	18.7	17.7	17.4	17.3	17.0
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00067	0.00057	0.00067	0.00071	0.00097	0.00060	0.00051	0.00057	0.00056	0.00074	<0.00050	<0.00050	<0.00050	0.00053	0.00055
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.84	2.05	2.22	2.10	2.07	2.14	2.13	2.11	2.04	2.20	2.09	2.09	2.08	2.09	2.14
Manganese (Mn)-Total (mg/L)	0.00076	0.00114	0.00079	0.00064	0.00060	0.00189	0.00076	0.00064	0.00063	0.00216	0.00105	0.00075	0.00056	0.00117	0.00110
Molybdenum (Mo)-Tota (mg/L)	0.000305	0.000342	0.000311	0.000315	0.000320	0.000356	0.000352	0.000316	0.000346	0.000368	0.000348	0.000351	0.000314	0.000357	0.000356
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.445	0.502	0.507	0.444	0.483	0.507	0.503	0.511	0.497	0.522	0.488	0.505	0.498	0.483	0.498
Selenium (Se)-Total (mg/L)	0.000084	0.000094	0.000071	0.000088	0.000084	0.000092	0.000082	0.000057	0.000089	0.000123	0.000080	0.000093	0.000082	0.000120	0.000101
Silicon (Si)-Total (mg/L)	1.57	1.85	1.80	1.79	1.75	1.99	1.97	1.78	1.86	1.83	1.90	1.85	1.78	1.85	1.77
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.856	0.934	0.997	0.920	0.981	1.03	0.982	1.01	1.03	1.03	0.948	0.983	0.946	0.942	0.910
Strontium (Sr)-Total (mg/L)	0.124	0.136	0.142	0.150	0.146	0.135	0.140	0.143	0.140	0.141	0.136	0.144	0.147	0.134	0.145
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000151	0.000161	0.000164	0.000154	0.000162	0.000170	0.000162	0.000159	0.000177	0.000164	0.000162	0.000166	0.000166	0.000167	0.000149
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.2	17.6
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00051	<0.00050
Iron (Fe)-Total (mg/L)	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.05	1.96
Manganese (Mn)-Total (mg/L)	0.00059	0.00044
Molybdenum (Mo)-Tota (mg/L)	0.000347	0.000326
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.478	0.462
Selenium (Se)-Total (mg/L)	0.000098	0.000089
Silicon (Si)-Total (mg/L)	1.81	1.71
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.989	0.879
Strontium (Sr)-Total (mg/L)	0.145	0.134
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000171	0.000162
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030

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	E303022 : QUL-120a-120m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	17	17	46.80000	53.50000	49.64118	52.28000	1.67856
Ammonia (as N) (mg/L)	17	1	0.00250	0.00840	0.00285	0.00250	0.00143
Chloride (mg/L)	17	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	17	1	0.00050	0.00130	0.00055	0.00050	0.00019
Diss-Phosphorus (mg/L)	17	1	0.00100	0.00230	0.00108	0.00259	0.00032
Floride (mg/L)	17	17	0.02800	0.03900	0.03424	0.03700	0.00297
Nitrate (N) (mg/L)	17	17	0.13100	0.15400	0.14265	0.14980	0.00536
Nitrate and Nitrite (mg/L)	17	17	0.13100	0.15400	0.14271	0.14800	0.00532
Nitrite (N) (mg/L)	17	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	17	17	5.76000	6.82000	6.41765	6.65800	0.28958
Total Nitrogen (mg/L)	17	17	0.16000	0.21800	0.18994	0.20910	0.01516
Total Phosphorus (mg/L)	17	6	0.00100	0.00570	0.00191	0.04024	0.00152
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	17	17	0.00410	0.00810	0.00573	0.00659	0.00121
Diss-Antimony (Sb) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	17	3	0.00005	0.00014	0.00006	0.00012	0.00003
Diss-Barium (Ba) (mg/L)	17	17	0.00452	0.00555	0.00508	0.00543	0.00028
Diss-Beryllium (Be) (mg/L)	17	0	0.00005	0.00050	0.00016	0.00005	0.00020
Diss-Bismuth (Bi) (mg/L)	17	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	17	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	17	17	16.60000	18.60000	17.95294	18.80000	0.53047
Diss-Chromium (Cr) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	17	9	0.00025	0.00091	0.00045	0.00102	0.00021
Diss-Iron (Fe) (mg/L)	17	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	17	0	0.00003	0.00003	0.00003	0.00035	0.00000
Diss-Lithium (Li) (mg/L)	17	0	0.00050	0.00050	0.00050	0.00109	0.00000
Diss-Magnesium (Mg) (mg/L)	17	17	1.90000	2.18000	2.06824	2.12600	0.07350
Diss-Manganese (Mn) (mg/L)	17	12	0.00005	0.00042	0.00015	0.00033	0.00011
Diss-Molybdenum (Mo) (mg/L)	17	17	0.00029	0.00039	0.00033	0.00039	0.00002
Diss-Nickel (Ni) (mg/L)	17	1	0.00025	0.00115	0.00030	0.00025	0.00022
Diss-Potassium (K) (mg/L)	17	17	0.46600	0.53000	0.50118	0.51380	0.01810

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	E303022 : QUL-120a-120m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	17	17	0.00007	0.00014	0.00009	0.00025	0.00002
Diss-Silicon (Si) (mg/L)	17	17	1.58000	1.92000	1.76059	1.74900	0.09608
Diss-Silver (Ag) (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	17	17	0.89200	1.04000	0.97018	1.01900	0.04083
Diss-Strontium (Sr) (mg/L)	17	17	0.13100	0.15400	0.14035	0.14380	0.00625
Diss-Thallium (Tl) (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	17	17	0.00015	0.00017	0.00016	0.00017	0.00001
Diss-Vanadium (V) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	17	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	17	17	66.00000	92.00000	74.00000	79.70000	6.08276
Field Tests							
Cond (in situ) (µs/cm)	17	17	108.50000	131.40000	112.64118	115.42500	5.29670
NTU - in situ (ntu)	16	16	0.00000	0.35000	0.11188	2.36200	0.12978
pH (in situ) (pH)	17	17	6.42000	8.65000	7.61647	7.91500	0.47447
Sample Depth (m)	17	17	120.00000	120.00000	120.00000	120.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	17	17	3.27800	3.92100	3.78576	7.95635	0.18374
Organic / Inorganic							
DOC (mg/L)	17	17	1.64000	12.50000	2.53294	2.08800	2.57388
Physical Test							
Conductivity (µs/cm)	17	17	105.00000	118.00000	111.23529	113.00000	2.58673
Hardness (mg/L)	17	17	50.10000	55.10000	53.34118	55.58000	1.27870
NTU (ntu)	17	8	0.05000	0.36000	0.12588	1.30700	0.09747
pH (pH)	17	17	7.77000	7.98000	7.88118	7.97000	0.05098
TDS (mg/L)	17	17	66.00000	92.00000	74.00000	79.70000	6.08276
TSS (mg/L)	17	2	0.50000	3.90000	0.75882	1.50000	0.82637
Total Metals							
Aluminum (Al)-Total (mg/L)	17	17	0.00690	0.02680	0.01131	0.08375	0.00486
Antimony (Sb)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00011	0.00000
Arsenic (As)-Total (mg/L)	17	10	0.00005	0.00013	0.00009	0.00014	0.00003
Barium (Ba)-Total (mg/L)	17	17	0.00467	0.00565	0.00508	0.00708	0.00024
Beryllium (Be)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	17	0	0.00003	0.00003	0.00003	0.00025	0.00000

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	E303022 : QUL-120a-120m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	17	1	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	17	17	15.50000	19.80000	17.74706	18.30000	1.01496
Chromium (Cr)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	17	13	0.00025	0.00097	0.00054	0.00205	0.00020
Iron (Fe)-Total (mg/L)	17	1	0.01500	0.03000	0.01588	0.04810	0.00364
Lead (Pb)-Total (mg/L)	17	0	0.00003	0.00003	0.00003	0.00068	0.00000
Lithium (Li)-Total (mg/L)	17	6	0.00050	0.00110	0.00068	0.00119	0.00026
Magnesium (Mg)-Total (mg/L)	17	17	1.84000	2.22000	2.08235	2.13600	0.08686
Manganese (Mn)-Total (mg/L)	17	17	0.00044	0.00216	0.00092	0.00254	0.00047
Molybdenum (Mo)-Tota (mg/L)	17	17	0.00031	0.00037	0.00034	0.00042	0.00002
Nickel (Ni)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Potassium (K)-Total (mg/L)	17	17	0.44400	0.52200	0.49018	0.56180	0.02226
Selenium (Se)-Total (mg/L)	17	17	0.00006	0.00012	0.00009	0.00025	0.00002
Silicon (Si)-Total (mg/L)	17	17	1.57000	1.99000	1.81529	1.85900	0.09631
Silver (Ag)-Total (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	17	17	0.85600	1.03000	0.96276	1.03550	0.05217
Strontium (Sr)-Total (mg/L)	17	17	0.12400	0.15000	0.14012	0.14480	0.00637
Thallium (Tl)-Total (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	17	17	0.00015	0.00018	0.00016	0.00018	0.00001
Vanadium (V)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	17	0	0.00150	0.00150	0.00150	0.00150	0.00000

Grid Format Report : QUL-120a-140m Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-140m														
	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23	26-Jun-23
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.5	51.2	47.5	49.4	49.0	48.7	47.9	52.7	49.2	50.9	50.7	48.1	46.9	50.2	51.1
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0103	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	0.0024	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.035	0.036	0.034	0.036	0.039	0.038	0.038	0.038	0.038	0.037	0.035	0.033	0.038	0.033	0.035
Nitrate (N) (mg/L)	0.140	0.139	0.142	0.136	0.154	0.135	0.143	0.148	0.150	0.131	0.138	0.142	0.147	0.142	0.146
Nitrate and Nitrite (mg/L)	0.140	0.140	0.142	0.136	0.154	0.135	0.143	0.148	0.150	0.131	0.138	0.142	0.147	0.142	0.146
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.19	6.60	6.53	6.43	6.79	6.69	6.46	6.61	6.82	6.35	6.31	6.14	6.68	6.68	5.76
Total Nitrogen (mg/L)	0.211	0.204	0.205	0.209	0.209	0.177	0.179	0.194	0.179	0.215	0.184	0.178	0.191	0.188	0.176
Total Phosphorus (mg/L)	0.0063	0.0061	<0.0020	<0.0020	<0.0020	0.0022	0.0023	<0.0020	<0.0020	0.0025	0.0030	<0.0020	<0.0020	<0.0020	0.0027
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0043	0.0063	0.0045	0.0047	0.0042	0.0080	0.0050	0.0072	0.0057	0.0060	0.0063	0.0052	0.0059	0.0051	0.0064
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	0.00011
Diss-Barium (Ba) (mg/L)	0.00539	0.00538	0.00516	0.00560	0.00491	0.00512	0.00480	0.00502	0.00464	0.00530	0.00524	0.00507	0.00538	0.00505	0.00512
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.9	18.3	18.0	18.7	18.4	17.8	18.6	18.8	18.6	17.6	18.4	17.5	17.8	17.6	18.7
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	<0.00050	0.00056	0.00124	0.00061	<0.00050	<0.00050	0.00051	0.00063	<0.00050	0.00056	<0.00050	<0.00050	0.00092
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000138	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.13	2.13	2.06	2.23	2.06	2.13	1.97	2.02	2.01	2.19	2.14	2.14	2.12	2.06	2.08
Diss-Manganese (Mn) (mg/L)	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	0.00026	0.00010	0.00016	<0.00010	0.00042	0.00012	0.00012	0.00014	0.00034	0.00024
Diss-Molybdenum (Mo) (mg/L)	0.000338	0.000336	0.000337	0.000357	0.000312	0.000344	0.000349	0.000298	0.000334	0.000361	0.000326	0.000360	0.000338	0.000341	0.000344
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.508	0.510	0.513	0.516	0.509	0.522	0.476	0.495	0.493	0.530	0.499	0.528	0.506	0.491	0.549
Diss-Selenium (mg/L)	0.000082	0.000128	0.000110	0.000107	0.000088	0.000113	0.000092	0.000098	0.000072	0.000118	0.000091	0.000070	0.000101	0.000120	0.000082

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Anions and Nutrients		
Alkalinity (CaCO3) (mg/L)	50.5	51.0
Ammonia (as N) (mg/L)	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020
Floride (mg/L)	0.035	0.028
Nitrate (N) (mg/L)	0.146	0.148
Nitrate and Nitrite (mg/L)	0.146	0.148
Nitrite (N) (mg/L)	<0.0010	<0.0010
Sulphate (mg/L)	6.44	6.02
Total Nitrogen (mg/L)	0.186	0.184
Total Phosphorus (mg/L)	<0.0020	<0.0020
Dissolved Metals		
Aluminum (Al)-Diss (mg/L)	0.0076	0.0055
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00494	0.00470
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.4	18.4
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00055	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.09	1.96
Diss-Manganese (Mn) (mg/L)	0.00014	0.00010
Diss-Molybdenum (Mo) (mg/L)	0.000322	0.000318
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.478	0.497
Diss-Selenium (mg/L)	0.000097	0.000083

Grid Format Report : QUL-120a-140m Quesnel Lake Beyond

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Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-140m														
	19-Aug-19	**16-Jun-20**	**11-Aug-20**	**16-Sep-20**	**4-Nov-20**	**19-May-21**	**21-Jul-21**	**15-Sep-21**	**27-Oct-21**	**9-May-22**	**27-Jun-22**	**15-Aug-22**	**19-Oct-22**	**10-May-23**	**26-Jun-23**
Diss-Silicon (Si) (mg/L)	1.77	1.82	1.76	1.89	1.62	1.83	1.76	1.76	1.60	1.87	1.90	1.80	1.80	1.81	1.85
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.982	0.945	0.997	1.06	0.959	1.01	0.909	0.966	0.919	1.02	0.961	1.00	1.00	0.930	1.02
Diss-Strontium (Sr) (mg/L)	0.139	0.139	0.141	0.138	0.151	0.138	0.147	0.134	0.142	0.139	0.138	0.134	0.142	0.135	0.139
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000156	0.000151	0.000159	0.000166	0.000162	0.000153	0.000164	0.000162	0.000163	0.000153	0.000156	0.000158	0.000156	0.000159	0.000169
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	74	69	70	76	72	73	88	82	69	80	72	76	89	68	66
Field Tests															
Cond (in situ) (µs/cm)	111.7	118.1	110.7	112	111.7	110.8	131.6	114.3	110.6	112.4	111.2	108.7	110.3	112.6	108.8
NTU - in situ (ntu)	0.09	0.24	0	0.05	0.13	0.06	0	0.06	0.05	0	0.44	0	0	0.32	0.33
pH (in situ) (pH)	7.46	7.65	7.68	7.79	7.95	8.39	7.31	8.73	7.62	7.67	7.67	7.53	7.42	6.42	7.24
Sample Depth (m)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Sample Taken	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Temp (in situ) (Degrees Celcius)	3.791	3.857	3.825	3.791	3.842	3.852	3.867	3.751	3.886	3.286	3.868	3.799	3.841	3.361	3.788
Organic / Inorganic															
DOC (mg/L)	1.61	2.00	1.96	1.79	12.8	2.05	2.21	1.86	1.73	2.27	2.18	1.87	1.87	1.93	2.08
Physical Test															
Conductivity (µs/cm)	110	111	111	111	111	112	110	118	111	112	109	112	112	112	108
Hardness (mg/L)	53.4	54.4	53.4	55.8	54.4	53.2	54.6	55.3	54.7	53.0	54.8	52.5	53.2	52.4	55.2
NTU (ntu)	<0.10	0.22	0.11	<0.10	<0.10	0.26	<0.10	<0.10	<0.10	0.24	0.26	0.14	<0.10	0.14	0.22
pH (pH)	7.97	7.81	7.82	7.94	7.84	7.87	7.87	7.86	7.93	7.90	7.87	7.85	7.87	7.86	7.85
TDS (mg/L)	74	69	70	76	72	73	88	82	69	80	72	76	89	68	66
TSS (mg/L)	<1.0	<1.0	<1.1	<1.0	<1.0	<1.1	<1.0	<1.0	<1.0	3.8	<1.0	<1.1	<1.0	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0073	0.0144	0.0112	0.0077	0.0088	0.0162	0.0099	0.0084	0.0081	0.0180	0.0114	0.0097	0.0074	0.0123	0.0106
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00011	0.00010	<0.00010	<0.00010	0.00012	0.00014	0.00011	0.00012	0.00011	<0.00010	0.00011	0.00011	0.00012	0.00011
Barium (Ba)-Total (mg/L)	0.00446	0.00506	0.00496	0.00513	0.00504	0.00503	0.00550	0.00471	0.00518	0.00548	0.00549	0.00508	0.00521	0.00520	0.00546
Beryllium (Be)-Total (mg/L)	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.77	1.76
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.972	0.938
Diss-Strontium (Sr) (mg/L)	0.145	0.145
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000166	0.000170
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030
TDS (mg/L)	72	63
Field Tests		
Cond (in situ) (µs/cm)	111.1	110.8
NTU - in situ (ntu)	0.08	
pH (in situ) (pH)	7.5	7.21
Sample Depth (m)	140	140
Sample Taken		
Temp (in situ) (Degrees Celcius)	3.683	3.787
Organic / Inorganic		
DOC (mg/L)	1.91	1.94
Physical Test		
Conductivity (µs/cm)	112	112
Hardness (mg/L)	52.0	54.0
NTU (ntu)	<0.10	<0.10
pH (pH)	7.91	7.77
TDS (mg/L)	72	63
TSS (mg/L)	<1.0	<1.0
Total Metals		
Aluminum (Al)-Total (mg/L)	0.0080	0.0075
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00011
Barium (Ba)-Total (mg/L)	0.00491	0.00483
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010

Grid Format Report : QUL-120a-140m Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

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	E303022 : QUL-120a-140m														
	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23	26-Jun-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	0.0000071	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.0	17.6	18.0	17.8	17.6	16.6	17.8	19.6	18.0	17.2	18.3	16.8	17.2	17.1	17.5
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	<0.00050	0.00080	0.00066	0.00054	0.00057	0.00056	0.00052	0.00060	0.00059	0.00068	<0.00050	<0.00050	<0.00050	0.00052	0.00053
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	1.95	2.03	2.21	2.10	2.08	2.03	1.99	2.10	2.01	2.18	2.15	2.07	2.13	2.16	2.16
Manganese (Mn)-Total (mg/L)	0.00074	0.00118	0.00074	0.00064	0.00066	0.00161	0.00100	0.00069	0.00065	0.00192	0.00124	0.00080	0.00068	0.00121	0.00104
Molybdenum (Mo)-Tota (mg/L)	0.000306	0.000337	0.000341	0.000321	0.000316	0.000351	0.000344	0.000356	0.000340	0.000340	0.000324	0.000344	0.000325	0.000372	0.000338
Nickel (Ni)-Total (mg/L)	<0.00050	0.00068	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00053	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.473	0.498	0.505	0.475	0.481	0.472	0.515	0.498	0.503	0.510	0.491	0.501	0.511	0.492	0.499
Selenium (Se)-Total (mg/L)	0.000070	0.000108	0.000105	0.000117	0.000125	0.000114	0.000109	0.000078	0.000092	0.000106	0.000092	0.000136	0.000071	0.000075	0.000104
Silicon (Si)-Total (mg/L)	1.67	1.83	1.83	1.68	1.73	2.02	1.85	1.78	1.80	1.88	1.95	1.93	1.84	1.89	1.75
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.922	0.929	0.986	0.932	0.961	0.978	0.984	0.987	0.941	1.02	0.963	0.974	0.970	0.971	0.918
Strontium (Sr)-Total (mg/L)	0.131	0.135	0.140	0.134	0.135	0.128	0.138	0.147	0.141	0.138	0.136	0.138	0.146	0.137	0.144
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	0.00023	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000164	0.000160	0.000165	0.000162	0.000159	0.000170	0.000167	0.000162	0.000175	0.000169	0.000161	0.000158	0.000161	0.000173	0.000152
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.7	18.0
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00052	<0.00050
Iron (Fe)-Total (mg/L)	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.11	2.06
Manganese (Mn)-Total (mg/L)	0.00051	0.00044
Molybdenum (Mo)-Tota (mg/L)	0.000339	0.000318
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.474	0.479
Selenium (Se)-Total (mg/L)	0.000102	0.000080
Silicon (Si)-Total (mg/L)	1.83	1.77
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.979	0.928
Strontium (Sr)-Total (mg/L)	0.139	0.136
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000170	0.000167
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030

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	E303022 : QUL-120a-140m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	17	17	46.90000	52.70000	49.61765	51.34000	1.57846
Ammonia (as N) (mg/L)	17	1	0.00250	0.01030	0.00296	0.00250	0.00189
Chloride (mg/L)	17	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	17	1	0.00050	0.00140	0.00055	0.00130	0.00022
Diss-Phosphorus (mg/L)	17	2	0.00100	0.00240	0.00115	0.00288	0.00042
Floride (mg/L)	17	17	0.02800	0.03900	0.03565	0.03560	0.00271
Nitrate (N) (mg/L)	17	17	0.13100	0.15400	0.14276	0.14780	0.00593
Nitrate and Nitrite (mg/L)	17	17	0.13100	0.15400	0.14282	0.14780	0.00590
Nitrite (N) (mg/L)	17	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	17	17	5.76000	6.82000	6.44118	6.62000	0.28766
Total Nitrogen (mg/L)	17	17	0.17600	0.21500	0.19229	0.19320	0.01365
Total Phosphorus (mg/L)	17	7	0.00100	0.00630	0.00206	0.05020	0.00172
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	17	17	0.00420	0.00800	0.00576	0.00726	0.00112
Diss-Antimony (Sb) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	17	5	0.00005	0.00014	0.00007	0.00009	0.00003
Diss-Barium (Ba) (mg/L)	17	17	0.00464	0.00560	0.00511	0.00545	0.00026
Diss-Beryllium (Be) (mg/L)	17	0	0.00005	0.00050	0.00016	0.00005	0.00020
Diss-Bismuth (Bi) (mg/L)	17	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Boron (B) (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	17	0	0.00000	0.00000	0.00000	0.00000	0.00000
Diss-Calcium (Ca) (mg/L)	17	17	17.40000	18.80000	18.14706	18.40000	0.47185
Diss-Chromium (Cr) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	17	8	0.00025	0.00124	0.00046	0.00082	0.00028
Diss-Iron (Fe) (mg/L)	17	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	17	1	0.00003	0.00014	0.00003	0.00027	0.00003
Diss-Lithium (Li) (mg/L)	17	1	0.00050	0.00100	0.00053	0.00050	0.00012
Diss-Magnesium (Mg) (mg/L)	17	17	1.96000	2.23000	2.08941	2.15600	0.07318
Diss-Manganese (Mn) (mg/L)	17	12	0.00005	0.00042	0.00015	0.00037	0.00011
Diss-Molybdenum (Mo) (mg/L)	17	17	0.00030	0.00036	0.00034	0.00032	0.00002
Diss-Nickel (Ni) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	17	17	0.47600	0.54900	0.50706	0.54940	0.01880

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	17	17	0.00007	0.00013	0.00010	0.00009	0.00002
Diss-Silicon (Si) (mg/L)	17	17	1.60000	1.90000	1.78647	1.72000	0.08077
Diss-Silver (Ag) (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	17	17	0.90900	1.06000	0.97576	1.00160	0.04077
Diss-Strontium (Sr) (mg/L)	17	17	0.13400	0.15100	0.14035	0.14520	0.00461
Diss-Thallium (Tl) (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	17	1	0.00005	0.00013	0.00005	0.00005	0.00002
Diss-Titanium (Ti) (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	17	17	0.00015	0.00017	0.00016	0.00017	0.00001
Diss-Vanadium (V) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Zinc (Zn) (mg/L)	17	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	17	17	63.00000	89.00000	74.05882	81.00000	7.19783
Field Tests							
Cond (in situ) (µs/cm)	17	17	108.70000	131.60000	112.78824	114.07000	5.29621
NTU - in situ (ntu)	16	16	0.00000	0.44000	0.11563	1.63000	0.13957
pH (in situ) (pH)	17	17	6.42000	8.73000	7.60235	7.92700	0.49394
Sample Depth (m)	17	17	140.00000	140.00000	140.00000	140.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	17	17	3.28600	3.88600	3.75735	6.62940	0.17123
Organic / Inorganic							
DOC (mg/L)	17	17	1.61000	12.80000	2.59176	1.75400	2.63612
Physical Test							
Conductivity (µs/cm)	17	17	108.00000	118.00000	111.41176	111.80000	2.06334
Hardness (mg/L)	17	17	52.00000	55.80000	53.90000	54.54000	1.11299
NTU (ntu)	17	8	0.05000	0.26000	0.12000	0.43800	0.08610
pH (pH)	17	17	7.77000	7.97000	7.87000	7.95600	0.04937
TDS (mg/L)	17	17	63.00000	89.00000	74.05882	81.00000	7.19783
TSS (mg/L)	17	1	0.50000	3.80000	0.70294	0.98000	0.79833
Total Metals							
Aluminum (Al)-Total (mg/L)	17	17	0.00730	0.01800	0.01041	0.03384	0.00321
Antimony (Sb)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00008	0.00000
Arsenic (As)-Total (mg/L)	17	12	0.00005	0.00014	0.00010	0.00014	0.00003
Barium (Ba)-Total (mg/L)	17	17	0.00446	0.00550	0.00510	0.00574	0.00029
Beryllium (Be)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	17	0	0.00003	0.00003	0.00003	0.00003	0.00000

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	17	1	0.00000	0.00001	0.00000	0.00000	0.00000
Calcium (Ca)-Total (mg/L)	17	17	16.60000	19.60000	17.63529	18.10000	0.69006
Chromium (Cr)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	17	12	0.00025	0.00080	0.00049	0.00177	0.00017
Iron (Fe)-Total (mg/L)	17	0	0.01500	0.01500	0.01500	0.02940	0.00000
Lead (Pb)-Total (mg/L)	17	0	0.00003	0.00003	0.00003	0.00034	0.00000
Lithium (Li)-Total (mg/L)	17	5	0.00050	0.00110	0.00065	0.00086	0.00025
Magnesium (Mg)-Total (mg/L)	17	17	1.95000	2.21000	2.08941	2.17600	0.07189
Manganese (Mn)-Total (mg/L)	17	17	0.00044	0.00192	0.00093	0.00158	0.00040
Molybdenum (Mo)-Tota (mg/L)	17	17	0.00031	0.00037	0.00034	0.00033	0.00002
Nickel (Ni)-Total (mg/L)	17	2	0.00025	0.00068	0.00029	0.00025	0.00012
Potassium (K)-Total (mg/L)	17	17	0.47200	0.51500	0.49276	0.54500	0.01449
Selenium (Se)-Total (mg/L)	17	17	0.00007	0.00014	0.00010	0.00010	0.00002
Silicon (Si)-Total (mg/L)	17	17	1.67000	2.02000	1.82529	1.81000	0.09295
Silver (Ag)-Total (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	17	17	0.91800	1.02000	0.96135	1.01360	0.02850
Strontium (Sr)-Total (mg/L)	17	17	0.12800	0.14700	0.13782	0.14380	0.00491
Thallium (Tl)-Total (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	17	1	0.00005	0.00023	0.00006	0.00011	0.00004
Titanium (Ti)-Total (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	17	17	0.00015	0.00018	0.00016	0.00018	0.00001
Vanadium (V)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Zinc (Zn)-Total (mg/L)	17	0	0.00150	0.00150	0.00150	0.00150	0.00000

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	E303022 : QUL-120a	
	19-Jun-19	10-May-23
Anions and Nutrients		
Alkalinity (CaCO3) (mg/L)	49.2	50.0
Ammonia (as N) (mg/L)	0.0056	<0.0050
Chloride (mg/L)	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020
Floride (mg/L)	0.045	0.033
Nitrate (N) (mg/L)	0.143	0.143
Nitrate and Nitrite (mg/L)	0.143	0.143
Nitrite (N) (mg/L)	<0.0010	<0.0010
Sulphate (mg/L)	6.76	6.70
Total Nitrogen (mg/L)	0.206	0.184
Total Phosphorus (mg/L)	0.0075	<0.0020
Dissolved Metals		
Aluminum (Al)-Diss (mg/L)	0.0050	0.0044
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00511	0.00493
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.7	17.4
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.13	1.99
Diss-Manganese (Mn) (mg/L)	<0.00010	0.00034
Diss-Molybdenum (Mo) (mg/L)	0.000351	0.000356
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.516	0.468
Diss-Selenium (mg/L)	0.000127	0.000081

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	E303022 : QUL-120a	
	19-Jun-19	10-May-23
Diss-Silicon (Si) (mg/L)	1.76	1.76
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.02	0.911
Diss-Strontium (Sr) (mg/L)	0.135	0.136
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.0100
Diss-Uranium (U) (mg/L)	0.000169	0.000158
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030
TDS (mg/L)	80	79
Field Tests		
Cond (in situ) (µs/cm)	113.7	112.7
NTU - in situ (ntu)	0.97	0.28
pH (in situ) (pH)	7.73	6.42
Sample Depth (m)	190	190
Sample Taken	Yes	Yes
Temp (in situ) (Degrees Celcius)	4.712	3.366
Organic / Inorganic		
DOC (mg/L)	1.59	2.00
Physical Test		
Conductivity (µs/cm)	111	111
Hardness (mg/L)	55.4	51.6
NTU (ntu)	<0.10	0.14
pH (pH)	8.00	7.90
TDS (mg/L)	80	79
TSS (mg/L)	1.1	<1.0
Total Metals		
Aluminum (Al)-Total (mg/L)	0.0091	0.0111
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00010	0.00011
Barium (Ba)-Total (mg/L)	0.00483	0.00521
Beryllium (Be)-Total (mg/L)	<0.00010	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010

Grid Format Report : QUL-120a-190m - Quesnel Lake Beyond

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Mining Corporation

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	19-Jun-19	10-May-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.6	17.4
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00061	0.00053
Iron (Fe)-Total (mg/L)	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	1.86	2.14
Manganese (Mn)-Total (mg/L)	0.00093	0.00126
Molybdenum (Mo)-Tota (mg/L)	0.000361	0.000342
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.432	0.499
Selenium (Se)-Total (mg/L)	0.000105	0.000082
Silicon (Si)-Total (mg/L)	1.79	1.82
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.873	0.965
Strontium (Sr)-Total (mg/L)	0.135	0.133
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.0100
Uranium (U)-Total (mg/L)	0.000157	0.000173
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030

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	E303022 : QUL-120a-190m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	2	2	49.20000	50.00000	49.60000	53.17000	0.56569
Ammonia (as N) (mg/L)	2	1	0.00250	0.00560	0.00405	0.00250	0.00219
Chloride (mg/L)	2	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	2	0	0.00050	0.00050	0.00050	0.00191	0.00000
Diss-Phosphorus (mg/L)	2	0	0.00100	0.00100	0.00100	0.00364	0.00000
Floride (mg/L)	2	2	0.03300	0.04500	0.03900	0.03500	0.00849
Nitrate (N) (mg/L)	2	2	0.14300	0.14300	0.14300	0.15130	0.00000
Nitrate and Nitrite (mg/L)	2	2	0.14300	0.14300	0.14300	0.15150	0.00000
Nitrite (N) (mg/L)	2	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	2	2	6.70000	6.76000	6.73000	6.47600	0.04243
Total Nitrogen (mg/L)	2	2	0.18400	0.20600	0.19500	0.19500	0.01556
Total Phosphorus (mg/L)	2	1	0.00100	0.00750	0.00425	0.00360	0.00460
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	2	2	0.00440	0.00500	0.00470	0.00692	0.00042
Diss-Antimony (Sb) (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	2	0	0.00005	0.00005	0.00005	0.00011	0.00000
Diss-Barium (Ba) (mg/L)	2	2	0.00493	0.00511	0.00502	0.00538	0.00013
Diss-Beryllium (Be) (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Bismuth (Bi) (mg/L)	2	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	2	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	2	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	2	2	17.40000	18.70000	18.05000	18.96000	0.91924
Diss-Chromium (Cr) (mg/L)	2	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	2	0	0.00025	0.00025	0.00025	0.00118	0.00000
Diss-Iron (Fe) (mg/L)	2	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	2	0	0.00003	0.00003	0.00003	0.00018	0.00000
Diss-Lithium (Li) (mg/L)	2	0	0.00050	0.00050	0.00050	0.00101	0.00000
Diss-Magnesium (Mg) (mg/L)	2	2	1.99000	2.13000	2.06000	2.12300	0.09899
Diss-Manganese (Mn) (mg/L)	2	1	0.00005	0.00034	0.00020	0.00086	0.00021
Diss-Molybdenum (Mo) (mg/L)	2	2	0.00035	0.00036	0.00035	0.00038	0.00000
Diss-Nickel (Ni) (mg/L)	2	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	2	2	0.46800	0.51600	0.49200	0.51030	0.03394

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Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-190m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	2	2	0.00008	0.00013	0.00010	0.00025	0.00003
Diss-Silicon (Si) (mg/L)	2	2	1.76000	1.76000	1.76000	1.83000	0.00000
Diss-Silver (Ag) (mg/L)	2	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	2	2	0.91100	1.02000	0.96550	0.97280	0.07707
Diss-Strontium (Sr) (mg/L)	2	2	0.13500	0.13600	0.13550	0.14230	0.00071
Diss-Thallium (Tl) (mg/L)	2	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	2	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	2	2	0.00016	0.00017	0.00016	0.00016	0.00001
Diss-Vanadium (V) (mg/L)	2	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	2	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	2	2	79.00000	80.00000	79.50000	76.30000	0.70711
Field Tests							
Cond (in situ) (µs/cm)	2	2	112.70000	113.70000	113.20000	116.12000	0.70711
NTU - in situ (ntu)	2	2	0.28000	0.97000	0.62500	0.37700	0.48790
pH (in situ) (pH)	2	2	6.42000	7.73000	7.07500	7.56000	0.92631
Sample Depth (m)	2	2	190.00000	190.00000	190.00000	190.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	2	2	3.36600	4.71200	4.03900	4.75740	0.95177
Organic / Inorganic							
DOC (mg/L)	2	2	1.59000	2.00000	1.79500	2.30100	0.28991
Physical Test							
Conductivity (µs/cm)	2	2	111.00000	111.00000	111.00000	114.00000	0.00000
Hardness (mg/L)	2	2	51.60000	55.40000	53.50000	55.73000	2.68701
NTU (ntu)	2	1	0.05000	0.14000	0.09500	0.69500	0.06364
pH (pH)	2	2	7.90000	8.00000	7.95000	7.99000	0.07071
TDS (mg/L)	2	2	79.00000	80.00000	79.50000	76.30000	0.70711
TSS (mg/L)	2	1	0.50000	1.10000	0.80000	1.50000	0.42426
Total Metals							
Aluminum (Al)-Total (mg/L)	2	2	0.00910	0.01110	0.01010	0.05355	0.00141
Antimony (Sb)-Total (mg/L)	2	0	0.00005	0.00005	0.00005	0.00011	0.00000
Arsenic (As)-Total (mg/L)	2	2	0.00010	0.00011	0.00011	0.00014	0.00001
Barium (Ba)-Total (mg/L)	2	2	0.00483	0.00521	0.00502	0.00631	0.00027
Beryllium (Be)-Total (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	2	0	0.00003	0.00003	0.00003	0.00025	0.00000

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	E303022 : QUL-120a-190m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	2	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	2	0	0.00000	0.00000	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	2	2	16.60000	17.40000	17.00000	18.60000	0.56569
Chromium (Cr)-Total (mg/L)	2	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	2	2	0.00053	0.00061	0.00057	0.00133	0.00006
Iron (Fe)-Total (mg/L)	2	0	0.01500	0.01500	0.01500	0.03850	0.00000
Lead (Pb)-Total (mg/L)	2	0	0.00003	0.00003	0.00003	0.00022	0.00000
Lithium (Li)-Total (mg/L)	2	1	0.00050	0.00100	0.00075	0.00108	0.00035
Magnesium (Mg)-Total (mg/L)	2	2	1.86000	2.14000	2.00000	2.10300	0.19799
Manganese (Mn)-Total (mg/L)	2	2	0.00093	0.00126	0.00110	0.00274	0.00023
Molybdenum (Mo)-Tota (mg/L)	2	2	0.00034	0.00036	0.00035	0.00042	0.00001
Nickel (Ni)-Total (mg/L)	2	0	0.00025	0.00025	0.00025	0.00025	0.00000
Potassium (K)-Total (mg/L)	2	2	0.43200	0.49900	0.46550	0.51630	0.04738
Selenium (Se)-Total (mg/L)	2	2	0.00008	0.00011	0.00009	0.00025	0.00002
Silicon (Si)-Total (mg/L)	2	2	1.79000	1.82000	1.80500	1.87600	0.02121
Silver (Ag)-Total (mg/L)	2	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	2	2	0.87300	0.96500	0.91900	1.03900	0.06505
Strontium (Sr)-Total (mg/L)	2	2	0.13300	0.13500	0.13400	0.14490	0.00141
Thallium (Tl)-Total (mg/L)	2	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	2	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	2	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	2	2	0.00016	0.00017	0.00017	0.00018	0.00001
Vanadium (V)-Total (mg/L)	2	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	2	0	0.00150	0.00150	0.00150	0.00150	0.00000

Grid Format Report : QUL-120a-40m - Quesnel Lake Beyond

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	E303022 : QUL-120a-40m														
	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23	26-Jun-23
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	47.9	49.5	47.7	49.2	47.3	48.3	50.6	52.6	47.1	50.5	50.3	47.1	46.2	50.8	50.5
Ammonia (as N) (mg/L)	0.0050	0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.035	0.038	0.036	0.035	0.036	0.036	0.032	0.035	0.036	0.034	0.034	0.033	0.038	0.035	0.032
Nitrate (N) (mg/L)	0.138	0.134	0.141	0.142	0.103	0.140	0.144	0.150	0.102	0.134	0.138	0.139	0.146	0.143	0.146
Nitrate and Nitrite (mg/L)	0.138	0.134	0.141	0.143	0.104	0.140	0.144	0.150	0.102	0.134	0.138	0.139	0.146	0.143	0.146
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.41	6.50	6.48	6.30	6.72	6.66	6.71	6.67	6.89	6.40	6.26	6.12	6.92	6.29	5.72
Total Nitrogen (mg/L)	0.218	0.210	0.204	0.184	0.173	0.182	0.185	0.198	0.147	0.212	0.181	0.178	0.198	0.194	0.183
Total Phosphorus (mg/L)	0.0069	0.0062	<0.0020	<0.0020	0.0023	<0.0020	0.0024	<0.0020	0.0026	0.0070	0.0029	<0.0020	<0.0020	0.0022	0.0026
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0053	0.0077	0.0059	0.0058	0.0074	0.0095	0.0064	0.0086	0.0068	0.0055	0.0068	0.0066	0.0063	0.0054	0.0066
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	0.00014	<0.00010	0.00010
Diss-Barium (Ba) (mg/L)	0.00491	0.00542	0.00535	0.00564	0.00476	0.00518	0.00484	0.00505	0.00502	0.00516	0.00520	0.00516	0.00558	0.00488	0.00512
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000060	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.9	17.9	17.6	18.4	18.3	18.3	18.4	18.1	18.6	17.1	18.4	17.8	15.9	17.0	17.5
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	0.00057	<0.00050	0.00074	0.00094	0.00073	0.00053	0.00051	0.00058	0.00063	<0.00050	0.00062	0.00052	<0.00050	0.00055
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.11	2.10	2.07	2.20	2.03	2.10	1.91	2.02	1.98	2.14	2.08	2.10	2.10	2.02	2.08
Diss-Manganese (Mn) (mg/L)	0.00016	0.00021	0.00012	0.00024	0.00037	0.00036	0.00021	0.00017	0.00044	0.00030	0.00011	0.00018	0.00039	0.00036	0.00019
Diss-Molybdenum (Mo) (mg/L)	0.000444	0.000365	0.000327	0.000396	0.000315	0.000353	0.000395	0.000348	0.000371	0.000350	0.000306	0.000359	0.000450	0.000344	0.000350
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.494	0.503	0.513	0.533	0.508	0.537	0.477	0.482	0.498	0.506	0.486	0.529	0.507	0.470	0.518
Diss-Selenium (mg/L)	0.000102	0.000102	0.000100	0.000106	0.000084	0.000118	0.000156	0.000090	0.000114	0.000112	0.000073	0.000093	0.000109	0.000077	0.000094

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Anions and Nutrients		
Alkalinity (CaCO3) (mg/L)	50.0	51.0
Ammonia (as N) (mg/L)	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020
Floride (mg/L)	0.035	0.028
Nitrate (N) (mg/L)	0.142	0.150
Nitrate and Nitrite (mg/L)	0.142	0.150
Nitrite (N) (mg/L)	<0.0010	<0.0010
Sulphate (mg/L)	6.78	6.00
Total Nitrogen (mg/L)	0.186	0.194
Total Phosphorus (mg/L)	0.0022	0.0024
Dissolved Metals		
Aluminum (Al)-Diss (mg/L)	0.0061	0.0056
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00510	0.00458
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	0.0000057	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.0	19.2
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00052	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	0.0010
Diss-Magnesium (Mg) (mg/L)	2.08	1.91
Diss-Manganese (Mn) (mg/L)	0.00013	0.00013
Diss-Molybdenum (Mo) (mg/L)	0.000444	0.000348
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.489	0.490
Diss-Selenium (mg/L)	0.000122	0.000092

Grid Format Report : QUL-120a-40m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

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Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-40m														
	19-Aug-19	**16-Jun-20**	**11-Aug-20**	**16-Sep-20**	**4-Nov-20**	**19-May-21**	**21-Jul-21**	**15-Sep-21**	**27-Oct-21**	**9-May-22**	**27-Jun-22**	**15-Aug-22**	**19-Oct-22**	**10-May-23**	**26-Jun-23**
Diss-Silicon (Si) (mg/L)	1.77	1.83	1.79	1.87	1.54	1.83	1.75	1.69	1.50	1.75	1.92	1.84	1.84	1.79	1.90
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.993	0.935	0.981	1.06	0.910	1.01	0.898	0.981	0.881	0.992	0.933	0.998	1.01	0.913	0.994
Diss-Strontium (Sr) (mg/L)	0.144	0.140	0.135	0.136	0.146	0.136	0.146	0.128	0.139	0.140	0.134	0.132	0.144	0.136	0.140
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000153	0.000147	0.000158	0.000164	0.000162	0.000156	0.000164	0.000155	0.000162	0.000158	0.000155	0.000154	0.000150	0.000160	0.000160
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	73	68	72	71	73	76	80	84	70	74	73	75	92	79	62
Field Tests															
Cond (in situ) (µs/cm)	111	116.4	109.7	111	107.5	109.6	130.4	113.9	108.5	111.1	110.8	107.6	109.8	112.4	107.2
NTU - in situ (ntu)	0.11	0.34	0	0.08	0.24	0.28	0	0.08	0.21	0	0.4	0	0	0.32	0.42
pH (in situ) (pH)	7.59	7.73	7.81	7.96	8.12	8.35	7.54	8.75	7.75	7.72	7.87	7.83	7.59	6.42	7.49
Sample Depth (m)	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Sample Taken	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Temp (in situ) (Degrees Celcius)	4.774	4.439	4.332	4.444	6.988	4.069	4.857	4.376	7.734	3.22	4.137	4.298	4.719	3.38	4.231
Organic / Inorganic															
DOC (mg/L)	1.94	2.00	1.95	1.86	12.5	2.19	1.96	1.78	1.72	1.98	1.93	2.09	1.95	2.08	2.31
Physical Test															
Conductivity (µs/cm)	109	109	111	111	106	110	109	117	109	112	110	112	110	112	105
Hardness (mg/L)	53.3	53.2	52.6	55.1	54.1	54.3	53.8	53.5	54.6	51.5	54.5	53.1	48.4	50.8	52.3
NTU (ntu)	0.16	0.33	0.14	<0.10	0.15	0.35	<0.10	<0.10	0.13	0.17	0.22	0.18	0.11	0.14	0.26
pH (pH)	7.96	7.80	7.91	7.92	7.85	7.84	7.87	7.84	7.95	7.89	7.86	7.82	7.87	7.91	7.85
TDS (mg/L)	73	68	72	71	73	76	80	84	70	74	73	75	92	79	62
TSS (mg/L)	<1.0	<1.0	<1.1	<1.0	<1.1	<1.1	<1.0	<1.1	<1.0	11.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0120	0.0194	0.0175	0.0105	0.0143	0.0227	0.0111	0.0095	0.0140	0.102	0.0111	0.0135	0.0110	0.0131	0.0112
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00013	0.00011	0.00013	0.00011	0.00014	0.00011	<0.00010	0.00011	0.00016	<0.00010	0.00011	0.00011	<0.00010	<0.00010
Barium (Ba)-Total (mg/L)	0.00463	0.00530	0.00494	0.00504	0.00481	0.00507	0.00518	0.00513	0.00509	0.00692	0.00520	0.00535	0.00524	0.00518	0.00542
Beryllium (Be)-Total (mg/L)	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.72	1.66
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.00	0.918
Diss-Strontium (Sr) (mg/L)	0.144	0.141
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000159	0.000160
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030
TDS (mg/L)	75	71
Field Tests		
Cond (in situ) (µs/cm)	111.1	109.6
NTU - in situ (ntu)	0.07	
pH (in situ) (pH)	7.59	7.62
Sample Depth (m)	40	40
Sample Taken		
Temp (in situ) (Degrees Celcius)	4.902	4.974
Organic / Inorganic		
DOC (mg/L)	1.99	1.96
Physical Test		
Conductivity (µs/cm)	112	112
Hardness (mg/L)	51.0	55.8
NTU (ntu)	0.11	0.16
pH (pH)	7.90	7.76
TDS (mg/L)	75	71
TSS (mg/L)	<1.0	<1.0
Total Metals		
Aluminum (Al)-Total (mg/L)	0.0098	0.0076
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00011	0.00010
Barium (Ba)-Total (mg/L)	0.00510	0.00496
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010

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	E303022 : QUL-120a-40m														
	19-Aug-19	**16-Jun-20**	**11-Aug-20**	**16-Sep-20**	**4-Nov-20**	**19-May-21**	**21-Jul-21**	**15-Sep-21**	**27-Oct-21**	**9-May-22**	**27-Jun-22**	**15-Aug-22**	**19-Oct-22**	**10-May-23**	**26-Jun-23**
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000053	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.4	17.4	17.5	18.9	16.5	16.8	17.9	18.2	18.0	17.6	17.6	17.2	17.8	17.2	17.5
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00066	0.00076	0.00065	0.00107	0.00064	0.00060	0.00054	0.00094	0.00056	0.00240	<0.00050	0.00063	0.00052	0.00057	0.00053
Iron (Fe)-Total (mg/L)	<0.030	<0.030	0.044	<0.030	<0.030	0.031	<0.030	<0.030	<0.030	0.088	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	0.0011	0.0010	<0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	1.91	2.05	2.22	2.10	2.00	2.02	2.12	2.15	2.01	2.15	2.07	2.09	2.09	2.11	2.15
Manganese (Mn)-Total (mg/L)	0.00106	0.00143	0.00118	0.00104	0.00090	0.00186	0.00136	0.00178	0.00123	0.00458	0.00107	0.00113	0.00160	0.00126	0.00110
Mercury (Hg)-Total (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Tota (mg/L)	0.000384	0.000359	0.000320	0.000362	0.000303	0.000328	0.000399	0.000389	0.000357	0.000335	0.000321	0.000392	0.000430	0.000364	0.000355
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.463	0.506	0.509	0.444	0.470	0.475	0.506	0.518	0.502	0.511	0.476	0.509	0.502	0.498	0.504
Selenium (Se)-Total (mg/L)	0.000104	0.000156	0.000097	0.000149	0.000073	0.000147	0.000101	0.000115	0.000098	0.000087	0.000082	0.000108	0.000097	0.000087	0.000100
Silicon (Si)-Total (mg/L)	1.60	1.89	1.83	1.91	1.58	2.02	1.98	1.85	1.73	1.97	1.86	1.87	1.84	1.85	1.77
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.917	0.942	0.997	0.926	0.914	0.972	0.980	1.03	0.925	0.999	0.920	0.993	0.965	0.961	0.925
Strontium (Sr)-Total (mg/L)	0.126	0.135	0.136	0.147	0.140	0.133	0.135	0.142	0.141	0.137	0.137	0.139	0.147	0.135	0.143
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000151	0.000160	0.000164	0.000149	0.000153	0.000163	0.000167	0.000160	0.000179	0.000171	0.000164	0.000163	0.000161	0.000169	0.000149
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303022 : QUL-120a	
	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.8	17.6
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00060	<0.00050
Iron (Fe)-Total (mg/L)	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.18	2.03
Manganese (Mn)-Total (mg/L)	0.00090	0.00050
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050
Molybdenum (Mo)-Tota (mg/L)	0.000450	0.000315
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.496	0.477
Selenium (Se)-Total (mg/L)	0.000122	0.000104
Silicon (Si)-Total (mg/L)	1.83	1.73
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.02	0.920
Strontium (Sr)-Total (mg/L)	0.144	0.135
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000169	0.000166
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030

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IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-40m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	17	17	46.20000	52.60000	49.21176	51.79500	1.78216
Ammonia (as N) (mg/L)	17	2	0.00250	0.00600	0.00285	0.00250	0.00101
Chloride (mg/L)	17	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	17	0	0.00050	0.00050	0.00050	0.00130	0.00000
Diss-Phosphorus (mg/L)	17	0	0.00100	0.00100	0.00100	0.00249	0.00000
Floride (mg/L)	17	17	0.02800	0.03800	0.03459	0.03985	0.00240
Nitrate (N) (mg/L)	17	17	0.10200	0.15000	0.13718	0.15000	0.01384
Nitrate and Nitrite (mg/L)	17	17	0.10200	0.15000	0.13729	0.14680	0.01371
Nitrite (N) (mg/L)	17	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	17	17	5.72000	6.92000	6.46059	7.25200	0.32505
Total Nitrogen (mg/L)	17	17	0.14700	0.21800	0.18982	0.20095	0.01691
Total Phosphorus (mg/L)	17	11	0.00100	0.00700	0.00269	0.00647	0.00204
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	17	17	0.00530	0.00950	0.00661	0.00835	0.00115
Diss-Antimony (Sb) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	17	4	0.00005	0.00014	0.00006	0.00014	0.00003
Diss-Barium (Ba) (mg/L)	17	17	0.00458	0.00564	0.00511	0.00632	0.00028
Diss-Beryllium (Be) (mg/L)	17	0	0.00005	0.00050	0.00016	0.00005	0.00020
Diss-Bismuth (Bi) (mg/L)	17	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	17	2	0.00000	0.00001	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	17	17	15.90000	19.20000	17.84706	18.70000	0.78112
Diss-Chromium (Cr) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	17	12	0.00025	0.00094	0.00051	0.00138	0.00020
Diss-Iron (Fe) (mg/L)	17	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	17	0	0.00003	0.00003	0.00003	0.00064	0.00000
Diss-Lithium (Li) (mg/L)	17	1	0.00050	0.00100	0.00053	0.00101	0.00012
Diss-Magnesium (Mg) (mg/L)	17	17	1.91000	2.20000	2.06059	2.10900	0.07570
Diss-Manganese (Mn) (mg/L)	17	17	0.00011	0.00044	0.00024	0.00054	0.00011
Diss-Molybdenum (Mo) (mg/L)	17	17	0.00031	0.00045	0.00037	0.00086	0.00004
Diss-Nickel (Ni) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	17	17	0.47000	0.53700	0.50235	0.54440	0.01947

Grid Format Report : QUL-120a-40m - Quesnel Lake Beyond

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Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-40m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	17	17	0.00007	0.00016	0.00010	0.00025	0.00002
Diss-Silicon (Si) (mg/L)	17	17	1.50000	1.92000	1.76412	1.74900	0.11571
Diss-Silver (Ag) (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	17	17	0.88100	1.06000	0.96512	1.18200	0.04979
Diss-Strontium (Sr) (mg/L)	17	17	0.12800	0.14600	0.13888	0.14295	0.00511
Diss-Thallium (Tl) (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	17	17	0.00015	0.00016	0.00016	0.00021	0.00000
Diss-Vanadium (V) (mg/L)	17	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	17	0	0.00150	0.00150	0.00150	0.00757	0.00000
TDS (mg/L)	17	17	62.00000	92.00000	74.58824	81.90000	6.64322
Field Tests							
Cond (in situ) (µs/cm)	17	17	107.20000	130.40000	111.62353	160.21000	5.36709
NTU - in situ (ntu)	16	16	0.00000	0.42000	0.15938	1.11550	0.15447
pH (in situ) (pH)	17	17	6.42000	8.75000	7.74882	7.87600	0.47044
Sample Depth (m)	17	17	40.00000	40.00000	40.00000	40.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	17	17	3.22000	7.73400	4.69847	7.35770	1.11775
Organic / Inorganic							
DOC (mg/L)	17	17	1.72000	12.50000	2.59941	2.06950	2.55505
Physical Test							
Conductivity (µs/cm)	17	17	105.00000	117.00000	110.35294	113.90000	2.66789
Hardness (mg/L)	17	17	48.40000	55.80000	53.05294	55.29500	1.83443
NTU (ntu)	17	14	0.05000	0.35000	0.16235	5.30500	0.08736
pH (pH)	17	17	7.76000	7.96000	7.87059	7.95950	0.05226
TDS (mg/L)	17	17	62.00000	92.00000	74.58824	81.90000	6.64322
TSS (mg/L)	17	1	0.50000	11.00000	1.12941	1.50000	2.54368
Total Metals							
Aluminum (Al)-Total (mg/L)	17	17	0.00760	0.10200	0.01825	0.27715	0.02191
Antimony (Sb)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00012	0.00000
Arsenic (As)-Total (mg/L)	17	12	0.00005	0.00016	0.00010	0.00023	0.00004
Barium (Ba)-Total (mg/L)	17	17	0.00463	0.00692	0.00521	0.01295	0.00048
Beryllium (Be)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	17	0	0.00003	0.00003	0.00003	0.00025	0.00000

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	17	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	17	1	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	17	17	16.40000	18.90000	17.52353	18.50000	0.60985
Chromium (Cr)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	17	15	0.00025	0.00240	0.00072	0.00636	0.00048
Iron (Fe)-Total (mg/L)	17	3	0.01500	0.08800	0.02194	0.12845	0.01872
Lead (Pb)-Total (mg/L)	17	0	0.00003	0.00003	0.00003	0.00063	0.00000
Lithium (Li)-Total (mg/L)	17	5	0.00050	0.00110	0.00066	0.00110	0.00026
Magnesium (Mg)-Total (mg/L)	17	17	1.91000	2.22000	2.08529	2.20950	0.07674
Manganese (Mn)-Total (mg/L)	17	17	0.00050	0.00458	0.00141	0.00879	0.00088
Mercury (Hg)-Total (mg/L)	16	0	0.00000	0.00000	0.00000		0.00000
Molybdenum (Mo)-Tota (mg/L)	17	17	0.00030	0.00045	0.00036	0.00090	0.00004
Nickel (Ni)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00025	0.00000
Potassium (K)-Total (mg/L)	17	17	0.44400	0.51800	0.49212	0.64620	0.02062
Selenium (Se)-Total (mg/L)	17	17	0.00007	0.00016	0.00011	0.00025	0.00002
Silicon (Si)-Total (mg/L)	17	17	1.58000	2.02000	1.83000	2.34550	0.12005
Silver (Ag)-Total (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	17	17	0.91400	1.03000	0.95918	1.21150	0.03884
Strontium (Sr)-Total (mg/L)	17	17	0.12600	0.14700	0.13835	0.14480	0.00537
Thallium (Tl)-Total (mg/L)	17	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	17	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	17	0	0.00500	0.00500	0.00500	0.01195	0.00000
Uranium (U)-Total (mg/L)	17	17	0.00015	0.00018	0.00016	0.00022	0.00001
Vanadium (V)-Total (mg/L)	17	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	17	0	0.00150	0.00150	0.00150	0.00150	0.00000

Grid Format Report : QUL-120a-80m - Quesnel Lake Beyond

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	E303022 : QUL-120a-80m														
	19-Jun-19	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.8	48.8	50.8	48.0	49.1	47.9	48.5	51.0	53.1	48.0	50.6	50.7	47.5	46.7	50.6
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	0.0022	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.038	0.035	0.038	0.037	0.033	0.038	0.038	0.032	0.032	0.035	0.036	0.034	0.032	0.038	0.035
Nitrate (N) (mg/L)	0.146	0.140	0.141	0.143	0.145	0.147	0.138	0.145	0.146	0.151	0.132	0.141	0.142	0.150	0.143
Nitrate and Nitrite (mg/L)	0.146	0.140	0.141	0.144	0.145	0.148	0.138	0.145	0.146	0.151	0.132	0.141	0.142	0.150	0.143
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.75	6.19	6.67	6.58	6.28	6.79	6.76	6.59	6.61	6.86	6.36	6.34	6.16	6.72	6.32
Total Nitrogen (mg/L)	0.207	0.202	0.204	0.201	0.188	0.194	0.176	0.182	0.192	0.183	0.216	0.161	0.178	0.194	0.184
Total Phosphorus (mg/L)	0.0033	0.0059	0.0061	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0025	<0.0020	<0.0020	<0.0020
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0048	0.0050	0.0058	0.0053	0.0047	0.0053	0.0069	0.0059	0.0040	0.0061	0.0051	0.0061	0.0056	0.0055	0.0054
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010
Diss-Barium (Ba) (mg/L)	0.00482	0.00513	0.00520	0.00526	0.00511	0.00493	0.00495	0.00462	0.00497	0.00482	0.00520	0.00494	0.00514	0.00540	0.00506
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000084	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.8	18.7	18.5	18.0	18.1	17.5	17.5	18.5	18.4	18.6	17.5	18.4	17.3	17.6	16.9
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	0.00055	<0.00050	0.00074	<0.00050	0.00054	<0.00050	<0.00050	<0.00050	0.00060	<0.00050	0.00060	<0.00050	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.99	2.12	2.05	2.02	2.03	2.04	2.06	1.89	1.98	1.99	2.15	2.05	2.11	2.06	2.04
Diss-Manganese (Mn) (mg/L)	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	0.00022	0.00025	0.00011	<0.00010	0.00012	0.00037	0.00012	0.00011	0.00014	0.00031
Diss-Molybdenum (Mo) (mg/L)	0.000320	0.000338	0.000328	0.000318	0.000321	0.000362	0.000345	0.000365	0.000292	0.000344	0.000342	0.000309	0.000334	0.000332	0.000351
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.497	0.510	0.488	0.504	0.494	0.482	0.510	0.471	0.483	0.496	0.512	0.472	0.524	0.501	0.478
Diss-Selenium (mg/L)	0.000102	0.000103	0.000089	0.000084	0.000091	0.000092	0.000079	0.000090	<0.000050	0.000078	0.000137	0.000090	0.000085	0.000096	0.000086

	E303022 : QUL-120a-80m		
	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients			
Alkalinity (CaCO3) (mg/L)	50.9	49.9	51.4
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.030	0.035	0.028
Nitrate (N) (mg/L)	0.145	0.147	0.147
Nitrate and Nitrite (mg/L)	0.145	0.147	0.147
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	5.78	6.43	6.00
Total Nitrogen (mg/L)	0.185	0.192	0.179
Total Phosphorus (mg/L)	0.0026	0.0024	<0.0020
Dissolved Metals			
Aluminum (Al)-Diss (mg/L)	0.0054	0.0090	0.0060
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00495	0.00505	0.00460
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.4	17.4	18.8
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00058	0.00067	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.06	2.07	1.90
Diss-Manganese (Mn) (mg/L)	0.00021	0.00023	<0.00010
Diss-Molybdenum (Mo) (mg/L)	0.000332	0.000352	0.000341
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.537	0.487	0.482
Diss-Selenium (mg/L)	0.000100	0.000091	0.000094

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Diss-Silicon (Si) (mg/L)	1.67	1.75	1.72	1.72	1.68	1.68	1.74	1.72	1.70	1.64	1.77	1.88	1.79	1.75	1.79
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.974	0.984	0.906	0.980	0.985	0.953	0.986	0.880	0.949	0.911	1.00	0.913	0.995	0.994	0.925
Diss-Strontium (Sr) (mg/L)	0.137	0.145	0.144	0.142	0.136	0.142	0.136	0.151	0.132	0.140	0.134	0.136	0.134	0.143	0.131
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000177	0.000149	0.000160	0.000159	0.000162	0.000153	0.000154	0.000166	0.000158	0.000169	0.000154	0.000158	0.000160	0.000158	0.000162
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	84	77	71	73	74	71	74	78	80	69	82	74	70	90	80
Field Tests															
Cond (in situ) (µs/cm)	113.4	111.2	117.6	110.6	111.7	111	110.8	130.9	113.9	110.3	112	110.7	108.1	109.9	112.5
NTU - in situ (ntu)	0.89	0.09	0.36	0	0.07	0.15	0.06	0	0.05	0.08	0	0.37	0	0	0.33
pH (in situ) (pH)	7.75	7.48	7.7	7.73	7.84	8.04	8.3	7.42	8.76	7.63	7.69	7.74	7.58	7.54	6.42
Sample Depth (m)	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Sample Taken	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Temp (in situ) (Degrees Celcius)	5.324	3.952	4.03	3.902	3.886	4.388	3.929	4.026	3.933	4.133	3.239	3.911	3.881	3.945	3.356
Organic / Inorganic															
DOC (mg/L)	1.51	1.56	2.16	1.73	1.62	12.7	2.00	1.81	1.73	1.74	2.06	1.89	1.80	1.70	2.44
Physical Test															
Conductivity (µs/cm)	110	111	110	111	112	110	112	108	118	110	113	110	112	111	113
Hardness (mg/L)	55.2	55.4	54.6	53.4	53.6	52.1	52.2	54.0	54.1	54.6	52.6	54.4	51.9	52.4	50.6
NTU (ntu)	<0.10	0.15	0.13	<0.10	<0.10	<0.10	0.19	<0.10	<0.10	<0.10	0.22	0.35	0.15	<0.10	0.15
pH (pH)	7.99	7.97	7.82	7.90	7.95	7.82	7.84	7.89	7.86	7.93	7.90	7.86	7.84	7.88	7.91
TDS (mg/L)	84	77	71	73	74	71	74	78	80	69	82	74	70	90	80
TSS (mg/L)	<1.0	<1.0	<1.0	<1.1	<1.1	<1.0	<1.1	<1.0	<1.1	<1.0	6.1	<1.2	<1.1	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0068	0.0077	0.0102	0.0100	0.0083	0.0102	0.0207	0.0100	0.0088	0.0086	0.0150	0.0070	0.0095	0.0078	0.0115
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00011	<0.00010	0.00012	<0.00010	0.00011	<0.00010	0.00014	<0.00010	<0.00010	0.00011	0.00010	<0.00010	0.00010	0.00011	0.00012
Barium (Ba)-Total (mg/L)	0.00477	0.00431	0.00508	0.00486	0.00467	0.00506	0.00536	0.00510	0.00470	0.00513	0.00537	0.00515	0.00517	0.00525	0.00506
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303022 : QUL-120a-80m		
	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.86	1.74	1.68
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.00	0.963	0.918
Diss-Strontium (Sr) (mg/L)	0.137	0.141	0.142
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000166	0.000163	0.000168
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030
TDS (mg/L)	68	72	72
Field Tests			
Cond (in situ) (µs/cm)	108.4	110.4	110.1
NTU - in situ (ntu)	0.36	0.08	
pH (in situ) (pH)	7.23	7.52	7.45
Sample Depth (m)	80	80	80
Sample Taken			
Temp (in situ) (Degrees Celcius)	3.864	3.84	3.882
Organic / Inorganic			
DOC (mg/L)	2.18	1.90	1.92
Physical Test			
Conductivity (µs/cm)	106	110	112
Hardness (mg/L)	54.4	52.0	54.8
NTU (ntu)	0.34	0.11	<0.10
pH (pH)	7.85	7.90	7.77
TDS (mg/L)	68	72	72
TSS (mg/L)	<1.1	<1.0	<1.0
Total Metals			
Aluminum (Al)-Total (mg/L)	0.0123	0.0085	0.0072
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Barium (Ba)-Total (mg/L)	0.00528	0.00506	0.00475
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010

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	E303022 : QUL-120a-80m														
	19-Jun-19	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.6	16.3	17.8	18.0	19.3	17.0	17.6	17.7	19.1	18.3	17.7	18.5	17.7	17.2	17.0
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00061	<0.00050	0.00066	0.00061	0.00056	0.00057	0.00059	0.00050	0.00055	0.00063	0.00057	0.00054	0.00056	0.00065	0.00056
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.031	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0010	0.0010	<0.0010	0.0011	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.86	1.93	2.04	2.18	2.08	2.10	2.18	2.07	2.05	2.07	2.13	2.08	2.05	2.09	2.09
Manganese (Mn)-Total (mg/L)	0.00070	0.00044	0.00090	0.00075	0.00057	0.00108	0.00189	0.00081	0.00057	0.00085	0.00169	0.00012	0.00078	0.00068	0.00123
Molybdenum (Mo)-Tota (mg/L)	0.000337	0.000299	0.000332	0.000326	0.000303	0.000342	0.000355	0.000334	0.000342	0.000370	0.000337	0.000337	0.000346	0.000310	0.000372
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.407	0.476	0.494	0.494	0.434	0.490	0.512	0.497	0.507	0.504	0.502	0.483	0.496	0.511	0.486
Selenium (Se)-Total (mg/L)	0.000111	0.000091	0.000093	0.000081	0.000118	0.000114	0.000143	0.000096	0.000075	0.000093	0.000085	0.000076	0.000092	0.000068	0.000111
Silicon (Si)-Total (mg/L)	1.68	1.61	1.78	1.77	1.79	1.74	2.03	1.93	1.74	1.90	1.84	1.80	1.87	1.76	1.84
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.842	0.903	0.931	0.972	0.922	0.980	1.03	0.962	0.982	0.968	0.998	0.936	0.967	0.961	0.932
Strontium (Sr)-Total (mg/L)	0.138	0.127	0.139	0.150	0.149	0.136	0.141	0.136	0.148	0.145	0.136	0.138	0.141	0.148	0.137
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000158	0.000155	0.000162	0.000172	0.000155	0.000158	0.000178	0.000158	0.000159	0.000179	0.000165	0.000158	0.000160	0.000164	0.000170
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303022 : QUL-120a-80m		
	26-Jun-23	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.3	17.9	17.7
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00098	0.00051	<0.00050
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.11	2.16	2.03
Manganese (Mn)-Total (mg/L)	0.00108	0.00057	0.00043
Molybdenum (Mo)-Tota (mg/L)	0.000363	0.000365	0.000325
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.488	0.488	0.476
Selenium (Se)-Total (mg/L)	0.000111	0.000126	0.000113
Silicon (Si)-Total (mg/L)	1.73	1.84	1.70
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.903	0.992	0.912
Strontium (Sr)-Total (mg/L)	0.142	0.144	0.136
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000152	0.000175	0.000167
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030

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	E303022 : QUL-120a-80m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	18	18	46.70000	53.10000	49.57222	51.92000	1.67044
Ammonia (as N) (mg/L)	18	0	0.00250	0.00250	0.00250	0.00250	0.00000
Chloride (mg/L)	18	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	18	0	0.00050	0.00050	0.00050	0.00136	0.00000
Diss-Phosphorus (mg/L)	18	1	0.00100	0.00220	0.00107	0.00258	0.00028
Floride (mg/L)	18	18	0.02800	0.03800	0.03467	0.03580	0.00301
Nitrate (N) (mg/L)	18	18	0.13200	0.15100	0.14383	0.14980	0.00449
Nitrate and Nitrite (mg/L)	18	18	0.13200	0.15100	0.14394	0.15000	0.00453
Nitrite (N) (mg/L)	18	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	18	18	5.78000	6.86000	6.45500	6.53600	0.29924
Total Nitrogen (mg/L)	18	18	0.16100	0.21600	0.18989	0.19760	0.01316
Total Phosphorus (mg/L)	18	6	0.00100	0.00610	0.00193	0.00566	0.00165
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	18	18	0.00400	0.00900	0.00566	0.00970	0.00105
Diss-Antimony (Sb) (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	18	3	0.00005	0.00015	0.00006	0.00011	0.00003
Diss-Barium (Ba) (mg/L)	18	18	0.00460	0.00540	0.00501	0.00544	0.00021
Diss-Beryllium (Be) (mg/L)	18	0	0.00005	0.00050	0.00015	0.00005	0.00019
Diss-Bismuth (Bi) (mg/L)	18	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	18	1	0.00000	0.00001	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	18	18	16.90000	18.80000	18.05000	18.90000	0.59631
Diss-Chromium (Cr) (mg/L)	18	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	18	7	0.00025	0.00074	0.00039	0.00104	0.00019
Diss-Iron (Fe) (mg/L)	18	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	18	0	0.00003	0.00003	0.00003	0.00041	0.00000
Diss-Lithium (Li) (mg/L)	18	2	0.00050	0.00100	0.00056	0.00111	0.00016
Diss-Magnesium (Mg) (mg/L)	18	18	1.89000	2.15000	2.03389	2.12000	0.06696
Diss-Manganese (Mn) (mg/L)	18	12	0.00005	0.00037	0.00015	0.00045	0.00010
Diss-Molybdenum (Mo) (mg/L)	18	18	0.00029	0.00037	0.00033	0.00037	0.00002
Diss-Nickel (Ni) (mg/L)	18	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	18	18	0.47100	0.53700	0.49600	0.52660	0.01789

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	E303022 : QUL-120a-80m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	18	17	0.00003	0.00014	0.00009	0.00025	0.00002
Diss-Silicon (Si) (mg/L)	18	18	1.64000	1.88000	1.73778	1.75000	0.06348
Diss-Silver (Ag) (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	18	18	0.88000	1.00000	0.95644	0.99760	0.03829
Diss-Strontium (Sr) (mg/L)	18	18	0.13100	0.15100	0.13906	0.14400	0.00515
Diss-Thallium (Tl) (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	18	1	0.00005	0.00013	0.00005	0.00005	0.00002
Diss-Titanium (Ti) (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	18	18	0.00015	0.00018	0.00016	0.00017	0.00001
Diss-Vanadium (V) (mg/L)	18	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	18	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	18	18	68.00000	90.00000	75.50000	78.80000	5.84355
Field Tests							
Cond (in situ) (µs/cm)	18	18	108.10000	130.90000	112.41667	159.84000	5.08588
NTU - in situ (ntu)	17	17	0.00000	0.89000	0.17000	1.30600	0.23187
pH (in situ) (pH)	18	18	6.42000	8.76000	7.65667	7.82900	0.46753
Sample Depth (m)	18	18	80.00000	80.00000	80.00000	80.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	18	18	3.23900	5.32400	3.96783	5.25145	0.42117
Organic / Inorganic							
DOC (mg/L)	18	18	1.51000	12.70000	2.46944	2.15000	2.56406
Physical Test							
Conductivity (µs/cm)	18	18	106.00000	118.00000	111.05556	112.00000	2.43678
Hardness (mg/L)	18	18	50.60000	55.40000	53.46111	55.86000	1.36603
NTU (ntu)	18	9	0.05000	0.35000	0.12444	1.17000	0.09787
pH (pH)	18	18	7.77000	7.99000	7.88222	7.96600	0.05631
TDS (mg/L)	18	18	68.00000	90.00000	75.50000	78.80000	5.84355
TSS (mg/L)	18	1	0.50000	6.10000	0.83333	1.50000	1.31474
Total Metals							
Aluminum (Al)-Total (mg/L)	18	18	0.00680	0.02070	0.01001	0.06402	0.00337
Antimony (Sb)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00011	0.00000
Arsenic (As)-Total (mg/L)	18	9	0.00005	0.00014	0.00008	0.00015	0.00003
Barium (Ba)-Total (mg/L)	18	18	0.00431	0.00537	0.00501	0.00660	0.00028
Beryllium (Be)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	18	0	0.00003	0.00003	0.00003	0.00025	0.00000

Grid Format Report : QUL-120a-80m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

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	E303022 : QUL-120a-80m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	18	0	0.00000	0.00000	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	18	18	16.30000	19.30000	17.70556	18.30000	0.77571
Chromium (Cr)-Total (mg/L)	18	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	18	16	0.00025	0.00098	0.00056	0.00189	0.00015
Iron (Fe)-Total (mg/L)	18	1	0.01500	0.03100	0.01589	0.03620	0.00377
Lead (Pb)-Total (mg/L)	18	0	0.00003	0.00003	0.00003	0.00032	0.00000
Lithium (Li)-Total (mg/L)	18	9	0.00050	0.00110	0.00076	0.00110	0.00026
Magnesium (Mg)-Total (mg/L)	18	18	1.86000	2.18000	2.07222	2.17600	0.07908
Manganese (Mn)-Total (mg/L)	18	18	0.00012	0.00189	0.00084	0.00249	0.00044
Molybdenum (Mo)-Tota (mg/L)	18	18	0.00030	0.00037	0.00034	0.00040	0.00002
Nickel (Ni)-Total (mg/L)	18	0	0.00025	0.00025	0.00025	0.00025	0.00000
Potassium (K)-Total (mg/L)	18	18	0.40700	0.51200	0.48583	0.54240	0.02640
Selenium (Se)-Total (mg/L)	18	18	0.00007	0.00014	0.00010	0.00025	0.00002
Silicon (Si)-Total (mg/L)	18	18	1.61000	2.03000	1.79722	1.84400	0.09851
Silver (Ag)-Total (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	18	18	0.84200	1.03000	0.94961	1.01800	0.04402
Strontium (Sr)-Total (mg/L)	18	18	0.12700	0.15000	0.14061	0.14560	0.00594
Thallium (Tl)-Total (mg/L)	18	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	18	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	18	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	18	18	0.00015	0.00018	0.00016	0.00018	0.00001
Vanadium (V)-Total (mg/L)	18	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	18	0	0.00150	0.00150	0.00150	0.00150	0.00000

Grid Format Report : QUL-18-0m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

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Mount Polley

Mining Corporation

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	E303019 : QUL-18-0m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.9	46.5	44.4	47.8	53.2	42.8	46.9	46.9	48.9	45.0	51.5	47.4	50.7	44.7	42.2
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0064	<0.0050	<0.0050	<0.0050	0.0062	0.0070	<0.0050	<0.0050	<0.0050	<0.0050	0.0061
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0033	<0.0020	<0.0020	<0.0020	<0.0020	0.0105	0.0020	<0.0020	0.0026	<0.0020	<0.0020	<0.0020	<0.0020	0.0031	<0.0020
Floride (mg/L)	0.036	0.038	0.033	0.030	0.037	0.035	0.033	0.035	0.040	0.030	0.033	0.038	0.039	0.032	0.029
Nitrate (N) (mg/L)	0.133	0.110	0.0456	0.0909	0.0948	0.0274	0.0314	0.124	0.122	0.0560	0.0429	0.0792	0.127	0.0582	0.0197
Nitrate and Nitrite (mg/L)	0.133	0.110	0.0456	0.0909	0.0955	0.0277	0.0315	0.124	0.122	0.0560	0.0429	0.0792	0.127	0.0582	0.0197
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	7.34	6.48	5.65	6.66	6.04	5.44	5.76	6.74	6.96	5.95	6.39	6.97	7.65	5.21	5.22
Total Nitrogen (mg/L)	0.189	0.194	0.151	0.198	0.191	0.150	0.114	0.188	0.206	0.122	0.120	0.132	0.208	0.150	0.142
Total Phosphorus (mg/L)	0.0031	0.0055	0.0023	0.0045	0.0070	0.0080	<0.0020	0.0022	0.0023	<0.0020	<0.0020	<0.0020	<0.0020	0.0063	<0.0020
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0066	0.0079	0.0100	0.0080	0.0133	0.0132	0.0097	0.0075	0.0080	0.0106	0.0074	0.0069	0.0075	0.0159	0.0099
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	0.00010	0.00011	0.00012	0.00015	0.00015	0.00011	<0.00010	0.00010	0.00012	0.00010	0.00010	0.00010	0.00014	0.00010
Diss-Barium (Ba) (mg/L)	0.00550	0.00546	0.00546	0.00530	0.00591	0.00589	0.00523	0.00512	0.00518	0.00551	0.00518	0.00507	0.00520	0.00582	0.00529
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	20.0	18.5	16.5	16.9	16.8	15.2	16.5	17.9	17.4	16.0	16.5	18.4	17.6	15.3	14.9
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00055	<0.00050	<0.00050	<0.00050	0.00069	0.00064	0.00055	0.00058	0.00062	0.00054	<0.00050	0.00050	0.00071	0.00069	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.25	2.03	2.02	1.98	2.09	2.05	2.00	2.13	2.15	1.86	1.93	2.01	2.13	1.98	1.86
Diss-Manganese (Mn) (mg/L)	0.00026	0.00035	0.00017	0.00020	0.00042	<0.00010	0.00015	0.00047	0.00054	0.00063	0.00024	0.00028	0.00022	0.00107	0.00048
Diss-Molybdenum (Mo) (mg/L)	0.000622	0.000363	0.000362	0.000403	0.000408	0.000409	0.000327	0.000404	0.000406	0.000358	0.000312	0.000371	0.000726	0.000368	0.000367
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.545	0.527	0.506	0.497	0.530	0.519	0.473	0.529	0.516	0.515	0.494	0.499	0.483	0.504	0.485
Diss-Selenium (mg/L)	0.000168	0.000101	0.000116	0.000072	0.000128	0.000129	0.000118	0.000100	0.000112	0.000129	0.000099	0.000075	0.000180	0.000106	0.000123

	E303019 : QUL-18-0m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients					
Alkalinity (CaCO3) (mg/L)	44.4	50.0	48.7	49.7	50.9
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	0.0024	<0.0020	<0.0020
Floride (mg/L)	0.039	0.035	0.031	0.037	0.029
Nitrate (N) (mg/L)	0.0283	0.150	0.0987	0.0115	0.0789
Nitrate and Nitrite (mg/L)	0.0283	0.150	0.0987	0.0115	0.0789
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.35	8.08	6.19	6.69	6.33
Total Nitrogen (mg/L)	0.116	0.190	0.186	0.111	0.149
Total Phosphorus (mg/L)	0.0030	0.0028	0.0026	0.0028	0.0026
Dissolved Metals					
Aluminum (Al)-Diss (mg/L)	0.0151	0.0120	0.0079	0.0089	0.0068
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00017	0.00011	0.00012	0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00528	0.00545	0.00520	0.00540	0.00493
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.6	20.1	17.4	17.4	18.3
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	0.00073	0.00059	0.00065	0.00056
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.92	2.26	2.04	2.10	1.97
Diss-Manganese (Mn) (mg/L)	0.00022	0.00053	0.00046	0.00038	0.00030
Diss-Molybdenum (Mo) (mg/L)	0.000335	0.000966	0.000367	0.000368	0.000421
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.478	0.515	0.530	0.480	0.502
Diss-Selenium (mg/L)	0.000084	0.000198	0.000094	0.000094	0.000107

Grid Format Report : QUL-18-0m - QUL Deep Site in Middle of

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	E303019 : QUL-18-0m														
	8-May-19	**19-Jun-19**	**19-Aug-19**	**30-Oct-19**	**16-Jun-20**	**11-Aug-20**	**16-Sep-20**	**4-Nov-20**	**19-May-21**	**21-Jul-21**	**15-Sep-21**	**27-Oct-21**	**9-May-22**	**27-Jun-22**	**15-Aug-22**
Diss-Silicon (Si) (mg/L)	1.74	1.68	1.69	1.61	2.01	1.89	1.71	1.59	1.81	1.67	1.42	1.44	1.67	2.05	1.51
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.16	1.07	0.979	0.917	0.983	0.996	0.928	0.998	1.04	0.904	0.996	0.901	1.05	0.918	0.845
Diss-Strontium (Sr) (mg/L)	0.143	0.128	0.123	0.130	0.123	0.113	0.123	0.140	0.132	0.118	0.135	0.139	0.145	0.102	0.107
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000180	0.000161	0.000131	0.000144	0.000129	0.000126	0.000144	0.000154	0.000155	0.000131	0.000152	0.000161	0.000158	0.000121	0.000128
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	72	77	71	68	63	66	63	75	78	61	80	76	86	68	64
Field Tests															
Cond (in situ) (µs/cm)		104.9	102	24	108.9	97.3	98.2	108.4	110.7	119.1	109.1	107.3	114.7	95.3	96.3
NTU - in situ (ntu)		0.31	0.01	0.51	0.4	0	12.07	0.32	0.05	0.07	0.03	0.26	0	0.66	0.04
pH (in situ) (pH)		7.89	7.97	7.84	7.37	7.71	8.28	8.01	8.51	8.06	8.48	7.86	7.97	7.99	7.88
Sample Depth (m)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample Taken		Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes
Secchi Depth (m)		6	6.9	8	4.5	5	6.25	6.5	6.8	9.5	11	10	7.25	4.75	5.5
Temp (in situ) (Degrees Celcius)		9.848	17.644	7.446	10.248	16.007	14.863	6.277	7.842	19.619	15.686	9.057	4.024	16.44	20.465
Organic / Inorganic															
DOC (mg/L)	1.83	1.84	2.31	1.91	2.85	3.43	2.25	2.30	2.64	2.20	1.64	1.58	1.95	3.11	2.52
Physical Test															
Conductivity (µs/cm)	116	105	100	111	116	97.8	104	107	111	97.9	111	109	114	89.6	98.0
Hardness (mg/L)	59.2	54.5	49.4	50.4	50.4	46.3	49.4	53.4	52.3	47.6	49.1	54.2	52.7	46.4	44.9
NTU (ntu)	0.31	0.23	0.24	0.21	1.24	0.42	0.28	0.21	0.37	0.23	0.18	0.16	0.23	1.10	0.50
pH (pH)	7.98	8.01	7.95	7.90	7.67	7.93	7.99	7.80	7.81	7.92	7.90	7.94	7.90	7.78	7.84
TDS (mg/L)	72	77	71	68	63	66	63	75	78	61	80	76	86	68	64
TSS (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.3	1.4
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0279	0.0099	0.0175	0.0156	0.0263	0.0233	0.0147	0.0161	0.0174	0.0166	0.0117	0.0111	0.0153	0.0436	0.0168
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00016	0.00011	0.00012	<0.00010	0.00018	0.00018	0.00014	0.00012	0.00014	0.00012	0.00011	0.00013	0.00011	0.00015	0.00012
Barium (Ba)-Total (mg/L)	0.00568	0.00499	0.00518	0.00510	0.00585	0.00566	0.00502	0.00509	0.00536	0.00546	0.00493	0.00502	0.00538	0.00569	0.00535
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.30	1.80	1.73	0.798	1.23
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.895	1.16	0.973	0.960	0.969
Diss-Strontium (Sr) (mg/L)	0.134	0.150	0.132	0.133	0.145
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000145	0.000160	0.000154	0.000158	0.000169
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	87	72	65	69	68
Field Tests					
Cond (in situ) (µs/cm)	103.7	116.2	104.5	109.2	110.6
NTU - in situ (ntu)	0.48	0.28	0.41	0.35	
pH (in situ) (pH)	8.06	7.31	7.54	7.8	6.91
Sample Depth (m)	0	0	0	0	0
Sample Taken	Yes	Yes	Yes	Yes	
Secchi Depth (m)	7.75	10.1	8.5	5.6	7.95
Temp (in situ) (Degrees Celcius)	13.473	4.669	15.551	16.758	6.83
Organic / Inorganic					
DOC (mg/L)	2.03	2.20	2.62	2.12	1.95
Physical Test					
Conductivity (µs/cm)	105	113	98.6	109	112
Hardness (mg/L)	54.4	59.5	51.8	52.1	53.8
NTU (ntu)	0.24	0.24	0.33	0.63	0.36
pH (pH)	7.84	7.91	7.85	7.97	7.82
TDS (mg/L)	87	72	65	69	68
TSS (mg/L)	<1.0	<1.0	<1.0	1.9	1.9
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0163	0.0159	0.0130	0.0130	0.0126
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00013	0.00012	0.00011	0.00013	0.00012
Barium (Ba)-Total (mg/L)	0.00525	0.00541	0.00579	0.00539	0.00502
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000061	0.0000084	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.2	15.8	14.7	16.9	16.1	15.6	17.6	16.5	18.7	16.8	17.8	16.9	18.0	15.3	15.0
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00158	0.00061	0.00071	0.00066	0.00087	0.00078	0.00069	0.00067	0.00066	0.00055	0.00063	0.00062	0.00078	0.00113	0.00059
Iron (Fe)-Total (mg/L)	0.031	<0.030	<0.030	<0.030	0.036	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.063	<0.030
Lead (Pb)-Total (mg/L)	0.000249	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0012	<0.0010
Magnesium (Mg)-Total (mg/L)	2.07	1.77	1.90	1.99	2.06	2.15	1.96	2.10	2.11	1.88	1.95	1.94	2.23	1.98	1.92
Manganese (Mn)-Total (mg/L)	0.00211	0.00109	0.00139	0.00110	0.00187	0.00194	0.00108	0.00139	0.00149	0.00172	0.00105	0.00089	0.00116	0.00319	0.00145
Molybdenum (Mo)-Tota (mg/L)	0.000602	0.000351	0.000338	0.000426	0.000396	0.000374	0.000323	0.000415	0.000494	0.000387	0.000299	0.000417	0.000728	0.000428	0.000365
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050
Potassium (K)-Total (mg/L)	0.481	0.416	0.484	0.490	0.528	0.519	0.432	0.492	0.497	0.490	0.488	0.494	0.499	0.531	0.488
Selenium (Se)-Total (mg/L)	0.000156	0.000093	0.000116	0.000069	0.000143	0.000123	0.000108	0.000114	0.000129	0.000146	0.000115	0.000123	0.000240	0.000150	0.000085
Silicon (Si)-Total (mg/L)	1.72	1.77	1.65	1.61	2.07	2.03	1.70	1.70	1.86	1.86	1.44	1.58	1.82	2.09	1.65
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.13	0.831	0.905	0.891	0.984	0.960	0.854	0.990	1.02	0.878	0.900	0.914	1.10	0.946	0.907
Strontium (Sr)-Total (mg/L)	0.130	0.127	0.109	0.124	0.117	0.111	0.129	0.134	0.145	0.119	0.128	0.136	0.143	0.122	0.119
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000158	0.000152	0.000141	0.000144	0.000136	0.000133	0.000137	0.000148	0.000171	0.000141	0.000146	0.000169	0.000170	0.000133	0.000136
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

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	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.0	16.8	16.6	17.4	18.1
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00065	0.00082	0.00060	0.00057	0.00064
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.99	2.12	2.12	2.12	2.09
Manganese (Mn)-Total (mg/L)	0.00124	0.00117	0.00117	0.00105	0.00086
Molybdenum (Mo)-Tota (mg/L)	0.000319	0.000931	0.000385	0.000367	0.000438
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.490	0.506	0.490	0.490	0.497
Selenium (Se)-Total (mg/L)	0.000084	0.000238	0.000127	0.000126	0.000139
Silicon (Si)-Total (mg/L)	1.33	1.86	1.66	0.86	1.27
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.881	1.10	0.906	0.996	0.953
Strontium (Sr)-Total (mg/L)	0.134	0.137	0.139	0.137	0.135
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000147	0.000159	0.000148	0.000170	0.000170
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	20	20	42.20000	53.20000	47.57500	53.63500	3.00821
Ammonia (as N) (mg/L)	20	4	0.00250	0.00700	0.00329	0.00545	0.00162
Chloride (mg/L)	20	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	20	0	0.00050	0.00050	0.00050	0.00139	0.00000
Diss-Phosphorus (mg/L)	20	6	0.00100	0.01050	0.00190	0.00255	0.00217
Floride (mg/L)	20	20	0.02900	0.04000	0.03445	0.04390	0.00353
Nitrate (N) (mg/L)	20	20	0.01150	0.15000	0.07648	0.14145	0.04274
Nitrate and Nitrite (mg/L)	20	20	0.01150	0.15000	0.07653	0.13830	0.04273
Nitrite (N) (mg/L)	20	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	20	20	5.21000	8.08000	6.40500	8.30400	0.77003
Total Nitrogen (mg/L)	20	20	0.11100	0.20800	0.16035	0.21080	0.03417
Total Phosphorus (mg/L)	20	14	0.00100	0.00800	0.00305	0.00643	0.00213
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	20	20	0.00660	0.01590	0.00966	0.01165	0.00284
Diss-Antimony (Sb) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	20	18	0.00005	0.00017	0.00011	0.00022	0.00003
Diss-Barium (Ba) (mg/L)	20	20	0.00493	0.00591	0.00537	0.00743	0.00027
Diss-Beryllium (Be) (mg/L)	20	0	0.00005	0.00050	0.00014	0.00005	0.00018
Diss-Bismuth (Bi) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	20	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	20	20	14.90000	20.10000	17.31000	19.12500	1.43523
Diss-Chromium (Cr) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	20	14	0.00025	0.00073	0.00051	0.00191	0.00018
Diss-Iron (Fe) (mg/L)	20	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Lithium (Li) (mg/L)	20	1	0.00050	0.00100	0.00053	0.00095	0.00011
Diss-Magnesium (Mg) (mg/L)	20	20	1.86000	2.26000	2.03800	2.15350	0.11082
Diss-Manganese (Mn) (mg/L)	20	19	0.00005	0.00107	0.00037	0.00107	0.00022
Diss-Molybdenum (Mo) (mg/L)	20	20	0.00031	0.00097	0.00043	0.00139	0.00016
Diss-Nickel (Ni) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	20	20	0.47300	0.54500	0.50635	0.59100	0.02037

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	20	20	0.00007	0.00020	0.00012	0.00025	0.00003
Diss-Silicon (Si) (mg/L)	20	20	0.79800	2.05000	1.61740	1.74000	0.28489
Diss-Silver (Ag) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	20	20	0.84500	1.16000	0.98210	1.45050	0.08294
Diss-Strontium (Sr) (mg/L)	20	20	0.10200	0.15000	0.12975	0.14745	0.01288
Diss-Thallium (Tl) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	20	20	0.00012	0.00018	0.00015	0.00023	0.00002
Diss-Vanadium (V) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	20	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	20	20	61.00000	87.00000	71.45000	77.45000	7.45142
Field Tests							
Cond (in situ) (µs/cm)	19	19	24.00000	119.10000	102.12632	143.06000	20.05417
NTU - in situ (ntu)	18	18	0.00000	12.07000	0.90278	7.38000	2.79438
pH (in situ) (pH)	19	19	6.91000	8.51000	7.86526	8.28600	0.38742
Sample Depth (m)	19	19	0.00000	0.00000	0.00000	0.00000	0.00000
Sample Taken							
Secchi Depth (m)	19	19	4.50000	11.00000	7.25526	11.79000	1.91173
Temp (in situ) (Degrees Celcius)	19	19	4.02400	20.46500	12.24984	18.83830	5.19923
Organic / Inorganic							
DOC (mg/L)	20	20	1.58000	3.43000	2.26400	2.48800	0.48054
Physical Test							
Conductivity (µs/cm)	20	20	89.60000	116.00000	106.24500	117.45000	7.27060
Hardness (mg/L)	20	20	44.90000	59.50000	51.59000	56.33000	3.89384
NTU (ntu)	20	20	0.16000	1.24000	0.38550	4.28700	0.29257
pH (pH)	20	20	7.67000	8.01000	7.88550	8.00000	0.08407
TDS (mg/L)	20	20	61.00000	87.00000	71.45000	77.45000	7.45142
TSS (mg/L)	20	5	0.50000	2.30000	0.80500	1.50000	0.58352
Total Metals							
Aluminum (Al)-Total (mg/L)	20	20	0.00990	0.04360	0.01773	0.26020	0.00768
Antimony (Sb)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00007	0.00000
Arsenic (As)-Total (mg/L)	20	19	0.00005	0.00018	0.00013	0.00030	0.00003
Barium (Ba)-Total (mg/L)	20	20	0.00493	0.00585	0.00533	0.01351	0.00029
Beryllium (Be)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	20	0	0.00003	0.00003	0.00003	0.00025	0.00000
Boron (B)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	20	2	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	20	20	14.70000	18.70000	16.69000	19.24500	1.08283
Chromium (Cr)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	20	20	0.00055	0.00158	0.00074	0.00565	0.00024
Iron (Fe)-Total (mg/L)	20	4	0.01500	0.06300	0.02000	0.10615	0.01198
Lead (Pb)-Total (mg/L)	20	1	0.00003	0.00025	0.00004	0.00011	0.00005
Lithium (Li)-Total (mg/L)	20	2	0.00050	0.00120	0.00057	0.00106	0.00020
Magnesium (Mg)-Total (mg/L)	20	20	1.77000	2.23000	2.02250	2.18450	0.11220
Manganese (Mn)-Total (mg/L)	20	20	0.00086	0.00319	0.00142	0.00363	0.00054
Molybdenum (Mo)-Tota (mg/L)	20	20	0.00030	0.00093	0.00044	0.00147	0.00015
Nickel (Ni)-Total (mg/L)	20	2	0.00025	0.00054	0.00028	0.00025	0.00009
Potassium (K)-Total (mg/L)	20	20	0.41600	0.53100	0.49010	0.72060	0.02654
Selenium (Se)-Total (mg/L)	20	20	0.00007	0.00024	0.00013	0.00025	0.00004
Silicon (Si)-Total (mg/L)	20	20	0.86000	2.09000	1.67650	2.15500	0.29087
Silver (Ag)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	20	20	0.83100	1.13000	0.95230	1.50150	0.08385
Strontium (Sr)-Total (mg/L)	20	20	0.10900	0.14500	0.12875	0.15200	0.01016
Thallium (Tl)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00725	0.00000
Uranium (U)-Total (mg/L)	20	20	0.00013	0.00017	0.00015	0.00025	0.00001
Vanadium (V)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	20	0	0.00150	0.00150	0.00150	0.00150	0.00000

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	E303019 : QUL-18-100m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	49.3	49.9	49.2	49.1	51.7	47.4	50.2	48.8	48.8	51.1	56.0	48.9	50.5	50.5	48.7
Ammonia (as N) (mg/L)	<0.0050	0.0077	<0.0050	<0.0050	0.0075	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0034	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0026	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.038	0.043	0.037	0.041	0.039	0.039	0.036	0.038	0.038	0.034	0.038	0.040	0.038	0.036	0.035
Nitrate (N) (mg/L)	0.148	0.168	0.162	0.176	0.133	0.151	0.160	0.159	0.131	0.152	0.162	0.165	0.128	0.135	0.159
Nitrate and Nitrite (mg/L)	0.148	0.168	0.162	0.176	0.134	0.151	0.160	0.159	0.131	0.152	0.162	0.165	0.128	0.135	0.159
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	8.64	10.4	8.53	9.11	7.79	8.56	8.71	8.29	8.00	8.77	9.14	8.75	7.70	7.89	8.79
Total Nitrogen (mg/L)	0.241	0.216	0.230	0.255	0.209	0.286	0.204	0.226	0.195	0.254	0.218	0.210	0.217	0.170	0.202
Total Phosphorus (mg/L)	0.0033	0.0051	<0.0020	<0.0020	0.0066	<0.0020	0.0025	<0.0020	0.0023	0.0021	0.0037	<0.0020	0.0030	0.0025	<0.0020
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0084	0.0094	0.0081	0.0077	0.0069	0.0086	0.0091	0.0077	0.0086	0.0102	0.0089	0.0088	0.0080	0.0112	0.0095
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	0.00013	0.00010	0.00013	0.00010	0.00012	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
Diss-Barium (Ba) (mg/L)	0.00572	0.00578	0.00568	0.00512	0.00549	0.00557	0.00596	0.00521	0.00518	0.00530	0.00542	0.00527	0.00535	0.00536	0.00552
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	19.2	21.1	20.3	18.0	18.6	17.9	18.7	18.5	18.1	18.8	18.0	19.4	17.4	18.8	18.0
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00068	0.00069	0.00072	0.00055	0.00072	0.00068	0.00109	0.00070	0.00081	0.00071	0.00078	0.00066	0.00080	0.00084	0.00092
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.33	2.41	2.30	2.09	2.20	2.29	2.33	2.26	2.10	2.19	2.15	2.12	2.19	2.29	2.28
Diss-Manganese (Mn) (mg/L)	0.00029	<0.00010	<0.00010	0.00016	0.00011	0.00014	<0.00010	0.00013	0.00013	0.00017	0.00012	0.00014	0.00024	0.00020	0.00021
Diss-Molybdenum (Mo) (mg/L)	0.000998	0.00136	0.00106	0.000928	0.000703	0.000948	0.00102	0.000855	0.000705	0.000932	0.00102	0.000966	0.000750	0.000743	0.00126
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.549	0.592	0.565	0.536	0.518	0.540	0.550	0.529	0.502	0.539	0.514	0.523	0.506	0.508	0.540
Diss-Selenium (mg/L)	0.000256	0.000328	0.000248	0.000246	0.000195	0.000238	0.000211	0.000218	0.000213	0.000307	0.000290	0.000203	0.000202	0.000276	0.000320

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	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients					
Alkalinity (CaCO3) (mg/L)	46.3	48.9	50.6	50.1	51.5
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.041	0.037	0.042	0.038	0.030
Nitrate (N) (mg/L)	0.183	0.176	0.168	0.169	0.168
Nitrate and Nitrite (mg/L)	0.183	0.176	0.168	0.169	0.168
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	10.4	11.1	10.4	10.2	8.25
Total Nitrogen (mg/L)	0.242	0.221	0.246	0.211	0.212
Total Phosphorus (mg/L)	0.0024	0.0028	0.0025	0.0022	<0.0020
Dissolved Metals					
Aluminum (Al)-Diss (mg/L)	0.0094	0.0143	0.0099	0.0117	0.0062
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00017	0.00010	0.00012	0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00591	0.00566	0.00554	0.00559	0.00514
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.2	20.7	19.7	18.3	19.5
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00078	0.00079	0.00080	0.00092	0.00062
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	0.0010	<0.0010	0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.27	2.36	2.44	2.31	2.09
Diss-Manganese (Mn) (mg/L)	0.00029	0.00031	0.00020	0.00032	0.00013
Diss-Molybdenum (Mo) (mg/L)	0.00152	0.00191	0.00174	0.00136	0.000948
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.540	0.534	0.577	0.520	0.516
Diss-Selenium (mg/L)	0.000416	0.000453	0.000413	0.000377	0.000233

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Diss-Silicon (Si) (mg/L)	1.71	1.76	1.85	1.76	1.85	1.81	1.99	1.74	1.78	1.87	1.82	1.78	1.71	1.94	1.85
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.28	1.51	1.26	1.09	1.08	1.20	1.25	1.15	1.07	1.15	1.11	1.06	1.07	1.08	1.23
Diss-Strontium (Sr) (mg/L)	0.149	0.147	0.156	0.143	0.144	0.155	0.155	0.153	0.141	0.148	0.153	0.150	0.146	0.146	0.139
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000178	0.000184	0.000155	0.000161	0.000155	0.000153	0.000173	0.000162	0.000157	0.000162	0.000154	0.000169	0.000156	0.000166	0.000157
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	99	86	79	77	69	76	76	77	72	69	85	75	80	74	74
Field Tests															
Cond (in situ) (µs/cm)		124.7	118.6	117.7	122.8	116.5	119.1	116.8	114.7	138.4	120	115.8	115.1	115.5	115.4
NTU - in situ (ntu)		0.49	0.37	0.29	0.13	0	0.14	0.16	0.11	0.2	0.24	0.06	0	0.27	0
pH (in situ) (pH)		7.7	7.51	7.64	7.54	7.25	7.81	8	8.48	7.36	8.46	7.78	7.6	7.72	7.49
Sample Depth (m)		100	100	100	100	100	100	100	100	100	100	100	100	100	100
Sample Taken		Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes
Temp (in situ) (Degrees Celcius)		3.986	4.159	4.803	4.274	4.46	4.524	4.758	4	4.561	4.621	4.853	3.766	4.396	4.53
Organic / Inorganic															
DOC (mg/L)	2.02	1.80	1.82	1.75	2.11	2.31	2.21	13.1	2.30	2.68	2.03	1.98	2.11	2.39	2.19
Physical Test															
Conductivity (µs/cm)	119	120	117	116	114	118	118	114	114	114	123	116	114	114	120
Hardness (mg/L)	57.5	62.5	60.1	53.6	55.5	54.2	56.3	55.6	53.8	56.0	53.8	57.2	52.5	56.4	54.3
NTU (ntu)	0.52	0.20	0.28	0.17	0.27	0.19	<0.10	0.14	0.21	0.11	0.14	0.12	0.21	0.16	0.19
pH (pH)	7.99	8.02	7.98	7.84	7.80	7.90	7.92	7.79	7.86	7.86	7.84	7.91	7.90	7.87	7.80
TDS (mg/L)	99	86	79	77	69	76	76	77	72	69	85	75	80	74	74
TSS (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.1	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	2.1	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0292	0.0192	0.0274	0.0149	0.0161	0.0203	0.0158	0.0150	0.0178	0.0180	0.0170	0.0145	0.0253	0.0166	0.0154
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00013	0.00013	0.00011	0.00012	0.00013	0.00011	0.00015	0.00011	0.00013	0.00012	0.00011	0.00014	0.00011	0.00011	0.00012
Barium (Ba)-Total (mg/L)	0.00566	0.00562	0.00543	0.00519	0.00552	0.00548	0.00527	0.00520	0.00547	0.00547	0.00535	0.00525	0.00553	0.00510	0.00562
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303019 : QUL-18-100m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.85	1.82	1.92	1.91	1.81
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.24	1.38	1.39	1.26	1.11
Diss-Strontium (Sr) (mg/L)	0.155	0.162	0.159	0.160	0.147
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000163	0.000164	0.000175	0.000170	0.000162
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	93	71	72	82	75
Field Tests					
Cond (in situ) (µs/cm)	119.7	123.7	118.7	120.6	116.1
NTU - in situ (ntu)	0.38	0.53	0.61	0.17	
pH (in situ) (pH)	7.36	7.35	7.21	7.32	7.04
Sample Depth (m)	100	100	100	100	100
Sample Taken	Yes	Yes			
Temp (in situ) (Degrees Celcius)	4.753	3.328	3.791	4.131	4.497
Organic / Inorganic					
DOC (mg/L)	2.03	2.35	2.54	2.23	2.36
Physical Test					
Conductivity (µs/cm)	120	119	116	122	118
Hardness (mg/L)	52.3	61.4	59.2	55.2	57.3
NTU (ntu)	<0.10	0.28	0.22	0.11	0.15
pH (pH)	7.87	7.90	7.81	7.89	7.72
TDS (mg/L)	93	71	72	82	75
TSS (mg/L)	<1.0	<1.0	<1.1	<1.0	<1.0
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0137	0.0286	0.0180	0.0118	0.0092
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00010	0.00013	0.00012	0.00011	0.00013
Barium (Ba)-Total (mg/L)	0.00551	0.00581	0.00611	0.00550	0.00541
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010

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	E303019 : QUL-18-100m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000053
Calcium (Ca)-Total (mg/L)	18.2	17.3	18.3	18.3	18.0	18.4	20.3	18.1	17.7	19.0	20.6	18.7	18.2	18.6	17.3
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00111	0.00105	0.00141	0.00082	0.00090	0.00095	0.00112	0.00133	0.00094	0.00084	0.00097	0.00090	0.00104	0.00080	0.00088
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	0.0010	0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0010	0.0012	0.0011
Magnesium (Mg)-Total (mg/L)	2.18	2.00	2.17	2.20	2.17	2.35	2.20	2.24	2.24	2.22	2.28	2.12	2.24	2.28	2.30
Manganese (Mn)-Total (mg/L)	0.00186	0.00115	0.00136	0.00098	0.00113	0.00139	0.00111	0.00096	0.00128	0.00102	0.00091	0.00084	0.00163	0.00121	0.00128
Molybdenum (Mo)-Tota (mg/L)	0.000980	0.00142	0.000965	0.000928	0.000699	0.000873	0.00104	0.000851	0.000710	0.000934	0.00116	0.000976	0.000754	0.000873	0.00136
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.502	0.477	0.534	0.525	0.522	0.523	0.465	0.519	0.514	0.501	0.543	0.544	0.506	0.515	0.527
Selenium (Se)-Total (mg/L)	0.000275	0.000308	0.000248	0.000215	0.000185	0.000258	0.000242	0.000290	0.000150	0.000213	0.000273	0.000277	0.000229	0.000236	0.000412
Silicon (Si)-Total (mg/L)	1.78	1.78	1.79	1.91	1.87	1.95	1.90	1.86	1.98	2.05	1.87	1.88	1.83	1.87	1.96
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.30	1.17	1.24	1.12	1.08	1.16	1.11	1.17	1.13	1.12	1.20	1.11	1.11	1.10	1.22
Strontium (Sr)-Total (mg/L)	0.134	0.150	0.140	0.137	0.138	0.146	0.158	0.147	0.140	0.145	0.149	0.145	0.143	0.156	0.146
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00046	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000167	0.000162	0.000170	0.000155	0.000163	0.000162	0.000157	0.000161	0.000175	0.000170	0.000160	0.000179	0.000166	0.000169	0.000164
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303019 : QUL-18-100m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	18.3	18.2	18.9	18.8	18.8
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00075	0.00106	0.00091	0.00081	0.00067
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	0.0010	<0.0010	0.0011	0.0010
Magnesium (Mg)-Total (mg/L)	2.32	2.27	2.45	2.36	2.24
Manganese (Mn)-Total (mg/L)	0.00133	0.00154	0.00123	0.00073	0.00059
Molybdenum (Mo)-Tota (mg/L)	0.00160	0.00200	0.00179	0.00143	0.00106
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.534	0.534	0.548	0.526	0.514
Selenium (Se)-Total (mg/L)	0.000461	0.000499	0.000454	0.000407	0.000256
Silicon (Si)-Total (mg/L)	1.90	1.90	1.92	1.94	1.88
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.22	1.33	1.27	1.29	1.13
Strontium (Sr)-Total (mg/L)	0.159	0.153	0.165	0.165	0.149
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000169	0.000172	0.000172	0.000176	0.000177
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	20	20	46.30000	56.00000	49.87500	59.89000	1.95121
Ammonia (as N) (mg/L)	20	2	0.00250	0.00770	0.00301	0.00458	0.00157
Chloride (mg/L)	20	0	0.25000	0.25000	0.25000	0.61500	0.00000
Diss-Orthophosphate (mg/L)	20	1	0.00050	0.00120	0.00054	0.00226	0.00016
Diss-Phosphorus (mg/L)	20	2	0.00100	0.00340	0.00120	0.00393	0.00063
Floride (mg/L)	20	20	0.03000	0.04300	0.03790	0.06595	0.00294
Nitrate (N) (mg/L)	20	20	0.12800	0.18300	0.15765	0.23725	0.01581
Nitrate and Nitrite (mg/L)	20	20	0.12800	0.18300	0.15770	0.18255	0.01572
Nitrite (N) (mg/L)	20	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	20	20	7.70000	11.10000	8.97100	15.29500	0.99962
Total Nitrogen (mg/L)	20	20	0.17000	0.28600	0.22325	0.29895	0.02551
Total Phosphorus (mg/L)	20	13	0.00100	0.00660	0.00240	0.01506	0.00148
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	20	20	0.00620	0.01430	0.00913	0.01583	0.00179
Diss-Antimony (Sb) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00025	0.00000
Diss-Arsenic (As) (mg/L)	20	12	0.00005	0.00017	0.00009	0.00063	0.00004
Diss-Barium (Ba) (mg/L)	20	20	0.00512	0.00596	0.00549	0.01366	0.00025
Diss-Beryllium (Be) (mg/L)	20	0	0.00005	0.00050	0.00014	0.00005	0.00018
Diss-Bismuth (Bi) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	20	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	20	20	17.20000	21.10000	18.81000	21.99500	1.05377
Diss-Chromium (Cr) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	20	20	0.00055	0.00109	0.00076	0.00422	0.00012
Diss-Iron (Fe) (mg/L)	20	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00036	0.00000
Diss-Lithium (Li) (mg/L)	20	3	0.00050	0.00100	0.00058	0.00110	0.00018
Diss-Magnesium (Mg) (mg/L)	20	20	2.09000	2.44000	2.25000	2.40000	0.10453
Diss-Manganese (Mn) (mg/L)	20	17	0.00005	0.00032	0.00017	0.00058	0.00008
Diss-Molybdenum (Mo) (mg/L)	20	20	0.00070	0.00191	0.00109	0.00537	0.00034
Diss-Nickel (Ni) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	20	20	0.50200	0.59200	0.53490	1.04650	0.02360

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Diss-Selenium (mg/L)	20	20	0.00020	0.00045	0.00028	0.00027	0.00008
Diss-Silicon (Si) (mg/L)	20	20	1.71000	1.99000	1.82650	1.94300	0.07534
Diss-Silver (Ag) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	20	20	1.06000	1.51000	1.19850	3.43150	0.12537
Diss-Strontium (Sr) (mg/L)	20	20	0.13900	0.16200	0.15040	0.18215	0.00646
Diss-Thallium (Tl) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	20	20	0.00015	0.00018	0.00016	0.00056	0.00001
Diss-Vanadium (V) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	20	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	20	20	69.00000	99.00000	78.05000	102.50000	7.75598
Field Tests							
Cond (in situ) (µs/cm)	19	19	114.70000	138.40000	119.46842	151.34000	5.45619
NTU - in situ (ntu)	18	18	0.00000	0.61000	0.23056	3.84000	0.18453
pH (in situ) (pH)	19	19	7.04000	8.48000	7.61158	7.81050	0.38312
Sample Depth (m)	19	19	100.00000	100.00000	100.00000	100.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	19	19	3.32800	4.85300	4.32584	6.48990	0.41067
Organic / Inorganic							
DOC (mg/L)	20	20	1.75000	13.10000	2.71550	2.39550	2.45604
Physical Test							
Conductivity (µs/cm)	20	20	114.00000	123.00000	117.30000	146.30000	2.84882
Hardness (mg/L)	20	20	52.30000	62.50000	56.23500	64.75500	2.82420
NTU (ntu)	20	18	0.05000	0.52000	0.18850	28.44000	0.10210
pH (pH)	20	20	7.72000	8.02000	7.87350	7.97250	0.07264
TDS (mg/L)	20	20	69.00000	99.00000	78.05000	102.50000	7.75598
TSS (mg/L)	20	2	0.50000	2.10000	0.65000	4.42000	0.44751
Total Metals							
Aluminum (Al)-Total (mg/L)	20	20	0.00920	0.02920	0.01819	1.54150	0.00547
Antimony (Sb)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00025	0.00000
Arsenic (As)-Total (mg/L)	20	20	0.00010	0.00015	0.00012	0.00099	0.00001
Barium (Ba)-Total (mg/L)	20	20	0.00510	0.00611	0.00548	0.05379	0.00023
Beryllium (Be)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	20	0	0.00003	0.00003	0.00003	0.00025	0.00000

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	20	1	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	20	20	17.30000	20.60000	18.50000	21.83000	0.81499
Chromium (Cr)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00052	0.00000
Cobalt (Co)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00029	0.00000
Copper (Cu)-Total (mg/L)	20	20	0.00067	0.00141	0.00096	0.02646	0.00018
Iron (Fe)-Total (mg/L)	20	0	0.01500	0.01500	0.01500	0.50385	0.00000
Lead (Pb)-Total (mg/L)	20	0	0.00003	0.00003	0.00003	0.00099	0.00000
Lithium (Li)-Total (mg/L)	20	12	0.00050	0.00120	0.00082	0.00144	0.00027
Magnesium (Mg)-Total (mg/L)	20	20	2.00000	2.45000	2.24150	2.54000	0.09560
Manganese (Mn)-Total (mg/L)	20	20	0.00059	0.00186	0.00118	0.01730	0.00031
Molybdenum (Mo)-Tota (mg/L)	20	20	0.00070	0.00200	0.00112	0.00552	0.00036
Nickel (Ni)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00069	0.00000
Potassium (K)-Total (mg/L)	20	20	0.46500	0.54800	0.51865	1.85950	0.02105
Selenium (Se)-Total (mg/L)	20	20	0.00015	0.00050	0.00029	0.00030	0.00010
Silicon (Si)-Total (mg/L)	20	20	1.78000	2.05000	1.89100	5.40500	0.06743
Silver (Ag)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	20	20	1.08000	1.33000	1.17900	3.72400	0.07546
Strontium (Sr)-Total (mg/L)	20	20	0.13400	0.16500	0.14825	0.19720	0.00885
Thallium (Tl)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	20	1	0.00005	0.00046	0.00007	0.00005	0.00009
Titanium (Ti)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.04765	0.00000
Uranium (U)-Total (mg/L)	20	20	0.00016	0.00018	0.00017	0.00061	0.00001
Vanadium (V)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00257	0.00000
Zinc (Zn)-Total (mg/L)	20	0	0.00150	0.00150	0.00150	0.00620	0.00000

Grid Format Report : QUL-18-20m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-20m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	49.1	48.7	48.1	48.6	49.0	45.2	48.5	47.4	48.9	50.4	52.8	47.3	50.7	49.7	45.5
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0066	0.0071	0.0091	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0065
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0033	<0.0020	<0.0020	<0.0020	<0.0020	0.0025	0.0026	<0.0020	0.0024	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.038	0.041	0.035	0.031	0.036	0.034	0.031	0.038	0.038	0.032	0.036	0.037	0.037	0.034	0.032
Nitrate (N) (mg/L)	0.134	0.134	0.125	0.0913	0.108	0.121	0.141	0.110	0.126	0.132	0.136	0.0805	0.130	0.127	0.121
Nitrate and Nitrite (mg/L)	0.134	0.134	0.125	0.0913	0.109	0.121	0.141	0.110	0.126	0.132	0.136	0.0805	0.130	0.127	0.121
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	7.45	6.95	6.29	6.67	6.32	6.14	6.49	6.73	7.68	6.58	6.83	6.97	7.72	6.41	6.03
Total Nitrogen (mg/L)	0.189	0.220	0.231	0.192	0.211	0.212	0.191	0.277	0.202	0.180	0.199	0.134	0.212	0.165	0.178
Total Phosphorus (mg/L)	0.0038	0.0054	0.0022	0.0022	0.0078	<0.0020	0.0078	0.0031	0.0031	0.0041	<0.0020	<0.0020	0.0023	0.0039	0.0027
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0064	0.0052	0.0049	0.0088	0.0115	0.0097	0.0085	0.0076	0.0088	0.0075	0.0072	0.0065	0.0074	0.0087	0.0072
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	<0.00010	<0.00010	0.00013	0.00011	0.00010	0.00011	0.00012	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	0.00011
Diss-Barium (Ba) (mg/L)	0.00603	0.00527	0.00532	0.00512	0.00560	0.00536	0.00560	0.00506	0.00516	0.00518	0.00528	0.00490	0.00513	0.00534	0.00515
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	19.1	19.3	17.3	16.7	17.1	16.2	18.5	17.7	18.1	17.4	17.1	18.7	16.9	18.0	16.1
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00059	<0.00050	<0.00050	<0.00050	0.00063	0.00050	0.00070	0.00138	0.00079	0.00053	0.00060	0.00054	0.00080	0.00093	0.00055
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.35	2.12	2.12	1.98	2.09	1.98	2.20	2.09	2.14	1.98	2.08	1.93	2.18	2.16	2.02
Diss-Manganese (Mn) (mg/L)	0.00023	<0.00010	<0.00010	0.00023	0.00024	0.00010	0.00016	0.00044	0.00034	0.00012	0.00010	0.00025	0.00024	0.00019	0.00018
Diss-Molybdenum (Mo) (mg/L)	0.000630	0.000390	0.000421	0.000413	0.000410	0.000364	0.000427	0.000449	0.000555	0.000356	0.000469	0.000393	0.000763	0.000433	0.000391
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.581	0.534	0.523	0.493	0.516	0.496	0.528	0.506	0.521	0.516	0.518	0.495	0.503	0.508	0.521
Diss-Selenium (mg/L)	0.000177	0.000112	0.000140	0.000123	0.000120	0.000071	0.000096	0.000114	0.000174	0.000128	0.000098	0.000119	0.000157	0.000105	0.000115

	E303019 : QUL-18-20m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients					
Alkalinity (CaCO3) (mg/L)	43.6	49.7	50.4	50.6	51.2
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	0.0025	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.034	0.036	0.039	0.035	0.029
Nitrate (N) (mg/L)	0.0270	0.146	0.127	0.0932	0.128
Nitrate and Nitrite (mg/L)	0.0270	0.146	0.127	0.0932	0.128
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.32	8.06	6.52	6.53	6.47
Total Nitrogen (mg/L)	0.117	0.193	0.217	0.170	0.176
Total Phosphorus (mg/L)	0.0024	0.0027	0.0049	0.0025	<0.0020
Dissolved Metals					
Aluminum (Al)-Diss (mg/L)	0.0140	0.0100	0.0064	0.0050	0.0053
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00017	0.00012	0.00011	0.00012	<0.00010
Diss-Barium (Ba) (mg/L)	0.00534	0.00529	0.00516	0.00515	0.00478
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.4	20.5	18.2	16.8	18.8
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00053	0.00069	0.00059	<0.00050	0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.90	2.23	2.10	2.14	1.95
Diss-Manganese (Mn) (mg/L)	0.00060	0.00039	0.00017	0.00015	0.00020
Diss-Molybdenum (Mo) (mg/L)	0.000347	0.000972	0.000419	0.000405	0.000523
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.474	0.508	0.523	0.489	0.487
Diss-Selenium (mg/L)	0.000075	0.000238	0.000144	0.000113	0.000124

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	E303019 : QUL-18-20m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Diss-Silicon (Si) (mg/L)	1.70	1.72	1.78	1.62	1.99	1.79	1.96	1.59	1.79	1.80	1.74	1.41	1.72	1.97	1.82
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.21	1.04	1.02	0.910	0.958	0.948	1.06	0.961	1.08	0.972	1.02	0.868	1.08	0.986	0.970
Diss-Strontium (Sr) (mg/L)	0.147	0.137	0.141	0.128	0.127	0.131	0.145	0.138	0.141	0.137	0.142	0.138	0.145	0.130	0.124
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000178	0.000174	0.000143	0.000145	0.000136	0.000146	0.000158	0.000148	0.000158	0.000156	0.000154	0.000157	0.000159	0.000155	0.000144
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	94	81	72	64	62	61	71	71	75	63	81	67	74	72	69
Field Tests															
Cond (in situ) (µs/cm)		114.3	110.6	108.6	112.7	108.6	109.2	108.5	113.1	128.9	113.9	107.7	114.8	110.1	106.4
NTU - in situ (ntu)		0.37	0.02	0.33	0.38	0	0.12	0.14	0.01	0.05	0.01	0.23	0	0.24	0
pH (in situ) (pH)		7.74	7.81	7.87	7.5	7.67	8.07	8.09	8.59	7.71	8.52	7.85	7.79	8.01	8.24
Sample Depth (m)		20	20	20	20	20	20	20	20	20	20	20	20	20	20
Sample Taken		Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes
Temp (in situ) (Degrees Celcius)		4.301	6.038	7.488	7.523	5.443	5.664	6.268	4.961	5.974	5.682	9.055	3.868	5.292	5.333
Organic / Inorganic															
DOC (mg/L)	1.74	1.71	1.82	2.04	2.47	2.31	2.21	12.9	2.51	2.08	1.85	1.64	2.17	2.60	2.25
Physical Test															
Conductivity (µs/cm)	116	111	109	111	107	104	109	107	114	106	115	108	115	107	107
Hardness (mg/L)	57.4	56.9	52.0	49.9	51.4	48.7	55.2	52.8	54.0	51.6	51.3	54.6	51.2	53.8	48.5
NTU (ntu)	0.31	0.12	0.12	0.18	0.54	0.32	<0.10	0.18	0.16	0.24	0.14	0.12	0.35	0.34	0.22
pH (pH)	7.99	8.00	7.98	7.91	7.75	7.80	7.92	7.83	7.86	7.87	7.84	7.95	7.93	7.86	7.80
TDS (mg/L)	94	81	72	64	62	61	71	71	75	63	81	67	74	72	69
TSS (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.1	<1.0	<1.0	<1.1	<1.0	<1.1	<1.0	1.1	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0171	0.0091	0.0108	0.0122	0.0336	0.0252	0.0126	0.0140	0.0193	0.0125	0.0103	0.0139	0.0254	0.0195	0.0160
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00013	0.00011	<0.00010	0.00012	0.00014	0.00012	0.00013	0.00011	0.00015	0.00011	0.00011	0.00012	0.00012	0.00012	<0.00010
Barium (Ba)-Total (mg/L)	0.00538	0.00508	0.00454	0.00487	0.00590	0.00531	0.00502	0.00498	0.00517	0.00531	0.00486	0.00511	0.00571	0.00520	0.00564
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

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	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.33	1.77	1.86	1.41	1.55
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.883	1.15	1.02	1.00	0.972
Diss-Strontium (Sr) (mg/L)	0.132	0.153	0.138	0.136	0.146
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000136	0.000153	0.000162	0.000154	0.000165
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	85	75	67	72	66
Field Tests					
Cond (in situ) (µs/cm)	104.9	115.6	111.6	128.3	110.8
NTU - in situ (ntu)	0.39	0.33	0.53	0.28	
pH (in situ) (pH)	7.84	7.46	7.69	7.85	7.13
Sample Depth (m)	20	20	20	20	20
Sample Taken	Yes	Yes			
Temp (in situ) (Degrees Celcius)	10.482	3.823	6.874	7.649	5.715
Organic / Inorganic					
DOC (mg/L)	2.02	2.28	2.46	2.26	1.99
Physical Test					
Conductivity (µs/cm)	104	112	103	98.3	113
Hardness (mg/L)	51.3	60.4	54.1	50.8	55.0
NTU (ntu)	0.20	0.25	0.36	0.36	0.14
pH (pH)	7.85	7.91	7.83	7.83	7.78
TDS (mg/L)	85	75	67	72	66
TSS (mg/L)	<1.0	<1.0	<1.1	<1.0	<1.2
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0113	0.0163	0.0153	0.0102	0.0098
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	0.00013	<0.00010	0.00013	0.00012
Barium (Ba)-Total (mg/L)	0.00516	0.00538	0.00590	0.00508	0.00505
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010

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	E303019 : QUL-18-20m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.7	16.4	16.2	17.0	16.8	17.3	18.4	17.1	18.8	18.3	19.4	17.2	18.2	17.8	16.8
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00084	0.00069	0.00060	0.00063	0.00082	0.00062	0.00089	0.00082	0.00090	0.00054	0.00069	0.00170	0.00103	0.00068	0.00161
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	0.046	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	0.000267	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0013	0.0010
Magnesium (Mg)-Total (mg/L)	2.15	1.88	1.86	2.04	2.07	2.10	2.04	2.11	2.21	2.02	2.15	2.02	2.19	2.20	2.10
Manganese (Mn)-Total (mg/L)	0.00126	0.00089	0.00069	0.00102	0.00222	0.00144	0.00079	0.00135	0.00144	0.00098	0.00069	0.00100	0.00176	0.00161	0.00088
Molybdenum (Mo)-Tota (mg/L)	0.000661	0.000423	0.000371	0.000392	0.000406	0.000338	0.000403	0.000414	0.000679	0.000391	0.000448	0.000420	0.000731	0.000468	0.000410
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00051	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.498	0.451	0.465	0.498	0.528	0.502	0.440	0.486	0.512	0.485	0.523	0.502	0.495	0.526	0.520
Selenium (Se)-Total (mg/L)	0.000175	0.000107	0.000104	0.000082	0.000141	0.000105	0.000130	0.000102	0.000187	0.000123	0.000145	0.000144	0.000170	0.000119	0.000106
Silicon (Si)-Total (mg/L)	1.74	1.76	1.59	1.74	1.96	1.94	1.91	1.71	1.88	1.98	1.84	1.66	1.84	1.89	1.94
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.17	0.908	0.893	0.920	0.979	0.937	0.932	0.999	1.10	0.942	1.04	0.923	1.07	1.03	1.01
Strontium (Sr)-Total (mg/L)	0.134	0.141	0.125	0.125	0.126	0.127	0.140	0.137	0.142	0.137	0.138	0.138	0.146	0.150	0.137
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000162	0.000162	0.000150	0.000143	0.000147	0.000152	0.000139	0.000155	0.000172	0.000162	0.000159	0.000172	0.000168	0.000159	0.000153
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303019 : QUL-18-20m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.2	17.4	17.5	17.3	18.1
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00052	0.00075	0.00069	0.00054	0.00056
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.94	2.12	2.20	2.13	2.13
Manganese (Mn)-Total (mg/L)	0.00110	0.00118	0.00122	0.00090	0.00069
Molybdenum (Mo)-Tota (mg/L)	0.000301	0.000956	0.000412	0.000419	0.000512
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.477	0.501	0.521	0.494	0.497
Selenium (Se)-Total (mg/L)	0.000117	0.000258	0.000090	0.000133	0.000135
Silicon (Si)-Total (mg/L)	1.29	1.82	1.82	1.46	1.58
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.863	1.10	0.964	1.02	0.979
Strontium (Sr)-Total (mg/L)	0.134	0.135	0.143	0.134	0.138
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000147	0.000160	0.000154	0.000160	0.000160
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	20	20	43.60000	52.80000	48.77000	51.20000	2.19091
Ammonia (as N) (mg/L)	20	4	0.00250	0.00910	0.00347	0.00579	0.00204
Chloride (mg/L)	20	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	20	0	0.00050	0.00050	0.00050	0.00190	0.00000
Diss-Phosphorus (mg/L)	20	5	0.00100	0.00330	0.00142	0.00233	0.00076
Floride (mg/L)	20	20	0.02900	0.04100	0.03515	0.03765	0.00307
Nitrate (N) (mg/L)	20	20	0.02700	0.14600	0.11690	0.13665	0.02718
Nitrate and Nitrite (mg/L)	20	20	0.02700	0.14600	0.11695	0.13665	0.02716
Nitrite (N) (mg/L)	20	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	20	20	6.03000	8.06000	6.75800	7.22450	0.56082
Total Nitrogen (mg/L)	20	20	0.11700	0.27700	0.19330	0.20990	0.03421
Total Phosphorus (mg/L)	20	16	0.00100	0.00780	0.00325	0.00572	0.00199
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	20	20	0.00490	0.01400	0.00783	0.00980	0.00229
Diss-Antimony (Sb) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	20	13	0.00005	0.00017	0.00009	0.00015	0.00004
Diss-Barium (Ba) (mg/L)	20	20	0.00478	0.00603	0.00526	0.00590	0.00027
Diss-Beryllium (Be) (mg/L)	20	0	0.00005	0.00050	0.00014	0.00005	0.00018
Diss-Bismuth (Bi) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Boron (B) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	20	0	0.00000	0.00000	0.00000	0.00000	0.00000
Diss-Calcium (Ca) (mg/L)	20	20	16.10000	20.50000	17.79500	18.66000	1.12037
Diss-Chromium (Cr) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	20	16	0.00025	0.00138	0.00059	0.00126	0.00027
Diss-Iron (Fe) (mg/L)	20	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00044	0.00000
Diss-Lithium (Li) (mg/L)	20	1	0.00050	0.00100	0.00053	0.00080	0.00011
Diss-Magnesium (Mg) (mg/L)	20	20	1.90000	2.35000	2.08700	2.22550	0.11277
Diss-Manganese (Mn) (mg/L)	20	18	0.00005	0.00060	0.00022	0.00040	0.00014
Diss-Molybdenum (Mo) (mg/L)	20	20	0.00035	0.00097	0.00048	0.00059	0.00015
Diss-Nickel (Ni) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00042	0.00000
Diss-Potassium (K) (mg/L)	20	20	0.47400	0.58100	0.51200	0.58520	0.02251

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Diss-Selenium (mg/L)	20	20	0.00007	0.00024	0.00013	0.00014	0.00004
Diss-Silicon (Si) (mg/L)	20	20	1.33000	1.99000	1.71600	1.79000	0.18432
Diss-Silver (Ag) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	20	20	0.86800	1.21000	1.00540	1.18200	0.08369
Diss-Strontium (Sr) (mg/L)	20	20	0.12400	0.15300	0.13780	0.14200	0.00752
Diss-Thallium (Tl) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	20	20	0.00014	0.00018	0.00015	0.00017	0.00001
Diss-Vanadium (V) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Zinc (Zn) (mg/L)	20	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	20	20	61.00000	94.00000	72.10000	79.25000	8.27107
Field Tests							
Cond (in situ) (µs/cm)	19	19	104.90000	128.90000	112.55789	114.16000	6.35709
NTU - in situ (ntu)	18	18	0.00000	0.53000	0.19056	1.14600	0.17227
pH (in situ) (pH)	19	19	7.13000	8.59000	7.86474	8.02700	0.34677
Sample Depth (m)	19	19	20.00000	20.00000	20.00000	20.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	19	19	3.82300	10.48200	6.18068	9.06920	1.69467
Organic / Inorganic							
DOC (mg/L)	20	20	1.64000	12.90000	2.66550	2.02300	2.42495
Physical Test							
Conductivity (µs/cm)	20	20	98.30000	116.00000	108.81500	114.95000	4.61579
Hardness (mg/L)	20	20	48.50000	60.40000	53.04500	55.42000	3.00271
NTU (ntu)	20	19	0.05000	0.54000	0.23500	0.57000	0.11848
pH (pH)	20	20	7.75000	8.00000	7.87450	7.95000	0.07156
TDS (mg/L)	20	20	61.00000	94.00000	72.10000	79.25000	8.27107
TSS (mg/L)	20	1	0.50000	1.10000	0.54500	1.50000	0.13367
Total Metals							
Aluminum (Al)-Total (mg/L)	20	20	0.00910	0.03360	0.01572	0.03146	0.00630
Antimony (Sb)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Arsenic (As)-Total (mg/L)	20	17	0.00005	0.00015	0.00011	0.00016	0.00003
Barium (Ba)-Total (mg/L)	20	20	0.00454	0.00590	0.00523	0.00615	0.00035
Beryllium (Be)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	20	0	0.00003	0.00003	0.00003	0.00003	0.00000

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Boron (B)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	20	0	0.00000	0.00000	0.00000	0.00000	0.00000
Calcium (Ca)-Total (mg/L)	20	20	16.20000	19.40000	17.49500	18.30000	0.85500
Chromium (Cr)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	20	20	0.00052	0.00170	0.00081	0.00143	0.00032
Iron (Fe)-Total (mg/L)	20	1	0.01500	0.04600	0.01655	0.01500	0.00693
Lead (Pb)-Total (mg/L)	20	1	0.00003	0.00027	0.00004	0.00073	0.00005
Lithium (Li)-Total (mg/L)	20	4	0.00050	0.00130	0.00062	0.00127	0.00024
Magnesium (Mg)-Total (mg/L)	20	20	1.86000	2.21000	2.08300	2.18000	0.10110
Manganese (Mn)-Total (mg/L)	20	20	0.00069	0.00222	0.00116	0.00155	0.00040
Molybdenum (Mo)-Tota (mg/L)	20	20	0.00030	0.00096	0.00048	0.00061	0.00016
Nickel (Ni)-Total (mg/L)	20	1	0.00025	0.00051	0.00026	0.00078	0.00006
Potassium (K)-Total (mg/L)	20	20	0.44000	0.52800	0.49605	0.56595	0.02398
Selenium (Se)-Total (mg/L)	20	20	0.00008	0.00026	0.00013	0.00015	0.00004
Silicon (Si)-Total (mg/L)	20	20	1.29000	1.98000	1.76750	1.86600	0.17938
Silver (Ag)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	20	20	0.86300	1.17000	0.98895	1.10250	0.07931
Strontium (Sr)-Total (mg/L)	20	20	0.12500	0.15000	0.13635	0.14330	0.00677
Thallium (Tl)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	20	20	0.00014	0.00017	0.00016	0.00017	0.00001
Vanadium (V)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Zinc (Zn)-Total (mg/L)	20	0	0.00150	0.00150	0.00150	0.00326	0.00000

Grid Format Report : QUL-18-50m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-50m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	49.0	49.5	48.8	49.9	50.7	47.9	49.3	47.1	48.4	51.1	55.3	48.5	50.4	50.3	48.0
Ammonia (as N) (mg/L)	<0.0050	0.0061	<0.0050	<0.0050	0.0082	<0.0050	0.0128	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0026	<0.0020	<0.0020	<0.0020	<0.0020	0.0035	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	<0.0020
Floride (mg/L)	0.038	0.044	0.031	0.033	0.038	0.038	0.036	0.036	0.037	0.033	0.038	0.037	0.041	0.036	0.034
Nitrate (N) (mg/L)	0.138	0.146	0.146	0.154	0.131	0.138	0.142	0.114	0.136	0.142	0.152	0.154	0.128	0.132	0.139
Nitrate and Nitrite (mg/L)	0.138	0.146	0.146	0.154	0.132	0.138	0.143	0.114	0.136	0.142	0.152	0.154	0.128	0.132	0.139
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	7.74	8.11	6.77	7.81	7.15	6.95	6.93	6.85	7.97	7.26	7.56	8.28	7.74	6.77	6.65
Total Nitrogen (mg/L)	0.186	0.193	0.231	0.241	0.209	0.210	0.208	0.192	0.199	0.176	0.212	0.193	0.208	0.171	0.177
Total Phosphorus (mg/L)	0.0022	0.0048	0.0021	0.0033	0.0058	<0.0020	<0.0020	0.0020	0.0028	0.0021	0.0023	<0.0020	0.0035	0.0030	<0.0020
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0066	0.0059	0.0065	0.0075	0.0072	0.0071	0.0077	0.0072	0.0094	0.0146	0.0076	0.0159	0.0081	0.0083	0.0076
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00010	0.00012	<0.00010	0.00012	0.00011	0.00011	0.00011	0.00011	<0.00010	0.00014	<0.00010	<0.00010	0.00010	0.00010	0.00012
Diss-Barium (Ba) (mg/L)	0.00559	0.00538	0.00528	0.00545	0.00535	0.00549	0.00558	0.00499	0.00512	0.00551	0.00534	0.00522	0.00530	0.00514	0.00533
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	19.1	19.7	17.8	17.6	18.1	17.2	18.2	17.1	18.5	18.3	17.4	19.1	17.7	18.8	17.5
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00061	0.00059	0.00051	0.00051	0.00073	0.00057	0.00104	0.00065	0.00086	0.00150	0.00070	0.00071	0.00078	0.00055	0.00076
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.27	2.27	2.11	2.04	2.11	2.14	2.13	2.08	2.14	2.09	2.12	2.15	2.19	2.20	2.15
Diss-Manganese (Mn) (mg/L)	0.00017	<0.00010	<0.00010	0.00019	0.00015	0.00010	0.00013	0.00041	0.00015	0.00052	0.00017	0.00027	0.00024	0.00014	0.00015
Diss-Molybdenum (Mo) (mg/L)	0.000727	0.000721	0.000526	0.000710	0.000491	0.000538	0.000598	0.000458	0.000675	0.000560	0.000601	0.000788	0.000741	0.000482	0.000525
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.538	0.549	0.508	0.516	0.506	0.514	0.513	0.491	0.514	0.530	0.518	0.534	0.512	0.508	0.528
Diss-Selenium (mg/L)	0.000198	0.000181	0.000131	0.000253	0.000156	0.000134	0.000170	0.000120	0.000156	0.000159	0.000200	0.000232	0.000210	0.000134	0.000139

	E303019 : QUL-18-50m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients					
Alkalinity (CaCO3) (mg/L)	45.5	49.2	50.1	49.9	51.3
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	0.0022	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.042	0.036	0.039	0.036	0.029
Nitrate (N) (mg/L)	0.155	0.149	0.144	0.150	0.140
Nitrate and Nitrite (mg/L)	0.155	0.149	0.144	0.150	0.140
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	7.50	8.04	6.74	7.37	6.53
Total Nitrogen (mg/L)	0.209	0.188	0.216	0.198	0.184
Total Phosphorus (mg/L)	<0.0020	0.0027	0.0024	0.0023	<0.0020
Dissolved Metals					
Aluminum (Al)-Diss (mg/L)	0.0071	0.0112	0.0072	0.0055	0.0056
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00013	<0.00010	0.00011	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00548	0.00519	0.00518	0.00518	0.00481
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	19.9	19.6	18.8	17.2	18.7
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00057	0.00073	0.00066	0.00063	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.14	2.21	2.18	2.21	1.93
Diss-Manganese (Mn) (mg/L)	0.00012	0.00036	0.00021	0.00015	0.00012
Diss-Molybdenum (Mo) (mg/L)	0.000657	0.000920	0.000482	0.000645	0.000505
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.514	0.499	0.530	0.502	0.483
Diss-Selenium (mg/L)	0.000197	0.000204	0.000114	0.000188	0.000129

Grid Format Report : QUL-18-50m - QUL Deep Site in Middle of

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	E303019 : QUL-18-50m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Diss-Silicon (Si) (mg/L)	1.65	1.75	1.80	1.72	1.83	1.79	1.85	1.65	1.78	1.82	1.79	1.74	1.71	1.95	1.85
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.19	1.27	1.06	1.01	0.994	1.06	1.09	0.957	1.08	1.04	1.04	1.05	1.08	1.01	1.05
Diss-Strontium (Sr) (mg/L)	0.141	0.137	0.141	0.132	0.137	0.144	0.138	0.136	0.140	0.143	0.145	0.144	0.146	0.135	0.135
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000171	0.000173	0.000145	0.000144	0.000151	0.000155	0.000159	0.000144	0.000160	0.000157	0.000149	0.000164	0.000160	0.000158	0.000153
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	89	81	76	67	67	74	73	65	78	66	82	71	80	74	86
Field Tests															
Cond (in situ) (µs/cm)		118	112.7	114.4	119.6	112	112.7	109.3	113.4	132.9	116	112.8	114.4	112.3	110
NTU - in situ (ntu)		0.39	0.17	0.43	0.14	0	0.11	0.24	0	0.17	0.14	0.12	0	0.27	0
pH (in situ) (pH)		7.71	7.56	7.73	7.5	7.35	7.91	8.08	8.49	7.47	8.45	7.61	7.64	7.83	7.68
Sample Depth (m)		50	50	50	50	50	50	50	50	50	50	50	50	50	50
Sample Taken		Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes	Yes	Yes
Temp (in situ) (Degrees Celcius)		3.996	4.509	5.601	4.527	4.56	4.634	6.163	4.22	4.672	4.84	5.463	3.856	4.59	4.498
Organic / Inorganic															
DOC (mg/L)	1.95	1.80	1.77	1.89	2.16	2.20	2.17	12.9	2.32	2.23	2.26	1.83	2.42	2.60	2.23
Physical Test															
Conductivity (µs/cm)	117	114	112	117	111	111	112	108	114	110	118	113	114	110	113
Hardness (mg/L)	57.0	58.5	53.0	52.4	54.0	51.7	54.3	51.2	55.0	54.3	52.2	56.5	53.2	56.0	52.6
NTU (ntu)	0.29	0.14	0.17	0.33	0.20	0.21	<0.10	0.22	0.20	0.10	<0.10	<0.10	0.20	0.24	0.16
pH (pH)	7.99	8.01	7.97	7.88	7.78	7.89	7.91	7.83	7.87	7.87	7.84	7.87	7.89	7.86	7.82
TDS (mg/L)	89	81	76	67	67	74	73	65	78	66	82	71	80	74	86
TSS (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.1	<1.0	<1.1	<1.0	<1.0	<1.0	2.2	<1.0	<1.1
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0215	0.0121	0.0086	0.0408	0.0182	0.0163	0.0133	0.0144	0.0203	0.0113	0.0110	0.0120	0.0286	0.0177	0.0116
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00015	0.00013	<0.00010	0.00011	0.00013	0.00012	0.00014	<0.00010	0.00014	0.00012	0.00010	0.00016	0.00014	0.00011	0.00013
Barium (Ba)-Total (mg/L)	0.00552	0.00513	0.00440	0.00539	0.00550	0.00519	0.00498	0.00486	0.00517	0.00526	0.00489	0.00517	0.00562	0.00510	0.00541
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303019 : QUL-18-50m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.83	1.83	1.88	1.81	1.66
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.07	1.15	1.04	1.10	0.973
Diss-Strontium (Sr) (mg/L)	0.143	0.147	0.140	0.144	0.146
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000156	0.000160	0.000162	0.000160	0.000162
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	90	69	65	73	67
Field Tests					
Cond (in situ) (µs/cm)	113.4	115.7	108.5	112.5	111.1
NTU - in situ (ntu)	0.4	0.35	0.61	0.12	
pH (in situ) (pH)	7.52	7.48	7.42	7.39	7.1
Sample Depth (m)	50	50	50	50	50
Sample Taken	Yes	Yes			
Temp (in situ) (Degrees Celcius)	4.759	3.805	4.46	4.58	5.163
Organic / Inorganic					
DOC (mg/L)	2.14	2.64	2.32	2.13	1.94
Physical Test					
Conductivity (µs/cm)	112	114	105	115	113
Hardness (mg/L)	58.5	58.0	55.9	52.0	54.6
NTU (ntu)	<0.10	0.30	0.16	<0.10	0.13
pH (pH)	7.86	7.91	7.80	7.89	7.77
TDS (mg/L)	90	69	65	73	67
TSS (mg/L)	<1.0	<1.0	<1.1	1.4	<1.0
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0096	0.0176	0.0149	0.0091	0.0096
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	0.00011	0.00011	0.00012	0.00011
Barium (Ba)-Total (mg/L)	0.00548	0.00556	0.00557	0.00520	0.00513
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010

Grid Format Report : QUL-18-50m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-50m														
	8-May-19	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000071	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000053	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	19.1	17.2	16.1	18.0	17.6	17.9	18.8	16.6	18.8	18.0	18.1	18.6	18.0	18.3	17.3
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00099	0.00081	0.00058	0.00248	0.00103	0.00079	0.00097	0.00079	0.00092	0.00109	0.00073	0.00068	0.00110	0.00066	0.00064
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	0.033	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0013	0.0010
Magnesium (Mg)-Total (mg/L)	2.14	1.95	1.96	2.09	2.11	2.29	2.05	2.13	2.14	2.12	2.08	2.08	2.22	2.20	2.19
Manganese (Mn)-Total (mg/L)	0.00145	0.00077	0.00069	0.00151	0.00124	0.00107	0.00086	0.00141	0.00129	0.00086	0.00082	0.00079	0.00164	0.00135	0.00083
Mercury (Hg)-Total (mg/L)					<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000500	<0.0000050
Molybdenum (Mo)-Tota (mg/L)	0.000792	0.000745	0.000498	0.000703	0.000500	0.000461	0.000535	0.000442	0.000690	0.000554	0.000640	0.000866	0.000763	0.000513	0.000570
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.498	0.431	0.492	0.509	0.502	0.521	0.435	0.492	0.487	0.500	0.500	0.517	0.506	0.504	0.522
Selenium (Se)-Total (mg/L)	0.000195	0.000166	0.000159	0.000180	0.000122	0.000125	0.000166	0.000147	0.000172	0.000171	0.000158	0.000202	0.000211	0.000128	0.000144
Silicon (Si)-Total (mg/L)	1.75	1.78	1.63	1.87	1.89	1.93	1.83	1.69	1.84	1.99	1.74	1.81	1.79	1.88	1.99
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.21	1.02	0.986	1.02	1.00	1.04	0.962	1.01	1.06	1.01	1.03	1.05	1.09	1.04	1.07
Strontium (Sr)-Total (mg/L)	0.147	0.143	0.131	0.135	0.134	0.135	0.144	0.133	0.149	0.139	0.143	0.144	0.144	0.152	0.143
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000169	0.000168	0.000155	0.000154	0.000152	0.000173	0.000142	0.000150	0.000163	0.000168	0.000158	0.000175	0.000163	0.000164	0.000165
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303019 : QUL-18-50m				
	19-Oct-22	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.9	17.6	17.8	17.4	18.1
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00074	0.00080	0.00061	0.00061	0.00056
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	<0.0010	<0.0010	0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	2.21	2.16	2.21	2.19	2.13
Manganese (Mn)-Total (mg/L)	0.00107	0.00137	0.00126	0.00067	0.00070
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Tota (mg/L)	0.000642	0.000988	0.000500	0.000670	0.000475
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.529	0.514	0.507	0.506	0.493
Selenium (Se)-Total (mg/L)	0.000229	0.000246	0.000158	0.000204	0.000163
Silicon (Si)-Total (mg/L)	1.90	1.93	1.94	1.87	1.66
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.05	1.12	0.977	1.10	1.01
Strontium (Sr)-Total (mg/L)	0.148	0.139	0.146	0.144	0.140
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000156	0.000158	0.000156	0.000171	0.000170
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Grid Format Report : QUL-18-50m - QUL Deep Site in Middle of

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	E303019 : QUL-18-50m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	20	20	45.50000	55.30000	49.51000	51.17000	1.95553
Ammonia (as N) (mg/L)	20	3	0.00250	0.01280	0.00348	0.00250	0.00264
Chloride (mg/L)	20	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	20	0	0.00050	0.00050	0.00050	0.00174	0.00000
Diss-Phosphorus (mg/L)	20	4	0.00100	0.00350	0.00133	0.00285	0.00072
Floride (mg/L)	20	20	0.02900	0.04400	0.03660	0.03770	0.00356
Nitrate (N) (mg/L)	20	20	0.11400	0.15500	0.14150	0.16780	0.01022
Nitrate and Nitrite (mg/L)	20	20	0.11400	0.15500	0.14160	0.16780	0.01017
Nitrite (N) (mg/L)	20	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	20	20	6.53000	8.28000	7.33600	8.14900	0.54886
Total Nitrogen (mg/L)	20	20	0.17100	0.24100	0.20005	0.21470	0.01798
Total Phosphorus (mg/L)	20	14	0.00100	0.00580	0.00237	0.00481	0.00130
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	20	20	0.00550	0.01590	0.00819	0.00806	0.00274
Diss-Antimony (Sb) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	20	13	0.00005	0.00014	0.00009	0.00016	0.00003
Diss-Barium (Ba) (mg/L)	20	20	0.00481	0.00559	0.00530	0.00573	0.00020
Diss-Beryllium (Be) (mg/L)	20	0	0.00005	0.00050	0.00014	0.00005	0.00018
Diss-Bismuth (Bi) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Boron (B) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	20	0	0.00000	0.00000	0.00000	0.00000	0.00000
Diss-Calcium (Ca) (mg/L)	20	20	17.10000	19.90000	18.31500	18.60000	0.87796
Diss-Chromium (Cr) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	20	19	0.00025	0.00150	0.00070	0.00114	0.00025
Diss-Iron (Fe) (mg/L)	20	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	20	0	0.00003	0.00003	0.00003	0.00039	0.00000
Diss-Lithium (Li) (mg/L)	20	0	0.00050	0.00050	0.00050	0.00050	0.00000
Diss-Magnesium (Mg) (mg/L)	20	20	1.93000	2.27000	2.14300	2.26700	0.07740
Diss-Manganese (Mn) (mg/L)	20	18	0.00005	0.00052	0.00019	0.00031	0.00012
Diss-Molybdenum (Mo) (mg/L)	20	20	0.00046	0.00092	0.00062	0.00084	0.00012
Diss-Nickel (Ni) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	20	20	0.48300	0.54900	0.51535	0.58280	0.01605

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Diss-Selenium (mg/L)	20	20	0.00011	0.00025	0.00017	0.00020	0.00004
Diss-Silicon (Si) (mg/L)	20	20	1.65000	1.95000	1.78450	1.79700	0.07884
Diss-Silver (Ag) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	20	20	0.95700	1.27000	1.06570	1.22700	0.07283
Diss-Strontium (Sr) (mg/L)	20	20	0.13200	0.14700	0.14070	0.14340	0.00433
Diss-Thallium (Tl) (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	20	20	0.00014	0.00017	0.00016	0.00017	0.00001
Diss-Vanadium (V) (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Zinc (Zn) (mg/L)	20	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	20	20	65.00000	90.00000	74.65000	84.00000	7.92913
Field Tests							
Cond (in situ) (µs/cm)	19	19	108.50000	132.90000	114.30000	115.92000	5.27836
NTU - in situ (ntu)	18	18	0.00000	0.61000	0.20333	0.83800	0.17419
pH (in situ) (pH)	19	19	7.10000	8.49000	7.68000	7.90900	0.35338
Sample Depth (m)	19	19	50.00000	50.00000	50.00000	50.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	19	19	3.80500	6.16300	4.67874	6.56380	0.58777
Organic / Inorganic							
DOC (mg/L)	20	20	1.77000	12.90000	2.69500	2.19900	2.41426
Physical Test							
Conductivity (µs/cm)	20	20	105.00000	118.00000	112.65000	116.70000	3.08263
Hardness (mg/L)	20	20	51.20000	58.50000	54.54500	55.95000	2.31118
NTU (ntu)	20	15	0.05000	0.33000	0.16500	0.58600	0.08817
pH (pH)	20	20	7.77000	8.01000	7.87550	7.94700	0.06329
TDS (mg/L)	20	20	65.00000	90.00000	74.65000	84.00000	7.92913
TSS (mg/L)	20	2	0.50000	2.20000	0.64000	1.47000	0.41789
Total Metals							
Aluminum (Al)-Total (mg/L)	20	20	0.00860	0.04080	0.01593	0.03348	0.00770
Antimony (Sb)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Arsenic (As)-Total (mg/L)	20	18	0.00005	0.00016	0.00012	0.00027	0.00003
Barium (Ba)-Total (mg/L)	20	20	0.00440	0.00562	0.00523	0.00611	0.00030
Beryllium (Be)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	20	0	0.00003	0.00003	0.00003	0.00003	0.00000

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Boron (B)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	20	2	0.00000	0.00001	0.00000	0.00000	0.00000
Calcium (Ca)-Total (mg/L)	20	20	16.10000	19.10000	17.86000	18.77000	0.72577
Chromium (Cr)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	20	20	0.00056	0.00248	0.00088	0.00160	0.00041
Iron (Fe)-Total (mg/L)	20	1	0.01500	0.03300	0.01590	0.01500	0.00402
Lead (Pb)-Total (mg/L)	20	0	0.00003	0.00003	0.00003	0.00046	0.00000
Lithium (Li)-Total (mg/L)	20	7	0.00050	0.00130	0.00069	0.00117	0.00027
Magnesium (Mg)-Total (mg/L)	20	20	1.95000	2.29000	2.13250	2.27600	0.08410
Manganese (Mn)-Total (mg/L)	20	20	0.00067	0.00164	0.00108	0.00154	0.00031
Mercury (Hg)-Total (mg/L)	16	0	0.00000	0.00003	0.00000		0.00001
Molybdenum (Mo)-Tota (mg/L)	20	20	0.00044	0.00099	0.00063	0.00091	0.00015
Nickel (Ni)-Total (mg/L)	20	1	0.00025	0.00054	0.00026	0.00025	0.00006
Potassium (K)-Total (mg/L)	20	20	0.43100	0.52900	0.49825	0.55770	0.02487
Selenium (Se)-Total (mg/L)	20	20	0.00012	0.00025	0.00017	0.00020	0.00003
Silicon (Si)-Total (mg/L)	20	20	1.63000	1.99000	1.83550	1.87400	0.10374
Silver (Ag)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	20	20	0.96200	1.21000	1.04275	1.13400	0.05662
Strontium (Sr)-Total (mg/L)	20	20	0.13100	0.15200	0.14165	0.14370	0.00575
Thallium (Tl)-Total (mg/L)	20	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	20	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	20	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	20	20	0.00014	0.00018	0.00016	0.00018	0.00001
Vanadium (V)-Total (mg/L)	20	0	0.00025	0.00025	0.00025	0.00025	0.00000
Zinc (Zn)-Total (mg/L)	20	0	0.00150	0.00150	0.00150	0.00150	0.00000

Grid Format Report : QUL-2a-0m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

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	E303020 : QUL-2a-0m														
	8-May-19	18-Jun-19	19-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.4	44.6	45.0	45.0	47.9	48.8	45.3	42.6	43.3	47.3	48.5	47.8	42.9	51.0	47.3
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0057	<0.0050	<0.0050	0.0056	<0.0050	<0.0050	0.0061	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0031	<0.0020	<0.0020	0.0030	<0.0020	<0.0020	0.0026	<0.0020	0.0024	0.0022	<0.0020	<0.0020	<0.0020	0.0022	<0.0020
Floride (mg/L)	0.034	0.038	0.039	0.036	0.033	0.035	0.038	0.039	0.035	0.035	0.037	0.037	0.035	0.031	0.034
Nitrate (N) (mg/L)	0.126	0.0900	0.0887	0.0564	0.0468	0.0882	0.0848	0.0160	0.0366	0.0301	0.116	0.116	0.0553	0.0435	0.0854
Nitrate and Nitrite (mg/L)	0.126	0.0900	0.0887	0.0564	0.0468	0.0882	0.0852	<0.0500	0.0372	0.0304	0.116	0.116	0.0553	0.0435	0.0854
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.53	5.96	6.32	5.90	5.82	6.97	5.61	4.80	5.43	5.91	6.98	6.51	5.82	6.36	6.82
Total Nitrogen (mg/L)	0.209	0.191	0.161	0.159	0.134	0.199	0.200	0.150	0.150	0.130	0.177	0.176	0.139	0.123	0.141
Total Phosphorus (mg/L)	0.0041	0.0054	0.0068	0.0072	0.0030	0.0049	0.0087	0.0114	0.0061	0.0027	0.0022	<0.0020	<0.0020	0.0021	<0.0020
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0050	0.0108	0.0101	0.0098	0.0090	0.0082	0.0162	0.0195	0.0145	0.0093	0.0094	0.0110	0.0100	0.0083	0.0067
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	0.00010	0.00012	<0.00010	0.00011	<0.00010	0.00014	0.00019	0.00016	0.00012	<0.00010	0.00012	0.00012	<0.00010	0.00011
Diss-Barium (Ba) (mg/L)	0.00538	0.00560	0.00555	0.00528	0.00495	0.00520	0.00616	0.00586	0.00581	0.00545	0.00466	0.00519	0.00512	0.00504	0.00454
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	19.1	16.5	18.1	16.2	15.6	16.8	15.8	14.1	15.3	16.5	17.2	17.5	15.9	16.4	17.2
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	<0.00050	0.00051	<0.00050	<0.00050	0.00073	0.00077	0.00072	0.00069	<0.00050	0.00061	<0.00050	<0.00050	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.035	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.14	1.93	2.07	1.94	1.99	1.99	2.08	2.06	2.00	1.93	1.98	2.10	1.76	1.87	1.84
Diss-Manganese (Mn) (mg/L)	0.00021	0.00087	0.00071	0.00018	0.00010	0.00019	0.00078	0.00042	<0.00010	0.00036	0.00045	0.00090	0.00073	0.00025	0.00031
Diss-Molybdenum (Mo) (mg/L)	0.000388	0.000361	0.000335	0.000327	0.000311	0.000393	0.000409	0.000441	0.000349	0.000346	0.000414	0.000365	0.000355	0.000294	0.000320
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00057	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.522	0.511	0.557	0.491	0.454	0.501	0.535	0.516	0.530	0.490	0.472	0.523	0.479	0.463	0.450
Diss-Selenium (mg/L)	0.000135	0.000103	0.000099	0.000097	0.000110	0.000137	0.000154	0.000182	0.000128	0.000091	0.000127	0.000140	0.000126	0.000110	0.000097

	E303020 : QUL-2a-0m								
	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients									
Alkalinity (CaCO3) (mg/L)	50.9	43.4	42.2	43.6	49.9	49.5	48.9	49.9	51.4
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	0.0029	<0.0020	<0.0020	<0.0020	0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.037	0.031	0.030	0.036	0.035	0.036	0.028	0.037	0.028
Nitrate (N) (mg/L)	0.126	0.0508	0.0196	0.0286	0.144	0.118	0.0947	0.0072	0.0443
Nitrate and Nitrite (mg/L)	0.126	0.0508	0.0196	0.0286	0.144	0.118	0.0947	0.0072	0.0443
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.68	4.96	5.25	6.32	7.11	6.28	5.42	6.50	6.19
Total Nitrogen (mg/L)	0.184	0.185	0.086	0.113	0.188	0.188	0.150	0.107	0.125
Total Phosphorus (mg/L)	0.0025	0.0064	<0.0020	0.0023	0.0032	0.0029	0.0024	0.0028	0.0022
Dissolved Metals									
Aluminum (Al)-Diss (mg/L)	0.0062	0.0185	0.0113	0.0073	0.0062	0.0073	0.0091	0.0151	0.0053
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	0.00014	0.00011	0.00014	<0.00010	0.00011	0.00011	0.00011	<0.00010
Diss-Barium (Ba) (mg/L)	0.00523	0.00578	0.00531	0.00532	0.00511	0.00521	0.00504	0.00539	0.00486
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.2	14.7	15.2	17.4	19.0	17.0	17.8	16.6	18.9
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00064	0.00070	<0.00050	<0.00050	0.00056	<0.00050	0.00057	0.00085	0.00051
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.21	1.94	1.92	1.96	2.24	2.08	1.99	2.09	1.95
Diss-Manganese (Mn) (mg/L)	0.00037	0.00114	0.00058	0.00022	0.00042	0.00024	0.00036	0.00055	0.00022
Diss-Molybdenum (Mo) (mg/L)	0.000444	0.000364	0.000324	0.000339	0.000653	0.000379	0.000347	0.000343	0.000334
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.523	0.510	0.511	0.487	0.488	0.540	0.518	0.483	0.504
Diss-Selenium (mg/L)	0.000124	0.000149	0.000072	0.000080	0.000146	0.000099	0.000091	0.000093	0.000084

Grid Format Report : QUL-2a-0m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-0m														
	8-May-19	18-Jun-19	19-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21
Diss-Silicon (Si) (mg/L)	1.65	1.82	1.74	1.71	1.58	1.59	2.12	2.36	1.91	1.61	1.61	1.91	1.61	1.37	1.44
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.03	0.932	1.03	0.925	0.923	0.897	0.951	0.970	0.948	0.924	0.914	1.02	0.815	0.844	0.818
Diss-Strontium (Sr) (mg/L)	0.138	0.118	0.124	0.113	0.118	0.129	0.110	0.0914	0.110	0.128	0.142	0.128	0.117	0.138	0.130
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000176	0.000153	0.000171	0.000150	0.000137	0.000142	0.000122	0.000118	0.000125	0.000151	0.000152	0.000146	0.000140	0.000146	0.000157
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	75	74	75	53	67	66	65	65	66	66	67	70	72	82	67
Field Tests															
Cond (in situ) (µs/cm)		83.6	105	100.9	90.9	99.8	104.7		89	104.9	108.5	107.6	118.3	109.5	107
NTU - in situ (ntu)		1.2	0.77	0.38	0.12	0.02	0.37		0	0.09	0.19	0.2	0.41	0.04	0.24
pH (in situ) (pH)		7.85	7.9	7.89	7.8	7.86	7.77		7.94	8.13	8.01	8.08	8	8.45	7.91
Sample Depth (m)		0	0	0	0	0	0		0	0	0	0	0	0	0
Sample Taken		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	yes	Yes	Yes	Yes
Secchi Depth (m)		8.1		8.65	6	10	3.5		5.5	7.5	7	5.9	5.5	7	10.5
Temp (in situ) (Degrees Celcius)		14.163	12.348	17.701	17.008	7.739	11.163		16.085	15.88	6.574	8.695	19.674	15.721	9.038
Organic / Inorganic															
DOC (mg/L)	1.74	1.94	1.94	2.29	1.96	1.93	3.03	4.13	2.93	2.19	12.5	2.46	2.18	1.73	1.71
Physical Test															
Conductivity (µs/cm)	114	100	102	98.7	102	110	99.3	95.4	98.8	104	108	109	97.3	113	107
Hardness (mg/L)	56.4	49.0	53.8	48.5	47.0	50.2	48.2	43.6	46.5	49.1	51.1	52.3	46.9	48.6	50.5
NTU (ntu)	0.28	0.45	0.31	0.23	0.25	0.22	0.92	1.43	0.49	0.29	0.18	0.38	0.25	0.18	0.28
pH (pH)	8.00	8.00	8.01	7.94	7.95	7.89	7.77	7.46	7.93	7.95	7.87	7.87	7.92	7.90	7.95
TDS (mg/L)	75	74	75	53	67	66	65	65	66	66	67	70	72	82	67
TSS (mg/L)	<1.0	<1.0	<1.0	1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.1	<1.0	<1.0	<1.0	<1.0
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0116	0.0169	0.0154	0.0188	0.0150	0.0130	0.0450	0.0625	0.0214	0.0132	0.0135	0.0181	0.0152	0.0118	0.0122
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	<0.00010	0.00012	0.00014	<0.00010	<0.00010	0.00016	0.00023	0.00016	0.00011	0.00011	0.00014	0.00018	0.00011	0.00013
Barium (Ba)-Total (mg/L)	0.00532	0.00511	0.00503	0.00562	0.00499	0.00621	0.00616	0.00751	0.00547	0.00527	0.00489	0.00516	0.00587	0.00448	0.00490
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

	E303020 : QUL-2a-0m								
	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.74	2.12	1.55	1.26	1.79	1.96	1.69	0.758	1.01
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.04	0.888	0.869	0.899	1.07	1.03	0.931	0.947	0.938
Diss-Strontium (Sr) (mg/L)	0.139	0.0990	0.108	0.136	0.143	0.136	0.128	0.137	0.140
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000159	0.000118	0.000128	0.000144	0.000154	0.000158	0.000151	0.000163	0.000169
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	88	64	64	83	72	83	67	72	66
Field Tests									
Cond (in situ) (µs/cm)	111.5	93.4	96.9	104.2	113.7	106.7	104	106.7	111.2
NTU - in situ (ntu)	0.42	1.08	0	0	0.09	0	0	0.25	
pH (in situ) (pH)	7.79	7.94	7.92	8.1	7.03	7.64	7.56	8.29	7.73
Sample Depth (m)	0	0	0	0	0	0	0	0	0
Sample Taken	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Secchi Depth (m)	8.25	4	9.5	8	9.4	6	8	4.6	6.9
Temp (in situ) (Degrees Celcius)	4.143	16.16	21.059	13.505	4.076	8.334	16.688	17.401	8.297
Organic / Inorganic									
DOC (mg/L)	2.05	3.36	2.32	1.96	2.01	2.03	2.33	2.38	2.10
Physical Test									
Conductivity (µs/cm)	112	90.7	97.7	106	111	111	102	109	112
Hardness (mg/L)	52.0	44.7	45.9	51.5	56.7	51.0	52.6	50.0	55.2
NTU (ntu)	0.30	1.43	0.27	0.20	0.26	0.42	1.34	0.57	0.43
pH (pH)	7.90	7.77	7.86	7.87	7.91	7.92	7.84	7.98	7.90
TDS (mg/L)	88	64	64	83	72	83	67	72	66
TSS (mg/L)	1.9	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	1.6
Total Metals									
Aluminum (Al)-Total (mg/L)	0.0238	0.0531	0.0180	0.0111	0.0130	0.0152	0.0134	0.0128	0.0128
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	0.00016	0.00012	0.00013	0.00010	0.00013	<0.00010	0.00011	0.00012
Barium (Ba)-Total (mg/L)	0.00548	0.00642	0.00524	0.00517	0.00515	0.00542	0.00549	0.00520	0.00512
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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Mining Corporation

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	E303020 : QUL-2a-0m														
	8-May-19	18-Jun-19	19-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000084	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.5	16.5	15.1	15.9	15.1	17.2	15.3	16.1	15.8	16.4	18.0	15.9	16.7	17.3	17.9
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00080	0.00061	0.00058	0.00097	0.00072	0.00064	0.00087	0.00115	0.00072	0.00066	0.00056	0.00074	0.00058	0.00062	0.00052
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.066	0.103	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.05	1.85	1.78	1.90	1.79	1.93	2.06	2.26	2.11	1.97	2.08	1.97	1.78	1.87	1.94
Manganese (Mn)-Total (mg/L)	0.00128	0.00179	0.00146	0.00136	0.00090	0.00112	0.00375	0.00428	0.00216	0.00119	0.00116	0.00176	0.00188	0.00078	0.00096
Mercury (Hg)-Total (mg/L)					<0.0000050										
Molybdenum (Mo)-Tota (mg/L)	0.000403	0.000365	0.000371	0.000343	0.000294	0.000385	0.000413	0.000483	0.000392	0.000324	0.000384	0.000390	0.000380	0.000316	0.000342
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	0.00075	0.00051	<0.00050	<0.00050	0.00057	<0.00050	0.00054	<0.00050
Potassium (K)-Total (mg/L)	0.485	0.471	0.434	0.464	0.442	0.447	0.532	0.586	0.510	0.460	0.470	0.468	0.511	0.463	0.490
Selenium (Se)-Total (mg/L)	0.000122	0.000114	0.000135	0.000139	0.000074	0.000122	0.000149	0.000160	0.000150	0.000130	0.000115	0.000139	0.000105	0.000108	0.000102
Silicon (Si)-Total (mg/L)	1.70	1.70	1.74	1.68	1.55	1.59	2.16	2.42	2.01	1.70	1.68	2.08	1.69	1.36	1.59
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.05	0.883	0.850	0.961	0.849	0.919	0.962	1.08	0.928	0.888	0.968	0.985	0.887	0.864	0.879
Strontium (Sr)-Total (mg/L)	0.130	0.123	0.124	0.120	0.111	0.125	0.109	0.0989	0.117	0.124	0.142	0.121	0.119	0.125	0.138
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000165	0.000150	0.000147	0.000141	0.000133	0.000149	0.000132	0.000130	0.000127	0.000147	0.000156	0.000147	0.000151	0.000145	0.000169
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303020 : QUL-2a-0m								
	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	0.0000081	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	18.0	14.8	15.5	16.6	16.6	17.5	16.6	18.0	18.0
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00088	0.00083	0.00055	<0.00050	0.00063	0.00062	0.00054	0.00056	0.00054
Iron (Fe)-Total (mg/L)	<0.030	0.074	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.15	1.91	1.88	1.99	2.05	2.07	2.02	2.11	2.14
Manganese (Mn)-Total (mg/L)	0.00187	0.00357	0.00152	0.00108	0.00136	0.00133	0.00128	0.00084	0.00089
Mercury (Hg)-Total (mg/L)									
Molybdenum (Mo)-Tota (mg/L)	0.000437	0.000385	0.000341	0.000301	0.000591	0.000381	0.000344	0.000354	0.000368
Nickel (Ni)-Total (mg/L)	<0.00050	0.00054	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.508	0.501	0.485	0.481	0.475	0.537	0.492	0.496	0.502
Selenium (Se)-Total (mg/L)	0.000138	0.000130	0.000111	0.000094	0.000185	0.000128	0.000112	0.000121	0.000117
Silicon (Si)-Total (mg/L)	1.85	2.18	1.54	1.31	1.84	1.89	1.59	0.80	1.08
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.02	0.886	0.851	0.872	0.990	0.993	0.844	0.980	0.969
Strontium (Sr)-Total (mg/L)	0.143	0.102	0.117	0.136	0.134	0.137	0.130	0.141	0.136
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	0.00018	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000165	0.000127	0.000139	0.000148	0.000157	0.000151	0.000140	0.000168	0.000167
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	24	24	42.20000	51.40000	46.89167	50.96000	2.94971
Ammonia (as N) (mg/L)	24	3	0.00250	0.00610	0.00291	0.00250	0.00112
Chloride (mg/L)	24	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	24	0	0.00050	0.00050	0.00050	0.00127	0.00000
Diss-Phosphorus (mg/L)	24	8	0.00100	0.00310	0.00152	0.00234	0.00078
Floride (mg/L)	24	24	0.02800	0.03900	0.03475	0.03700	0.00315
Nitrate (N) (mg/L)	24	24	0.00720	0.14400	0.07138	0.13570	0.04004
Nitrate and Nitrite (mg/L)	24	23	0.00720	0.14400	0.07180	0.13600	0.03951
Nitrite (N) (mg/L)	24	0	0.00050	0.00050	0.00050	0.00092	0.00000
Sulphate (mg/L)	24	24	4.80000	7.11000	6.10208	6.86300	0.63383
Total Nitrogen (mg/L)	24	24	0.08600	0.20900	0.15688	0.20680	0.03319
Total Phosphorus (mg/L)	24	20	0.00100	0.01140	0.00389	0.00461	0.00270
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	24	24	0.00500	0.01950	0.01017	0.01277	0.00396
Diss-Antimony (Sb) (mg/L)	24	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	24	16	0.00005	0.00019	0.00010	0.00015	0.00004
Diss-Barium (Ba) (mg/L)	24	24	0.00454	0.00616	0.00529	0.00572	0.00038
Diss-Beryllium (Be) (mg/L)	24	0	0.00005	0.00050	0.00014	0.00005	0.00019
Diss-Bismuth (Bi) (mg/L)	24	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	24	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	24	1	0.00000	0.00001	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	24	24	14.10000	19.10000	16.75000	18.87000	1.30284
Diss-Chromium (Cr) (mg/L)	24	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	24	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	24	12	0.00025	0.00085	0.00045	0.00127	0.00022
Diss-Iron (Fe) (mg/L)	24	1	0.01500	0.03500	0.01583	0.01500	0.00408
Diss-Lead (Pb) (mg/L)	24	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Lithium (Li) (mg/L)	24	0	0.00050	0.00050	0.00050	0.00100	0.00000
Diss-Magnesium (Mg) (mg/L)	24	24	1.76000	2.24000	2.00250	2.13700	0.11207
Diss-Manganese (Mn) (mg/L)	24	23	0.00005	0.00114	0.00044	0.00114	0.00028
Diss-Molybdenum (Mo) (mg/L)	24	24	0.00029	0.00065	0.00037	0.00056	0.00007
Diss-Nickel (Ni) (mg/L)	24	2	0.00025	0.00057	0.00027	0.00025	0.00008
Diss-Potassium (K) (mg/L)	24	24	0.45000	0.55700	0.50242	0.55930	0.02743

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Diss-Selenium (mg/L)	24	24	0.00007	0.00018	0.00012	0.00025	0.00003
Diss-Silicon (Si) (mg/L)	24	24	0.75800	2.36000	1.66283	1.81800	0.34555
Diss-Silver (Ag) (mg/L)	24	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	24	24	0.81500	1.07000	0.93971	1.05000	0.06957
Diss-Strontium (Sr) (mg/L)	24	24	0.09140	0.14300	0.12502	0.14070	0.01426
Diss-Thallium (Tl) (mg/L)	24	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	24	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	24	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	24	24	0.00012	0.00018	0.00015	0.00017	0.00002
Diss-Vanadium (V) (mg/L)	24	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	24	0	0.00150	0.00150	0.00150	0.00332	0.00000
TDS (mg/L)	24	24	53.00000	88.00000	70.37500	77.00000	7.77852
Field Tests							
Cond (in situ) (µs/cm)	22	22	83.60000	118.30000	103.54545	149.02000	8.43545
NTU - in situ (ntu)	21	21	0.00000	1.20000	0.27952	1.18600	0.34735
pH (in situ) (pH)	22	22	7.03000	8.45000	7.89045	8.30800	0.27739
Sample Depth (m)	22	22	0.00000	0.00000	0.00000	0.00000	0.00000
Sample Taken							
Secchi Depth (m)	21	21	3.50000	10.50000	7.13333	13.10000	1.94116
Temp (in situ) (Degrees Celcius)	22	22	4.07600	21.05900	12.79327	18.45340	5.00223
Organic / Inorganic							
DOC (mg/L)	24	24	1.71000	12.50000	2.71667	2.57100	2.15899
Physical Test							
Conductivity (µs/cm)	24	24	90.70000	114.00000	104.57917	113.40000	6.44239
Hardness (mg/L)	24	24	43.60000	56.70000	50.05417	55.71000	3.45178
NTU (ntu)	24	24	0.18000	1.43000	0.47333	1.25650	0.39157
pH (pH)	24	24	7.46000	8.01000	7.89000	7.98700	0.11081
TDS (mg/L)	24	24	53.00000	88.00000	70.37500	77.00000	7.77852
TSS (mg/L)	24	5	0.50000	1.90000	0.74375	1.50000	0.48439
Total Metals							
Aluminum (Al)-Total (mg/L)	24	24	0.01110	0.06250	0.01987	0.07194	0.01362
Antimony (Sb)-Total (mg/L)	24	0	0.00005	0.00005	0.00005	0.00005	0.00000
Arsenic (As)-Total (mg/L)	24	20	0.00005	0.00023	0.00012	0.00016	0.00004
Barium (Ba)-Total (mg/L)	24	24	0.00448	0.00751	0.00545	0.00730	0.00063
Beryllium (Be)-Total (mg/L)	24	0	0.00005	0.00005	0.00005	0.00005	0.00000

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	E303020 : QUL-2a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	24	0	0.00003	0.00003	0.00003	0.00025	0.00000
Boron (B)-Total (mg/L)	24	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	24	2	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	24	24	14.80000	18.00000	16.59583	18.34000	1.03356
Chromium (Cr)-Total (mg/L)	24	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	24	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	24	23	0.00025	0.00115	0.00067	0.00215	0.00018
Iron (Fe)-Total (mg/L)	24	3	0.01500	0.10300	0.02325	0.04470	0.02302
Lead (Pb)-Total (mg/L)	24	0	0.00003	0.00003	0.00003	0.00009	0.00000
Lithium (Li)-Total (mg/L)	24	2	0.00050	0.00100	0.00054	0.00114	0.00014
Magnesium (Mg)-Total (mg/L)	24	24	1.78000	2.26000	1.98583	2.17000	0.12728
Manganese (Mn)-Total (mg/L)	24	24	0.00078	0.00428	0.00165	0.00259	0.00093
Mercury (Hg)-Total (mg/L)	1	0	0.00000	0.00000	0.00000		
Molybdenum (Mo)-Tota (mg/L)	24	24	0.00029	0.00059	0.00038	0.00067	0.00006
Nickel (Ni)-Total (mg/L)	24	6	0.00025	0.00075	0.00033	0.00061	0.00015
Potassium (K)-Total (mg/L)	24	24	0.43400	0.58600	0.48792	0.55370	0.03346
Selenium (Se)-Total (mg/L)	24	24	0.00007	0.00019	0.00013	0.00025	0.00002
Silicon (Si)-Total (mg/L)	24	24	0.80000	2.42000	1.69708	1.86800	0.35065
Silver (Ag)-Total (mg/L)	24	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	24	24	0.84400	1.08000	0.93158	1.07700	0.06846
Strontium (Sr)-Total (mg/L)	24	24	0.09890	0.14300	0.12512	0.14510	0.01221
Thallium (Tl)-Total (mg/L)	24	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	24	1	0.00005	0.00018	0.00006	0.00005	0.00003
Titanium (Ti)-Total (mg/L)	24	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	24	24	0.00013	0.00017	0.00015	0.00018	0.00001
Vanadium (V)-Total (mg/L)	24	0	0.00025	0.00025	0.00025	0.00050	0.00000
Zinc (Zn)-Total (mg/L)	24	0	0.00150	0.00150	0.00150	0.00338	0.00000

Grid Format Report : QUL-2a-20m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley Mining Corporation
IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-20m														
	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.7	48.3	48.0	49.8	49.1	47.9	46.2	46.0	48.6	47.8	48.7	46.9	51.3	47.7	50.8
Ammonia (as N) (mg/L)	<0.0050	0.0104	<0.0050	<0.0050	<0.0050	0.0066	0.0129	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0033	<0.0020	0.0025	<0.0020	<0.0020	<0.0020	<0.0020	0.0031	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.036	0.042	0.038	0.034	0.035	0.035	0.036	0.034	0.036	0.037	0.038	0.038	0.032	0.034	0.036
Nitrate (N) (mg/L)	0.129	0.131	0.128	0.109	0.0880	0.112	0.122	0.128	0.128	0.116	0.137	0.138	0.123	0.0853	0.128
Nitrate and Nitrite (mg/L)	0.129	0.131	0.128	0.109	0.0880	0.112	0.122	0.128	0.128	0.116	0.137	0.138	0.123	0.0853	0.128
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.51	6.48	6.58	6.11	7.11	6.11	6.09	6.32	6.42	7.09	6.86	6.51	6.51	6.84	6.66
Total Nitrogen (mg/L)	0.176	0.220	0.202	0.180	0.200	0.201	0.210	0.206	0.192	0.188	0.166	0.180	0.191	0.124	0.212
Total Phosphorus (mg/L)	0.0038	0.0072	0.0026	0.0029	0.0070	0.0068	0.0072	0.0022	0.0026	0.0037	<0.0020	0.0022	0.0024	<0.0020	0.0039
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0054	0.0064	0.0057	0.0065	0.0081	0.0115	0.0086	0.0082	0.0078	0.0087	0.0064	0.0066	0.0063	0.0073	0.0058
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010	0.00010	0.00011	0.00013	0.00012	<0.00010	<0.00010	<0.00010	0.00011	0.00010	<0.00010	<0.00010	0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00538	0.00539	0.00518	0.00515	0.00514	0.00548	0.00511	0.00536	0.00540	0.00504	0.00499	0.00445	0.00528	0.00491	0.00512
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.6	18.1	16.6	16.1	16.7	16.8	16.8	16.6	17.5	18.0	17.7	18.2	16.8	18.4	17.7
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00056	<0.00050	0.00051	0.00066	<0.00050	0.00060	<0.00050	0.00052	<0.00050	0.00066
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.21	2.04	2.06	2.09	1.95	2.04	2.00	2.01	2.00	2.12	2.08	1.83	2.02	1.96	2.13
Diss-Manganese (Mn) (mg/L)	0.00020	0.00015	0.00012	<0.00010	0.00020	0.00023	0.00021	0.00014	0.00027	0.00044	0.00021	0.00010	0.00017	0.00032	0.00032
Diss-Molybdenum (Mo) (mg/L)	0.000384	0.000374	0.000399	0.000370	0.000368	0.000360	0.000343	0.000350	0.000380	0.000474	0.000388	0.000390	0.000371	0.000345	0.000431
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.533	0.516	0.497	0.473	0.481	0.514	0.502	0.524	0.500	0.512	0.512	0.463	0.494	0.491	0.503
Diss-Selenium (mg/L)	0.000099	0.000112	0.000128	0.000127	0.000168	0.000126	0.000118	0.000093	0.000142	0.000102	0.000109	0.000142	0.000114	0.000116	0.000124

	E303020 : QUL-2a-20m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients								
Alkalinity (CaCO3) (mg/L)	49.3	46.2	44.0	49.8	49.4	50.4	49.5	51.5
Ammonia (as N) (mg/L)	<0.0050	<0.0050	0.0056	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.034	0.032	0.036	0.034	0.036	0.035	0.034	0.028
Nitrate (N) (mg/L)	0.121	0.126	0.0458	0.143	0.131	0.116	0.0789	0.123
Nitrate and Nitrite (mg/L)	0.121	0.126	0.0458	0.143	0.131	0.116	0.0789	0.123
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.08	5.91	6.50	7.09	6.16	5.70	6.33	6.37
Total Nitrogen (mg/L)	0.180	0.191	0.130	0.190	0.188	0.164	0.161	0.176
Total Phosphorus (mg/L)	0.0044	0.0020	0.0034	0.0028	0.0029	0.0028	0.0027	<0.0020
Dissolved Metals								
Aluminum (Al)-Diss (mg/L)	0.0095	0.0078	0.0079	0.0074	0.0074	0.0101	0.0068	0.0054
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00010	0.00011	0.00015	<0.00010	0.00010	0.00012	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00522	0.00509	0.00545	0.00507	0.00526	0.00531	0.00514	0.00477
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.8	17.0	17.1	19.0	17.2	17.5	16.9	19.4
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00053	0.00077	0.00052	0.00058	<0.00050	0.00084	<0.00050	0.00053
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.06	2.10	1.95	2.26	2.08	2.05	2.19	1.97
Diss-Manganese (Mn) (mg/L)	0.00021	0.00027	0.00022	0.00037	0.00012	0.00025	0.00011	0.00014
Diss-Molybdenum (Mo) (mg/L)	0.000354	0.000376	0.000328	0.000618	0.000350	0.000391	0.000379	0.000452
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.497	0.537	0.482	0.501	0.545	0.531	0.487	0.493
Diss-Selenium (mg/L)	0.000122	0.000099	0.000114	0.000165	0.000085	0.000098	0.000101	0.000160

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	8-May-19	**18-Jun-19**	**25-Jul-19**	**20-Aug-19**	**30-Oct-19**	**16-Jun-20**	**21-Jul-20**	**11-Aug-20**	**16-Sep-20**	**4-Nov-20**	**19-May-21**	**21-Jul-21**	**15-Sep-21**	**27-Oct-21**	**9-May-22**
Diss-Silicon (Si) (mg/L)	1.67	1.83	1.81	1.71	1.57	1.96	1.82	1.79	1.62	1.58	1.75	1.66	1.74	1.42	1.71
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.06	0.979	0.992	0.983	0.880	0.927	0.924	0.983	0.987	0.976	0.993	0.859	0.946	0.867	1.00
Diss-Strontium (Sr) (mg/L)	0.137	0.133	0.129	0.129	0.126	0.128	0.126	0.133	0.131	0.150	0.141	0.148	0.142	0.138	0.140
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000170	0.000165	0.000159	0.000145	0.000145	0.000136	0.000156	0.000150	0.000151	0.000158	0.000154	0.000165	0.000152	0.000162	0.000155
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	72	68	65	66	67	66	73	73	71	67	80	70	84	68	80
Field Tests															
Cond (in situ) (µs/cm)		108	109.5	108.9	107.5	111.1		107.9	110.6	109.6	110.2	129.8	114.9	107.4	112.3
NTU - in situ (ntu)		0.52	0.35	0	0	0.13		0	0.04	0.25	0.04	0.47	0.05	0.25	0
pH (in situ) (pH)		7.7	7.74	7.89	7.86	7.74		7.92	8.05	8.09	8.23	7.63	8.48	7.85	7.78
Sample Depth (m)		20	20	20	20	20		20	20	20	20	20	20	20	20
Sample Taken		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes
Temp (in situ) (Degrees Celcius)		5.055	5.156	7.057	7.765	7.281		5.488	5.272	6.281	4.484	5.748	5.827	9	4.056
Organic / Inorganic															
DOC (mg/L)	1.73	1.69	2.03	1.76	2.00	2.36	2.22	2.17	1.97	12.8	2.01	2.03	1.72	1.70	1.91
Physical Test															
Conductivity (µs/cm)	114	109	106	105	111	105	107	106	109	109	111	108	114	107	113
Hardness (mg/L)	55.7	53.5	49.8	48.8	49.8	50.2	50.2	49.9	52.0	53.7	52.8	53.0	50.3	54.0	53.0
NTU (ntu)	0.22	0.15	0.14	0.23	0.19	0.60	0.69	0.26	0.15	0.14	0.15	0.11	<0.10	0.15	0.19
pH (pH)	8.00	8.00	7.88	7.97	7.90	7.76	7.34	7.86	7.93	7.87	7.88	7.85	7.87	7.94	7.91
TDS (mg/L)	72	68	65	66	67	66	73	73	71	67	80	70	84	68	80
TSS (mg/L)	<1.0	<1.0	<1.0	1.0	1.2	<1.1	<1.0	<1.1	<1.0	<1.0	<1.0	<1.0	<1.1	<1.0	4.1
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0117	0.0120	0.0099	0.0088	0.0133	0.0364	0.0463	0.0198	0.0131	0.0142	0.0118	0.0153	0.0099	0.0112	0.0184
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00015	<0.00010	0.00010	<0.00010	0.00011	0.00016	0.00013	0.00012	<0.00010	<0.00010	0.00010	0.00014	<0.00010	0.00011	0.00010
Barium (Ba)-Total (mg/L)	0.00519	0.00488	0.00549	0.00492	0.00534	0.00571	0.00596	0.00529	0.00500	0.00520	0.00480	0.00536	0.00465	0.00485	0.00544
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303020 : QUL-2a-20m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.94	1.80	1.38	1.84	1.92	1.88	1.23	1.47
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.936	0.990	0.900	1.09	1.00	1.01	0.999	0.962
Diss-Strontium (Sr) (mg/L)	0.128	0.130	0.133	0.142	0.142	0.130	0.134	0.144
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000150	0.000147	0.000152	0.000149	0.000159	0.000154	0.000155	0.000168
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	74	74	87	66	84	68	73	73
Field Tests								
Cond (in situ) (µs/cm)	108.4	105.8	105.7	113.8	108.1	114.3	124.3	111.5
NTU - in situ (ntu)	0.49	0	0	0.11	0	0	0.23	
pH (in situ) (pH)	8.01	8.22	7.8	7.34	7.6	7.7	8.04	7.77
Sample Depth (m)	20	20	20	20	20	20	20	20
Sample Taken	Yes	Yes	Yes	Yes				
Temp (in situ) (Degrees Celcius)	5.241	5.726	9.612	3.831	5.577	6.86	8.954	6.113
Organic / Inorganic								
DOC (mg/L)	2.51	2.16	2.06	2.19	2.12	2.43	2.17	1.98
Physical Test								
Conductivity (µs/cm)	106	107	106	110	110	106	133	113
Hardness (mg/L)	52.9	51.1	50.7	56.7	51.5	52.1	51.2	56.6
NTU (ntu)	0.53	0.19	0.23	0.23	0.33	0.16	0.42	0.20
pH (pH)	7.86	7.82	7.87	7.91	7.89	7.87	7.94	7.79
TDS (mg/L)	74	74	87	66	84	68	73	73
TSS (mg/L)	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Metals								
Aluminum (Al)-Total (mg/L)	0.0211	0.0128	0.0121	0.0131	0.0158	0.0222	0.0120	0.0090
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00013	0.00010	0.00012	0.00011	0.00013	0.00013	0.00011	0.00011
Barium (Ba)-Total (mg/L)	0.00549	0.00531	0.00518	0.00526	0.00520	0.00602	0.00518	0.00498
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

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	E303020 : QUL-2a-20m														
	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000066	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.3	17.4	17.1	16.5	16.7	16.4	17.4	17.2	16.9	17.5	16.8	17.8	18.1	17.6	17.8
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00056	0.00056	0.00107	<0.00050	0.00062	0.00073	0.00076	0.00070	0.00073	0.00059	0.00058	0.00053	0.00058	0.00053	0.00070
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	0.045	0.050	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	2.05	1.96	1.99	1.87	1.91	2.01	2.06	2.15	2.01	2.10	1.97	1.93	1.95	1.94	2.14
Manganese (Mn)-Total (mg/L)	0.00123	0.00119	0.00106	0.00066	0.00109	0.00210	0.00186	0.00146	0.00125	0.00114	0.00107	0.00117	0.00067	0.00093	0.00167
Molybdenum (Mo)-Tota (mg/L)	0.000391	0.000369	0.000407	0.000343	0.000372	0.000355	0.000331	0.000353	0.000357	0.000439	0.000366	0.000363	0.000397	0.000329	0.000443
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.481	0.475	0.476	0.466	0.436	0.511	0.518	0.499	0.462	0.492	0.455	0.512	0.483	0.490	0.498
Selenium (Se)-Total (mg/L)	0.000138	0.000076	0.000105	0.000118	0.000106	0.000111	0.000122	0.000110	0.000134	0.000136	0.000092	0.000115	0.000112	0.000100	0.000191
Silicon (Si)-Total (mg/L)	1.71	1.64	1.81	1.64	1.58	1.93	1.91	1.86	1.66	1.68	1.89	1.82	1.68	1.55	1.79
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.04	0.939	1.00	0.909	0.908	0.923	0.978	0.954	0.898	0.982	0.950	0.983	0.942	0.883	1.01
Strontium (Sr)-Total (mg/L)	0.132	0.137	0.132	0.124	0.124	0.126	0.129	0.136	0.130	0.139	0.131	0.135	0.134	0.138	0.135
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000163	0.000166	0.000161	0.000145	0.000144	0.000144	0.000164	0.000149	0.000153	0.000160	0.000163	0.000170	0.000152	0.000170	0.000165
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303020 : QUL-2a-20m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000058	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	18.0	16.6	17.0	17.2	17.2	17.6	17.8	17.9
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00060	0.00054	0.00055	0.00066	0.00056	0.00135	0.00054	0.00051
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	2.10	2.06	2.00	2.09	2.06	2.14	2.16	2.12
Manganese (Mn)-Total (mg/L)	0.00188	0.00109	0.00122	0.00128	0.00128	0.00166	0.00092	0.00068
Molybdenum (Mo)-Tota (mg/L)	0.000364	0.000396	0.000318	0.000649	0.000358	0.000393	0.000392	0.000462
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.498	0.507	0.492	0.495	0.548	0.502	0.491	0.481
Selenium (Se)-Total (mg/L)	0.000102	0.000125	0.000087	0.000144	0.000115	0.000139	0.000128	0.000133
Silicon (Si)-Total (mg/L)	2.03	1.90	1.46	1.85	1.95	1.77	1.32	1.55
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.953	0.975	0.876	1.02	0.978	0.928	0.985	0.976
Strontium (Sr)-Total (mg/L)	0.131	0.135	0.138	0.135	0.132	0.137	0.141	0.138
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000154	0.000150	0.000149	0.000159	0.000154	0.000148	0.000165	0.000168
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

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	E303020 : QUL-2a-20m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	23	23	44.00000	51.50000	48.51739	50.98500	1.82698
Ammonia (as N) (mg/L)	23	4	0.00250	0.01290	0.00361	0.00584	0.00277
Chloride (mg/L)	23	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	23	0	0.00050	0.00050	0.00050	0.00149	0.00000
Diss-Phosphorus (mg/L)	23	4	0.00100	0.00330	0.00130	0.00237	0.00070
Floride (mg/L)	23	23	0.02800	0.04200	0.03522	0.03585	0.00268
Nitrate (N) (mg/L)	23	23	0.04580	0.14300	0.11683	0.13670	0.02255
Nitrate and Nitrite (mg/L)	23	23	0.04580	0.14300	0.11683	0.13670	0.02255
Nitrite (N) (mg/L)	23	0	0.00050	0.00050	0.00050	0.00050	0.00000
Sulphate (mg/L)	23	23	5.70000	7.11000	6.44957	6.79000	0.37687
Total Nitrogen (mg/L)	23	23	0.12400	0.22000	0.18383	0.19785	0.02363
Total Phosphorus (mg/L)	23	20	0.00100	0.00720	0.00341	0.00527	0.00192
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	23	23	0.00540	0.01150	0.00746	0.00769	0.00153
Diss-Antimony (Sb) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	23	12	0.00005	0.00015	0.00008	0.00013	0.00003
Diss-Barium (Ba) (mg/L)	23	23	0.00445	0.00548	0.00516	0.00557	0.00024
Diss-Beryllium (Be) (mg/L)	23	0	0.00005	0.00050	0.00015	0.00005	0.00019
Diss-Bismuth (Bi) (mg/L)	23	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Boron (B) (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	23	0	0.00000	0.00000	0.00000	0.00000	0.00000
Diss-Calcium (Ca) (mg/L)	23	23	16.10000	19.40000	17.50000	18.48500	0.84477
Diss-Chromium (Cr) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	23	12	0.00025	0.00084	0.00044	0.00108	0.00020
Diss-Iron (Fe) (mg/L)	23	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	23	0	0.00003	0.00003	0.00003	0.00061	0.00000
Diss-Lithium (Li) (mg/L)	23	0	0.00050	0.00050	0.00050	0.00050	0.00000
Diss-Magnesium (Mg) (mg/L)	23	23	1.83000	2.26000	2.05217	2.20000	0.09467
Diss-Manganese (Mn) (mg/L)	23	22	0.00005	0.00044	0.00021	0.00045	0.00009
Diss-Molybdenum (Mo) (mg/L)	23	23	0.00033	0.00062	0.00039	0.00041	0.00006
Diss-Nickel (Ni) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	23	23	0.46300	0.54500	0.50383	0.54780	0.02086

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	E303020 : QUL-2a-20m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	23	23	0.00009	0.00017	0.00012	0.00013	0.00002
Diss-Silicon (Si) (mg/L)	23	23	1.23000	1.96000	1.70000	1.74850	0.18904
Diss-Silver (Ag) (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	23	23	0.85900	1.09000	0.96709	1.06400	0.05657
Diss-Strontium (Sr) (mg/L)	23	23	0.12600	0.15000	0.13539	0.13600	0.00708
Diss-Thallium (Tl) (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	23	23	0.00014	0.00017	0.00015	0.00017	0.00001
Diss-Vanadium (V) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Zinc (Zn) (mg/L)	23	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	23	23	65.00000	87.00000	72.56522	77.85000	6.41607
Field Tests							
Cond (in situ) (µs/cm)	21	21	105.70000	129.80000	111.40952	114.57000	5.85764
NTU - in situ (ntu)	20	20	0.00000	0.52000	0.14650	0.75800	0.18314
pH (in situ) (pH)	21	21	7.34000	8.48000	7.87810	7.95000	0.25313
Sample Depth (m)	21	21	20.00000	20.00000	20.00000	20.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	21	21	3.83100	9.61200	6.20876	8.54600	1.59162
Organic / Inorganic							
DOC (mg/L)	23	23	1.69000	12.80000	2.50957	2.17500	2.25464
Physical Test							
Conductivity (µs/cm)	23	23	105.00000	133.00000	109.78261	112.00000	5.81500
Hardness (mg/L)	23	23	48.80000	56.70000	52.15217	54.84000	2.19604
NTU (ntu)	23	22	0.05000	0.69000	0.24826	0.42800	0.16197
pH (pH)	23	23	7.34000	8.00000	7.86565	7.94000	0.12862
TDS (mg/L)	23	23	65.00000	87.00000	72.56522	77.85000	6.41607
TSS (mg/L)	23	4	0.50000	4.10000	0.74130	1.44000	0.76063
Total Metals							
Aluminum (Al)-Total (mg/L)	23	23	0.00880	0.04630	0.01610	0.02452	0.00889
Antimony (Sb)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Arsenic (As)-Total (mg/L)	23	18	0.00005	0.00016	0.00010	0.00013	0.00003
Barium (Ba)-Total (mg/L)	23	23	0.00465	0.00602	0.00525	0.00608	0.00034
Beryllium (Be)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	23	0	0.00003	0.00003	0.00003	0.00003	0.00000

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	E303020 : QUL-2a-20m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	23	2	0.00000	0.00001	0.00000	0.00000	0.00000
Calcium (Ca)-Total (mg/L)	23	23	16.40000	18.10000	17.29565	18.17000	0.49311
Chromium (Cr)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	23	22	0.00025	0.00135	0.00064	0.00132	0.00021
Iron (Fe)-Total (mg/L)	23	2	0.01500	0.05000	0.01783	0.01500	0.00939
Lead (Pb)-Total (mg/L)	23	0	0.00003	0.00003	0.00003	0.00086	0.00000
Lithium (Li)-Total (mg/L)	23	1	0.00050	0.00100	0.00052	0.00127	0.00010
Magnesium (Mg)-Total (mg/L)	23	23	1.87000	2.16000	2.03348	2.15000	0.08424
Manganese (Mn)-Total (mg/L)	23	23	0.00066	0.00210	0.00124	0.00178	0.00038
Molybdenum (Mo)-Tota (mg/L)	23	23	0.00032	0.00065	0.00039	0.00043	0.00007
Nickel (Ni)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Potassium (K)-Total (mg/L)	23	23	0.43600	0.54800	0.48991	0.54245	0.02324
Selenium (Se)-Total (mg/L)	23	23	0.00008	0.00019	0.00012	0.00013	0.00002
Silicon (Si)-Total (mg/L)	23	23	1.32000	2.03000	1.73826	1.84000	0.17445
Silver (Ag)-Total (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	23	23	0.87600	1.04000	0.95609	1.06700	0.04369
Strontium (Sr)-Total (mg/L)	23	23	0.12400	0.14100	0.13343	0.14070	0.00465
Thallium (Tl)-Total (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	23	23	0.00014	0.00017	0.00016	0.00017	0.00001
Vanadium (V)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Zinc (Zn)-Total (mg/L)	23	0	0.00150	0.00150	0.00150	0.00150	0.00000

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	E303020 : QUL-2a-40m														
	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.8	48.6	49.1	51.3	51.7	49.3	47.9	47.3	48.7	48.4	48.2	48.0	53.1	48.7	50.9
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0075	0.0093	0.0055	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0225
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0039	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0032	<0.0020	0.0029	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.037	0.040	0.039	0.035	0.037	0.035	0.041	0.036	0.036	0.038	0.036	0.039	0.033	0.038	0.036
Nitrate (N) (mg/L)	0.132	0.141	0.139	0.148	0.133	0.130	0.137	0.138	0.143	0.144	0.135	0.144	0.146	0.149	0.127
Nitrate and Nitrite (mg/L)	0.132	0.141	0.139	0.148	0.133	0.131	0.137	0.138	0.143	0.144	0.135	0.144	0.146	0.149	0.127
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.75	6.85	7.12	7.10	7.20	6.72	6.45	6.59	7.12	7.88	7.07	6.93	6.81	8.35	6.67
Total Nitrogen (mg/L)	0.189	0.205	0.214	0.220	0.221	0.213	0.199	0.217	0.202	0.203	0.172	0.198	0.194	0.182	0.215
Total Phosphorus (mg/L)	0.0035	0.0054	0.0067	0.0033	0.0034	0.0070	0.0052	0.0022	<0.0020	0.0025	<0.0020	<0.0020	<0.0020	<0.0020	0.0021
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0054	0.0059	0.0060	0.0059	0.0065	0.0076	0.0061	0.0064	0.0066	0.0084	0.0070	0.0082	0.0066	0.0082	0.0054
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	<0.00010	0.00010	0.00011	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00525	0.00543	0.00550	0.00501	0.00505	0.00556	0.00501	0.00538	0.00554	0.00552	0.00493	0.00492	0.00525	0.00513	0.00510
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.5	17.6	17.5	17.3	17.4	18.1	17.3	17.6	18.0	18.5	17.6	17.9	17.0	19.0	18.0
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	<0.00050	0.00052	0.00051	<0.00050	0.00059	0.00051	<0.00050	0.00064	0.00060	0.00063	0.00066	0.00055	0.00064	0.00053
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.20	2.07	2.09	2.29	1.98	2.14	2.08	2.07	2.10	2.20	2.06	2.03	2.12	2.07	2.07
Diss-Manganese (Mn) (mg/L)	0.00015	<0.00010	0.00016	0.00015	0.00022	0.00017	0.00016	0.00018	0.00025	0.00028	0.00019	0.00020	0.00016	0.00020	0.00033
Diss-Molybdenum (Mo) (mg/L)	0.000488	0.000467	0.000519	0.000580	0.000396	0.000416	0.000388	0.000364	0.000532	0.000658	0.000414	0.000495	0.000398	0.000763	0.000444
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.533	0.520	0.509	0.488	0.492	0.515	0.508	0.527	0.510	0.523	0.495	0.505	0.528	0.506	0.474
Diss-Selenium (mg/L)	0.000174	0.000129	0.000159	0.000157	0.000079	0.000123	0.000121	0.000104	0.000159	0.000150	0.000158	0.000147	0.000105	0.000196	0.000095

	E303020 : QUL-2a-40m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients								
Alkalinity (CaCO3) (mg/L)	50.0	47.2	45.6	49.9	49.5	49.1	49.6	51.5
Ammonia (as N) (mg/L)	<0.0050	0.0066	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	0.0022	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.034	0.033	0.038	0.034	0.037	0.040	0.036	0.028
Nitrate (N) (mg/L)	0.132	0.136	0.154	0.152	0.140	0.144	0.145	0.147
Nitrate and Nitrite (mg/L)	0.132	0.136	0.154	0.152	0.140	0.144	0.145	0.147
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.24	6.21	7.54	7.29	6.24	7.05	7.14	6.70
Total Nitrogen (mg/L)	0.170	0.192	0.209	0.174	0.192	0.198	0.199	0.193
Total Phosphorus (mg/L)	0.0029	<0.0020	0.0020	0.0025	0.0033	0.0031	0.0023	0.0020
Dissolved Metals								
Aluminum (Al)-Diss (mg/L)	0.0082	0.0064	0.0067	0.0079	0.0068	0.0070	0.0073	0.0059
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	0.00011	0.00017	0.00010	0.00011	0.00012	0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00529	0.00510	0.00543	0.00503	0.00495	0.00521	0.00523	0.00455
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	17.2	17.1	19.2	19.9	17.5	18.8	17.7	18.4
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00051	0.00065	0.00055	0.00056	<0.00050	0.00066	0.00059	0.00051
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.12	2.12	2.11	2.24	2.04	2.19	2.14	1.99
Diss-Manganese (Mn) (mg/L)	0.00016	0.00030	0.00014	0.00030	0.00016	0.00020	0.00015	0.00013
Diss-Molybdenum (Mo) (mg/L)	0.000314	0.000430	0.000693	0.000670	0.000341	0.000594	0.000605	0.000566
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.494	0.531	0.508	0.491	0.524	0.550	0.502	0.492
Diss-Selenium (mg/L)	0.000110	0.000123	0.000206	0.000187	0.000072	0.000129	0.000172	0.000150

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	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Diss-Silicon (Si) (mg/L)	1.67	1.88	1.81	1.75	1.69	1.86	1.87	1.78	1.72	1.70	1.74	1.77	1.86	1.59	1.74
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.08	1.02	1.06	1.10	0.914	0.979	0.969	1.00	1.05	1.07	0.993	0.959	1.02	1.01	0.924
Diss-Strontium (Sr) (mg/L)	0.144	0.132	0.127	0.136	0.136	0.142	0.133	0.134	0.140	0.154	0.136	0.142	0.143	0.144	0.146
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000178	0.000161	0.000157	0.000156	0.000153	0.000151	0.000159	0.000153	0.000153	0.000156	0.000153	0.000166	0.000147	0.000167	0.000163
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	68	71	69	73	66	72	72	72	71	74	79	84	82	71	79
Field Tests															
Cond (in situ) (µs/cm)		109.8	111.4	112.4	111.3	118.3		110.3	113.2	113.9	112.3	132.2	113.6	114.1	112.5
NTU - in situ (ntu)		0.51	0.46	0	0	0		0	0.08	0.21	0	0.42	0.06	0.18	0
pH (in situ) (pH)		7.62	7.58	7.63	7.77	7.69		7.77	7.83	8.02	8.2	7.51	8.48	7.63	7.76
Sample Depth (m)		40	40	40	40	40		40	40	40	40	40	40	40	40
Sample Taken		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes
Temp (in situ) (Degrees Celcius)		4.258	4.518	4.709	5.478	4.761		4.607	4.603	5.212	4.306	4.859	4.816	5.609	4.052
Organic / Inorganic															
DOC (mg/L)	1.77	1.68	1.87	1.73	1.76	2.14	2.00	2.24	1.87	12.8	1.99	1.93	1.71	1.83	2.06
Physical Test															
Conductivity (µs/cm)	115	111	109	111	114	112	111	110	113	112	112	111	117	113	112
Hardness (mg/L)	55.2	52.4	52.4	52.7	51.5	53.9	51.8	52.4	53.5	55.2	52.4	53.0	51.2	56.0	53.5
NTU (ntu)	0.25	0.13	<0.10	0.12	0.17	0.34	0.35	0.19	0.16	0.14	0.14	0.19	<0.10	0.10	0.18
pH (pH)	7.99	8.00	7.88	7.98	7.88	7.82	7.46	7.87	7.95	7.84	7.87	7.85	7.86	7.92	7.91
TDS (mg/L)	68	71	69	73	66	72	72	72	71	74	79	84	82	71	79
TSS (mg/L)	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.1	<1.1	<1.0	<1.0	<1.0	<1.0	<1.0	2.1
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0133	0.0116	0.0118	0.0119	0.0155	0.0211	0.0265	0.0150	0.0131	0.0155	0.0104	0.0132	0.0099	0.0125	0.0298
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	0.00010	0.00011	<0.00010	0.00011	0.00014	0.00011	0.00010	0.00012	0.00011	0.00011	0.00011	0.00011	0.00012	0.00012
Barium (Ba)-Total (mg/L)	0.00519	0.00508	0.00558	0.00530	0.00550	0.00540	0.00578	0.00507	0.00520	0.00532	0.00431	0.00522	0.00482	0.00502	0.00531
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

	E303020 : QUL-2a-40m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.98	1.84	1.80	1.81	1.96	1.89	1.79	1.63
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.954	1.01	1.06	1.08	0.990	1.11	1.07	0.990
Diss-Strontium (Sr) (mg/L)	0.126	0.131	0.142	0.146	0.134	0.142	0.145	0.148
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000150	0.000154	0.000149	0.000152	0.000159	0.000164	0.000160	0.000166
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	71	70	86	68	82	69	74	73
Field Tests								
Cond (in situ) (µs/cm)	109.9	107.8	112.1	114.1	107.7	108.7	112.2	111.5
NTU - in situ (ntu)	0.43	0	0	0.14	0	0.04	0.03	
pH (in situ) (pH)	7.86	7.84	7.56	7.4	7.49	7.51	7.62	7.6
Sample Depth (m)	40	40	40	40	40	40	40	40
Sample Taken	Yes	Yes	Yes	Yes				
Temp (in situ) (Degrees Celcius)	4.538	4.566	4.848	3.792	4.663	4.686	4.837	5.188
Organic / Inorganic								
DOC (mg/L)	2.39	2.11	1.98	2.30	1.80	2.42	2.05	1.91
Physical Test								
Conductivity (µs/cm)	108	110	112	112	111	102	113	115
Hardness (mg/L)	51.7	51.4	56.6	58.9	52.1	56.0	53.0	54.1
NTU (ntu)	0.26	0.13	<0.10	0.27	0.30	0.18	0.16	<0.10
pH (pH)	7.87	7.83	7.89	7.92	7.88	7.81	7.91	7.76
TDS (mg/L)	71	70	86	68	82	69	74	73
TSS (mg/L)	<1.0	<1.1	<1.0	<1.0	<1.0	<1.1	<1.0	<1.1
Total Metals								
Aluminum (Al)-Total (mg/L)	0.0119	0.0124	0.0106	0.0140	0.0156	0.0150	0.0095	0.0088
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00010	0.00013	0.00012	0.00013	0.00011	0.00011	0.00012
Barium (Ba)-Total (mg/L)	0.00496	0.00520	0.00529	0.00523	0.00528	0.00561	0.00499	0.00498
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

Grid Format Report : QUL-2a-40m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-40m														
	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000051	<0.0000050
Calcium (Ca)-Total (mg/L)	17.6	18.4	16.8	15.6	18.1	17.6	19.1	17.9	17.3	17.8	15.1	17.3	19.7	18.2	17.5
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00064	0.00060	0.00071	0.00072	0.00104	0.00068	0.00071	0.00062	0.00066	0.00076	0.00056	0.00063	0.00056	0.00067	0.00107
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.038
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	2.05	2.01	2.01	1.97	1.95	2.10	2.24	2.20	2.12	2.16	1.81	2.15	2.06	2.03	2.12
Manganese (Mn)-Total (mg/L)	0.00127	0.00102	0.00115	0.00102	0.00124	0.00145	0.00131	0.00121	0.00132	0.00126	0.00078	0.00113	0.00098	0.00080	0.00256
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			<0.0000050	<0.0000050		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Tota (mg/L)	0.000479	0.000466	0.000548	0.000478	0.000431	0.000437	0.000406	0.000388	0.000498	0.000645	0.000412	0.000475	0.000418	0.000831	0.000435
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.483	0.478	0.487	0.481	0.449	0.512	0.556	0.504	0.482	0.486	0.407	0.522	0.501	0.504	0.481
Selenium (Se)-Total (mg/L)	0.000135	0.000116	0.000129	0.000169	0.000111	0.000121	0.000082	0.000105	0.000133	0.000185	0.000151	0.000149	0.000129	0.000227	0.000152
Silicon (Si)-Total (mg/L)	1.76	1.67	1.72	1.74	1.69	1.95	1.87	1.79	1.79	1.84	1.89	1.82	1.72	1.81	1.83
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.08	0.987	1.06	1.01	0.938	0.977	1.08	0.981	0.989	1.07	0.890	1.03	0.997	1.03	1.00
Strontium (Sr)-Total (mg/L)	0.132	0.143	0.134	0.122	0.135	0.137	0.140	0.147	0.135	0.139	0.117	0.139	0.141	0.141	0.138
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000159	0.000171	0.000162	0.000140	0.000154	0.000166	0.000173	0.000157	0.000164	0.000159	0.000157	0.000150	0.000155	0.000168	0.000163
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303020 : QUL-2a-40m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	16.7	16.7	17.4	16.7	17.5	17.0	17.8	17.8
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	<0.00050	0.00057	0.00057	0.00060	0.00052	0.00064	0.00056	0.00056
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.97	2.09	2.14	2.12	2.10	2.23	2.20	2.05
Manganese (Mn)-Total (mg/L)	0.00104	0.00123	0.00110	0.00128	0.00140	0.00125	0.00072	0.00062
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050		<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Tota (mg/L)	0.000336	0.000426	0.000664	0.000705	0.000362	0.000609	0.000601	0.000557
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.440	0.509	0.510	0.499	0.544	0.513	0.489	0.486
Selenium (Se)-Total (mg/L)	0.000102	0.000108	0.000182	0.000185	0.000101	0.000124	0.000175	0.000166
Silicon (Si)-Total (mg/L)	1.90	1.91	1.85	1.83	1.98	1.86	1.82	1.72
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.889	0.998	1.01	1.04	1.01	0.994	1.07	0.972
Strontium (Sr)-Total (mg/L)	0.127	0.139	0.144	0.139	0.139	0.148	0.143	0.138
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000151	0.000157	0.000163	0.000158	0.000154	0.000160	0.000167	0.000168
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Grid Format Report : QUL-2a-40m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

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Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-40m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	23	23	45.60000	53.10000	49.23478	54.92500	1.67593
Ammonia (as N) (mg/L)	23	5	0.00250	0.02250	0.00419	0.01357	0.00443
Chloride (mg/L)	23	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	23	0	0.00050	0.00050	0.00050	0.00143	0.00000
Diss-Phosphorus (mg/L)	23	4	0.00100	0.00390	0.00136	0.00257	0.00084
Floride (mg/L)	23	23	0.02800	0.04100	0.03635	0.05320	0.00285
Nitrate (N) (mg/L)	23	23	0.12700	0.15400	0.14070	0.17850	0.00721
Nitrate and Nitrite (mg/L)	23	23	0.12700	0.15400	0.14074	0.15300	0.00714
Nitrite (N) (mg/L)	23	0	0.00050	0.00050	0.00050	0.00420	0.00000
Sulphate (mg/L)	23	23	6.21000	8.35000	6.95739	11.26500	0.50856
Total Nitrogen (mg/L)	23	23	0.17000	0.22100	0.19874	0.26895	0.01482
Total Phosphorus (mg/L)	23	17	0.00100	0.00700	0.00284	0.00896	0.00177
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	23	23	0.00540	0.00840	0.00680	0.01096	0.00092
Diss-Antimony (Sb) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00014	0.00000
Diss-Arsenic (As) (mg/L)	23	10	0.00005	0.00017	0.00008	0.00039	0.00004
Diss-Barium (Ba) (mg/L)	23	23	0.00455	0.00556	0.00519	0.01020	0.00025
Diss-Beryllium (Be) (mg/L)	23	0	0.00005	0.00050	0.00015	0.00005	0.00019
Diss-Bismuth (Bi) (mg/L)	23	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	23	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	23	23	17.00000	19.90000	17.96087	20.23000	0.74452
Diss-Chromium (Cr) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	23	18	0.00025	0.00066	0.00051	0.00364	0.00015
Diss-Iron (Fe) (mg/L)	23	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	23	0	0.00003	0.00003	0.00003	0.00034	0.00000
Diss-Lithium (Li) (mg/L)	23	0	0.00050	0.00050	0.00050	0.00107	0.00000
Diss-Magnesium (Mg) (mg/L)	23	23	1.98000	2.29000	2.10957	2.27950	0.07595
Diss-Manganese (Mn) (mg/L)	23	22	0.00005	0.00033	0.00019	0.00681	0.00006
Diss-Molybdenum (Mo) (mg/L)	23	23	0.00031	0.00076	0.00050	0.00294	0.00012
Diss-Nickel (Ni) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	23	23	0.47400	0.55000	0.50978	0.76445	0.01791

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	E303020 : QUL-2a-40m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	23	23	0.00007	0.00021	0.00014	0.00025	0.00004
Diss-Silicon (Si) (mg/L)	23	23	1.59000	1.98000	1.78826	1.82000	0.09833
Diss-Silver (Ag) (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	23	23	0.91400	1.11000	1.01791	2.19550	0.05504
Diss-Strontium (Sr) (mg/L)	23	23	0.12600	0.15400	0.13926	0.15530	0.00701
Diss-Thallium (Tl) (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	23	23	0.00015	0.00018	0.00016	0.00037	0.00001
Diss-Vanadium (V) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	23	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	23	23	66.00000	86.00000	73.73913	88.65000	5.52858
Field Tests							
Cond (in situ) (µs/cm)	21	21	107.70000	132.20000	112.82381	151.22500	5.05331
NTU - in situ (ntu)	20	20	0.00000	0.51000	0.12800	0.83250	0.17975
pH (in situ) (pH)	21	21	7.40000	8.48000	7.73190	7.94400	0.25376
Sample Depth (m)	21	21	40.00000	40.00000	40.00000	40.00000	0.00000
Sample Taken							
Temp (in situ) (Degrees Celcius)	21	21	3.79200	5.60900	4.70981	6.00750	0.43040
Organic / Inorganic							
DOC (mg/L)	23	23	1.68000	12.80000	2.44957	2.29700	2.26627
Physical Test							
Conductivity (µs/cm)	23	23	102.00000	117.00000	111.56522	127.95000	2.88926
Hardness (mg/L)	23	23	51.20000	58.90000	53.51739	59.68000	1.96946
NTU (ntu)	23	19	0.05000	0.35000	0.17217	21.02000	0.08888
pH (pH)	23	23	7.46000	8.00000	7.86739	7.99650	0.10614
TDS (mg/L)	23	23	66.00000	86.00000	73.73913	88.65000	5.52858
TSS (mg/L)	23	2	0.50000	2.10000	0.60652	5.04000	0.34847
Total Metals							
Aluminum (Al)-Total (mg/L)	23	23	0.00880	0.02980	0.01430	1.10650	0.00513
Antimony (Sb)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00017	0.00000
Arsenic (As)-Total (mg/L)	23	21	0.00005	0.00014	0.00011	0.00063	0.00002
Barium (Ba)-Total (mg/L)	23	23	0.00431	0.00578	0.00520	0.03717	0.00030
Beryllium (Be)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Bismuth (Bi)-Total (mg/L)	23	0	0.00003	0.00003	0.00003	0.00025	0.00000

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	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Boron (B)-Total (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	23	1	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	23	23	15.10000	19.70000	17.46087	20.73000	0.99075
Chromium (Cr)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00028	0.00000
Copper (Cu)-Total (mg/L)	23	22	0.00025	0.00107	0.00065	0.02182	0.00016
Iron (Fe)-Total (mg/L)	23	1	0.01500	0.03800	0.01600	0.43905	0.00480
Lead (Pb)-Total (mg/L)	23	0	0.00003	0.00003	0.00003	0.00085	0.00000
Lithium (Li)-Total (mg/L)	23	5	0.00050	0.00100	0.00061	0.00130	0.00021
Magnesium (Mg)-Total (mg/L)	23	23	1.81000	2.24000	2.08174	2.46300	0.10134
Manganese (Mn)-Total (mg/L)	23	23	0.00062	0.00256	0.00118	0.03019	0.00037
Mercury (Hg)-Total (mg/L)	19	0	0.00000	0.00000	0.00000	0.00000	0.00000
Molybdenum (Mo)-Tota (mg/L)	23	23	0.00034	0.00083	0.00050	0.00306	0.00012
Nickel (Ni)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00067	0.00000
Potassium (K)-Total (mg/L)	23	23	0.40700	0.55600	0.49230	1.30300	0.03168
Selenium (Se)-Total (mg/L)	23	23	0.00008	0.00023	0.00014	0.00025	0.00004
Silicon (Si)-Total (mg/L)	23	23	1.67000	1.98000	1.81565	4.25850	0.08212
Silver (Ag)-Total (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	23	23	0.88900	1.08000	1.00443	2.33650	0.05210
Strontium (Sr)-Total (mg/L)	23	23	0.11700	0.14800	0.13726	0.17150	0.00729
Thallium (Tl)-Total (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	23	0	0.00500	0.00500	0.00500	0.03930	0.00000
Uranium (U)-Total (mg/L)	23	23	0.00014	0.00017	0.00016	0.00040	0.00001
Vanadium (V)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00207	0.00000
Zinc (Zn)-Total (mg/L)	23	0	0.00150	0.00150	0.00150	0.00150	0.00000

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	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Anions and Nutrients															
Alkalinity (CaCO3) (mg/L)	48.8	48.9	48.7	51.8	58.8	50.8	47.9	48.3	49.3	49.0	48.4	48.0	53.1	48.8	50.9
Ammonia (as N) (mg/L)	<0.0050	0.0064	<0.0050	<0.0050	<0.0050	0.0103	<0.0050	<0.0050	0.0348	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	0.0038	<0.0020	0.0023	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.037	0.039	0.039	0.036	0.038	0.037	0.037	0.040	0.037	0.040	0.038	0.039	0.032	0.040	0.036
Nitrate (N) (mg/L)	0.133	0.143	0.147	0.156	0.153	0.135	0.138	0.153	0.143	0.172	0.133	0.145	0.144	0.160	0.127
Nitrate and Nitrite (mg/L)	0.133	0.143	0.147	0.156	0.153	0.135	0.138	0.153	0.143	0.172	0.133	0.145	0.144	0.160	0.127
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	7.24	7.38	7.95	7.76	7.93	7.57	6.48	8.70	7.27	8.59	7.42	6.88	6.72	8.69	6.70
Total Nitrogen (mg/L)	0.189	0.235	0.223	0.226	0.287	0.216	0.200	0.223	0.222	0.220	0.174	0.188	0.198	0.193	0.219
Total Phosphorus (mg/L)	0.0034	0.0053	0.0062	0.0023	0.0042	0.0081	0.0035	<0.0020	0.0028	<0.0020	<0.0020	0.0023	<0.0020	<0.0020	0.0027
Dissolved Metals															
Aluminum (Al)-Diss (mg/L)	0.0067	0.0055	0.0062	0.0067	0.0063	0.0077	0.0059	0.0080	0.0068	0.0076	0.0119	0.0060	0.0062	0.0114	0.0084
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Barium (Ba) (mg/L)	0.00566	0.00548	0.00528	0.00521	0.00522	0.00550	0.00494	0.00544	0.00547	0.00527	0.00484	0.00467	0.00501	0.00510	0.00519
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	19.6	18.3	17.5	17.0	17.6	18.3	17.2	18.1	18.3	19.2	17.1	17.6	17.3	19.2	18.0
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00054	<0.00050	0.00064	0.00062	<0.00050	0.00066	0.00059	0.00061	0.00078	0.00052	0.00061	<0.00050	0.00052	0.00062	0.00053
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.30	2.07	2.11	2.30	2.07	2.18	2.12	2.18	2.09	2.28	2.05	1.92	2.01	2.11	2.08
Diss-Manganese (Mn) (mg/L)	0.00018	<0.00010	0.00013	0.00015	0.00021	0.00015	0.00015	0.00019	0.00021	0.00018	0.00013	0.00026	0.00020	0.00022	0.00035
Diss-Molybdenum (Mo) (mg/L)	0.000601	0.000588	0.000756	0.000753	0.000602	0.000630	0.000392	0.000899	0.000575	0.000856	0.000502	0.000465	0.000347	0.000909	0.000440
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.568	0.511	0.512	0.490	0.517	0.514	0.517	0.531	0.509	0.546	0.488	0.478	0.486	0.524	0.475
Diss-Selenium (mg/L)	0.000151	0.000160	0.000192	0.000247	0.000129	0.000170	0.000096	0.000231	0.000190	0.000160	0.000128	0.000167	0.000120	0.000183	0.000113

	E303020 : QUL-2a-60m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Anions and Nutrients								
Alkalinity (CaCO3) (mg/L)	50.0	48.0	45.6	49.7	49.5	50.8	50.0	51.8
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020	0.0024	<0.0020	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.034	0.033	0.039	0.035	0.036	0.035	0.035	0.028
Nitrate (N) (mg/L)	0.134	0.140	0.159	0.144	0.141	0.163	0.152	0.162
Nitrate and Nitrite (mg/L)	0.134	0.140	0.159	0.144	0.141	0.163	0.152	0.162
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.53	6.31	7.94	7.36	6.41	9.63	7.77	6.65
Total Nitrogen (mg/L)	0.180	0.182	0.218	0.178	0.192	0.236	0.202	0.190
Total Phosphorus (mg/L)	0.0034	<0.0020	0.0028	0.0026	0.0031	0.0026	0.0023	<0.0020
Dissolved Metals								
Aluminum (Al)-Diss (mg/L)	0.0072	0.0068	0.0084	0.0108	0.0067	0.0102	0.0081	0.0066
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	0.00011	0.00010	0.00015	<0.00010	0.00011	0.00013	0.00011	<0.00010
Diss-Barium (Ba) (mg/L)	0.00521	0.00511	0.00572	0.00512	0.00524	0.00538	0.00519	0.00451
Diss-Beryllium (Be) (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Diss-Calcium (Ca) (mg/L)	18.3	16.9	18.9	19.7	17.0	19.3	17.6	18.3
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00052	0.00054	0.00055	0.00063	<0.00050	0.00078	0.00061	0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	2.16	2.15	2.14	2.23	2.09	2.34	2.19	1.97
Diss-Manganese (Mn) (mg/L)	0.00012	0.00032	0.00025	0.00036	0.00016	0.00025	0.00017	0.00012
Diss-Molybdenum (Mo) (mg/L)	0.000439	0.000455	0.000753	0.000673	0.000410	0.00146	0.000766	0.000547
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.494	0.534	0.518	0.500	0.529	0.558	0.504	0.484
Diss-Selenium (mg/L)	0.000120	0.000108	0.000200	0.000166	0.000088	0.000350	0.000208	0.000151

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Diss-Silicon (Si) (mg/L)	1.64	1.83	1.86	1.80	1.67	1.84	1.91	1.88	1.68	1.76	1.72	1.71	1.77	1.72	1.82
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	1.16	1.06	1.14	1.14	1.01	1.04	0.974	1.18	1.08	1.15	0.996	0.912	0.956	1.05	0.941
Diss-Strontium (Sr) (mg/L)	0.140	0.135	0.137	0.142	0.136	0.143	0.135	0.145	0.138	0.159	0.135	0.150	0.141	0.145	0.142
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000186	0.000164	0.000158	0.000151	0.000147	0.000149	0.000164	0.000158	0.000161	0.000160	0.000150	0.000166	0.000152	0.000165	0.000159
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	65	74	63	72	66	70	70	78	72	72	79	104	74	70	78
Field Tests															
Cond (in situ) (µs/cm)			114.7	114.6	114.5	121.3		117	115.8	115.7	112.5	134.8	114.5	114.9	113
NTU - in situ (ntu)			0.53	0	0	0		0	0.12	0.24	0	0.44	0.07	0.12	0
pH (in situ) (pH)			7.56	7.51	7.71	7.69		7.69	7.78	7.95	8.15	7.47	8.48	7.57	7.72
Sample Depth (m)		60	60	60	60	60		60	60	60	60	60	60	60	60
Sample Taken		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	yes	Yes	Yes	Yes	Yes
Secchi Depth (m)		8.1													
Temp (in situ) (Degrees Celcius)			4.238	4.482	5.014	4.43		4.523	4.526	4.879	4.222	4.629	4.535	5.188	4.022
Organic / Inorganic															
DOC (mg/L)	1.96	1.64	1.86	1.84	1.74	2.04	2.10	2.33	1.88	12.9	2.10	1.96	1.77	1.88	2.05
Physical Test															
Conductivity (µs/cm)	116	113	112	114	116	115	112	117	113	115	113	111	117	115	112
Hardness (mg/L)	58.5	54.1	52.3	51.8	52.4	54.7	51.6	54.1	54.3	57.4	51.1	51.8	51.5	56.6	53.5
NTU (ntu)	0.34	0.16	0.14	0.17	0.18	0.26	0.18	0.17	0.13	0.12	0.18	0.11	0.11	<0.10	0.20
pH (pH)	7.99	8.01	7.88	7.99	7.87	7.78	7.38	7.88	7.95	7.80	7.88	7.83	7.85	7.92	7.91
TDS (mg/L)	65	74	63	72	66	70	70	78	72	72	79	104	74	70	78
TSS (mg/L)	<1.0	<1.0	<1.0	1.1	<1.0	1.1	<1.0	<1.0	<1.1	<1.0	<1.0	<1.0	<1.0	<1.0	1.4
Total Metals															
Aluminum (Al)-Total (mg/L)	0.0183	0.0152	0.0167	0.0120	0.0175	0.0192	0.0201	0.0171	0.0110	0.0147	0.0126	0.0115	0.0097	0.0138	0.0143
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00013	<0.00010	0.00011	0.00011	0.00013	0.00012	<0.00010	0.00012	0.00010	<0.00010	0.00012	<0.00010	<0.00010	0.00014	0.00012
Barium (Ba)-Total (mg/L)	0.00544	0.00498	0.00591	0.00559	0.00535	0.00538	0.00594	0.00539	0.00515	0.00567	0.00505	0.00498	0.00506	0.00539	0.00530
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

	E303020 : QUL-2a-60m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Diss-Silicon (Si) (mg/L)	1.90	1.87	1.83	1.81	1.97	1.95	1.82	1.72
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.974	1.02	1.08	1.10	1.02	1.34	1.08	0.964
Diss-Strontium (Sr) (mg/L)	0.137	0.136	0.147	0.149	0.140	0.154	0.148	0.142
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Diss-Uranium (U) (mg/L)	0.000154	0.000162	0.000156	0.000160	0.000156	0.000168	0.000163	0.000166
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
TDS (mg/L)	68	75	90	83	83	75	76	64
Field Tests								
Cond (in situ) (µs/cm)	111.9	108.7	113.5	114.7	108.5	116.1	114	112.7
NTU - in situ (ntu)	0.43	0	0	0.2	0	0.11	0.07	
pH (in situ) (pH)	7.82	7.73	7.53	7.35	7.44	7.36	7.54	7.47
Sample Depth (m)	60	60	60	60	60	60	60	60
Sample Taken	Yes	Yes	Yes	Yes				
Secchi Depth (m)								
Temp (in situ) (Degrees Celcius)	4.427	4.424	4.648	3.728	4.291	3.962	4.48	4.771
Organic / Inorganic								
DOC (mg/L)	2.38	2.06	2.02	2.05	2.04	2.46	2.29	1.93
Physical Test								
Conductivity (µs/cm)	110	112	113	110	113	110	115	113
Hardness (mg/L)	54.6	51.0	56.0	58.4	51.0	57.8	53.0	53.8
NTU (ntu)	0.25	0.12	<0.10	0.27	0.30	0.10	0.10	<0.10
pH (pH)	7.87	7.83	7.89	7.91	7.88	7.80	7.91	7.76
TDS (mg/L)	68	75	90	83	83	75	76	64
TSS (mg/L)	<1.0	<1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.1
Total Metals								
Aluminum (Al)-Total (mg/L)	0.0118	0.0130	0.0129	0.0135	0.0190	0.0146	0.0146	0.0090
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	0.00011	0.00012	0.00011	0.00011	0.00013	0.00011	0.00012
Barium (Ba)-Total (mg/L)	0.00518	0.00522	0.00543	0.00533	0.00530	0.00603	0.00522	0.00499
Beryllium (Be)-Total (mg/L)	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Grid Format Report : QUL-2a-60m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-60m														
	8-May-19	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	21-Jul-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000091	0.0000060	<0.0000100	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.8	18.3	18.1	18.3	18.5	18.0	19.2	18.8	17.6	18.1	17.2	17.2	19.0	18.6	17.8
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00081	0.00073	0.00123	0.00078	0.00090	0.00078	0.00074	0.00085	0.00072	0.00075	0.00072	0.00054	0.00060	0.00069	0.00175
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	2.13	2.05	2.10	2.11	2.00	2.15	2.31	2.33	2.06	2.13	2.07	2.11	2.12	2.12	2.14
Manganese (Mn)-Total (mg/L)	0.00153	0.00106	0.00114	0.00106	0.00125	0.00122	0.00129	0.00138	0.00118	0.00115	0.00107	0.00119	0.00100	0.00097	0.00149
Molybdenum (Mo)-Tota (mg/L)	0.000581	0.000576	0.000757	0.000710	0.000628	0.000607	0.000390	0.000939	0.000566	0.000789	0.000525	0.000473	0.000377	0.000978	0.000442
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.500	0.488	0.496	0.514	0.466	0.505	0.566	0.504	0.474	0.497	0.473	0.508	0.520	0.525	0.500
Selenium (Se)-Total (mg/L)	0.000198	0.000173	0.000218	0.000206	0.000176	0.000137	0.000114	0.000255	0.000149	0.000240	0.000154	0.000136	0.000127	0.000262	0.000144
Silicon (Si)-Total (mg/L)	1.79	1.68	1.75	1.76	1.75	1.85	1.87	1.86	1.71	1.84	1.93	1.84	1.77	1.92	1.85
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.16	1.04	1.14	1.08	1.02	1.04	1.10	1.14	0.954	1.08	1.02	1.00	1.02	1.09	1.02
Strontium (Sr)-Total (mg/L)	0.134	0.145	0.140	0.144	0.136	0.143	0.138	0.150	0.136	0.144	0.134	0.137	0.140	0.149	0.140
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000158	0.000169	0.000165	0.000175	0.000154	0.000159	0.000168	0.000163	0.000162	0.000152	0.000171	0.000151	0.000158	0.000181	0.000161
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

	E303020 : QUL-2a-60m							
	27-Jun-22	15-Aug-22	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	17.9	16.9	18.3	17.4	17.4	18.4	18.0	18.7
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00054	0.00058	0.00062	0.00064	0.00065	0.00083	0.00062	0.00054
Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0010
Magnesium (Mg)-Total (mg/L)	2.11	2.10	2.16	2.13	2.09	2.42	2.13	2.11
Manganese (Mn)-Total (mg/L)	0.00115	0.00130	0.00125	0.00141	0.00164	0.00135	0.00081	0.00062
Molybdenum (Mo)-Tota (mg/L)	0.000421	0.000450	0.000778	0.000718	0.000424	0.00148	0.000771	0.000567
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.476	0.508	0.508	0.503	0.534	0.538	0.496	0.488
Selenium (Se)-Total (mg/L)	0.000123	0.000140	0.000209	0.000238	0.000104	0.000378	0.000214	0.000160
Silicon (Si)-Total (mg/L)	1.96	1.95	1.85	1.88	1.98	1.92	1.87	1.75
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.954	1.01	1.04	1.06	1.01	1.20	1.11	0.987
Strontium (Sr)-Total (mg/L)	0.137	0.141	0.148	0.137	0.139	0.161	0.148	0.144
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium (U)-Total (mg/L)	0.000159	0.000162	0.000163	0.000157	0.000158	0.000165	0.000169	0.000169
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Grid Format Report : QUL-2a-60m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-60m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	23	23	45.60000	58.80000	49.86522	56.72000	2.52291
Ammonia (as N) (mg/L)	23	3	0.00250	0.03480	0.00441	0.02401	0.00686
Chloride (mg/L)	23	1	0.25000	0.75000	0.27174	0.25000	0.10426
Diss-Orthophosphate (mg/L)	23	0	0.00050	0.00050	0.00050	0.00158	0.00000
Diss-Phosphorus (mg/L)	23	3	0.00100	0.00380	0.00124	0.00317	0.00068
Floride (mg/L)	23	23	0.02800	0.04000	0.03652	0.06240	0.00291
Nitrate (N) (mg/L)	23	23	0.12700	0.17200	0.14683	0.20250	0.01152
Nitrate and Nitrite (mg/L)	23	23	0.12700	0.17200	0.14683	0.16600	0.01152
Nitrite (N) (mg/L)	23	0	0.00050	0.00050	0.00050	0.00566	0.00000
Sulphate (mg/L)	23	23	6.31000	9.63000	7.47304	14.43000	0.86320
Total Nitrogen (mg/L)	23	23	0.17400	0.28700	0.20830	0.28740	0.02561
Total Phosphorus (mg/L)	23	16	0.00100	0.00810	0.00281	0.01865	0.00182
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	23	23	0.00550	0.01190	0.00766	0.01412	0.00181
Diss-Antimony (Sb) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00023	0.00000
Diss-Arsenic (As) (mg/L)	23	10	0.00005	0.00015	0.00008	0.00059	0.00003
Diss-Barium (Ba) (mg/L)	23	23	0.00451	0.00572	0.00521	0.01319	0.00029
Diss-Beryllium (Be) (mg/L)	23	0	0.00005	0.00050	0.00015	0.00005	0.00019
Diss-Bismuth (Bi) (mg/L)	23	0	0.00003	0.00003	0.00003	0.00025	0.00000
Diss-Boron (B) (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	23	0	0.00000	0.00000	0.00000	0.00001	0.00000
Diss-Calcium (Ca) (mg/L)	23	23	16.90000	19.70000	18.10000	21.81000	0.87750
Diss-Chromium (Cr) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	23	19	0.00025	0.00078	0.00054	0.00501	0.00015
Diss-Iron (Fe) (mg/L)	23	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	23	0	0.00003	0.00003	0.00003	0.00033	0.00000
Diss-Lithium (Li) (mg/L)	23	1	0.00050	0.00100	0.00052	0.00111	0.00010
Diss-Magnesium (Mg) (mg/L)	23	23	1.92000	2.34000	2.13652	2.40000	0.10611
Diss-Manganese (Mn) (mg/L)	23	22	0.00005	0.00036	0.00020	0.02160	0.00008
Diss-Molybdenum (Mo) (mg/L)	23	23	0.00035	0.00146	0.00064	0.00489	0.00024
Diss-Nickel (Ni) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	23	23	0.47500	0.56800	0.51248	0.96790	0.02464

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	E303020 : QUL-2a-60m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	23	23	0.00009	0.00035	0.00017	0.00025	0.00006
Diss-Silicon (Si) (mg/L)	23	23	1.64000	1.97000	1.80348	1.97100	0.09023
Diss-Silver (Ag) (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	23	23	0.91200	1.34000	1.05943	3.08000	0.09716
Diss-Strontium (Sr) (mg/L)	23	23	0.13500	0.15900	0.14243	0.17210	0.00645
Diss-Thallium (Tl) (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	23	23	0.00015	0.00019	0.00016	0.00052	0.00001
Diss-Vanadium (V) (mg/L)	23	0	0.00025	0.00025	0.00025	0.00050	0.00000
Diss-Zinc (Zn) (mg/L)	23	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	23	23	63.00000	104.00000	74.82609	98.40000	9.11369
Field Tests							
Cond (in situ) (µs/cm)	20	20	108.50000	134.80000	115.17000	151.49500	5.37383
NTU - in situ (ntu)	19	19	0.00000	0.53000	0.12263	0.91550	0.17029
pH (in situ) (pH)	20	20	7.35000	8.48000	7.67600	7.77900	0.27366
Sample Depth (m)	21	21	60.00000	60.00000	60.00000	60.00000	0.00000
Sample Taken							
Secchi Depth (m)	1	1	8.10000	8.10000	8.10000		
Temp (in situ) (Degrees Celcius)	20	20	3.72800	5.18800	4.47095	5.44350	0.34785
Organic / Inorganic							
DOC (mg/L)	23	23	1.64000	12.90000	2.49043	2.30700	2.27827
Physical Test							
Conductivity (µs/cm)	23	23	110.00000	117.00000	113.34783	142.10000	2.12365
Hardness (mg/L)	23	23	51.00000	58.50000	53.96957	64.38000	2.45087
NTU (ntu)	23	20	0.05000	0.34000	0.16261	34.36000	0.07921
pH (pH)	23	23	7.38000	8.01000	7.85957	8.00000	0.12323
TDS (mg/L)	23	23	63.00000	104.00000	74.82609	98.40000	9.11369
TSS (mg/L)	23	3	0.50000	1.40000	0.60000	6.16000	0.24448
Total Metals							
Aluminum (Al)-Total (mg/L)	23	23	0.00900	0.02010	0.01444	1.88400	0.00307
Antimony (Sb)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00028	0.00000
Arsenic (As)-Total (mg/L)	23	18	0.00005	0.00014	0.00010	0.00104	0.00003
Barium (Ba)-Total (mg/L)	23	23	0.00498	0.00603	0.00536	0.05929	0.00030
Beryllium (Be)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000

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	E303020 : QUL-2a-60m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	23	0	0.00003	0.00003	0.00003	0.00025	0.00000
Boron (B)-Total (mg/L)	23	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	23	2	0.00000	0.00001	0.00000	0.00001	0.00000
Calcium (Ca)-Total (mg/L)	23	23	16.90000	19.20000	18.06522	21.97000	0.60273
Chromium (Cr)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00081	0.00000
Cobalt (Co)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00044	0.00000
Copper (Cu)-Total (mg/L)	23	23	0.00054	0.00175	0.00077	0.03411	0.00026
Iron (Fe)-Total (mg/L)	23	0	0.01500	0.01500	0.01500	0.67800	0.00000
Lead (Pb)-Total (mg/L)	23	0	0.00003	0.00003	0.00003	0.00065	0.00000
Lithium (Li)-Total (mg/L)	23	7	0.00050	0.00100	0.00065	0.00154	0.00024
Magnesium (Mg)-Total (mg/L)	23	23	2.00000	2.42000	2.13826	2.68400	0.09374
Manganese (Mn)-Total (mg/L)	23	23	0.00062	0.00164	0.00120	0.05628	0.00023
Molybdenum (Mo)-Tota (mg/L)	23	23	0.00038	0.00148	0.00065	0.00513	0.00025
Nickel (Ni)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00122	0.00000
Potassium (K)-Total (mg/L)	23	23	0.46600	0.56600	0.50378	1.92700	0.02292
Selenium (Se)-Total (mg/L)	23	23	0.00010	0.00038	0.00019	0.00025	0.00006
Silicon (Si)-Total (mg/L)	23	23	1.68000	1.98000	1.84043	6.38200	0.08304
Silver (Ag)-Total (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	23	23	0.95400	1.20000	1.05543	3.47800	0.06457
Strontium (Sr)-Total (mg/L)	23	23	0.13400	0.16100	0.14196	0.19340	0.00633
Thallium (Tl)-Total (mg/L)	23	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	23	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	23	0	0.00500	0.00500	0.00500	0.06480	0.00000
Uranium (U)-Total (mg/L)	23	23	0.00015	0.00018	0.00016	0.00058	0.00001
Vanadium (V)-Total (mg/L)	23	0	0.00025	0.00025	0.00025	0.00315	0.00000
Zinc (Zn)-Total (mg/L)	23	0	0.00150	0.00150	0.00150	0.00431	0.00000

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	E306455 : QUL-ZOO-1		
	25-Jun-19	30-Jul-19	29-Aug-19
Anions and Nutrients			
Alkalinity (CaCO3) (mg/L)	46.7	45.8	47.0
Ammonia (as N) (mg/L)	<0.0050	0.0067	0.0214
Chloride (mg/L)	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.033	0.030	0.035
Nitrate (N) (mg/L)	0.0989	0.0476	0.0453
Nitrate and Nitrite (mg/L)	0.0989	0.0476	0.0453
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	6.00	5.84	5.93
Total Nitrogen (mg/L)	0.258	0.188	0.164
Total Phosphorus (mg/L)	0.0046	0.0062	0.0076
Dissolved Metals			
Aluminum (Al)-Diss (mg/L)	0.0101	0.0116	0.0098
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	0.00012	0.00011
Diss-Barium (Ba) (mg/L)	0.00519	0.00563	0.00590
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	0.0000206	<0.0000050	0.0000223
Diss-Calcium (Ca) (mg/L)	17.0	16.5	17.4
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	0.00057	0.00058	0.00054
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.98	2.02	2.03
Diss-Manganese (Mn) (mg/L)	0.00062	0.00027	0.00013
Diss-Molybdenum (Mo) (mg/L)	0.000319	0.000354	0.000351
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.490	0.507	0.481
Diss-Selenium (mg/L)	0.000103	0.000097	0.000093

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	E306455 : QUL-ZOO-1		
	25-Jun-19	**30-Jul-19**	**29-Aug-19**
Diss-Silicon (Si) (mg/L)	1.62	1.67	1.58
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.926	0.992	0.913
Diss-Strontium (Sr) (mg/L)	0.126	0.123	0.129
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010
Diss-Uranium (U) (mg/L)	0.000163	0.000149	0.000140
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030
TDS (mg/L)	71	73	63
Field Tests			
Cond (in situ) (µs/cm)	104.4	100.3	103.4
NTU - in situ (ntu)	0.03	0.24	0.18
pH (in situ) (pH)	7.92	8.11	8.14
Sample Depth (m)	0	0	0
Sample Taken	Yes	Yes	Yes
Secchi Depth (m)	9	5.5	8.5
Temp (in situ) (Degrees Celcius)	12.334	18.267	18.217
Organic / Inorganic			
DOC (mg/L)	2.01	2.34	1.59
Physical Test			
Conductivity (µs/cm)	105	100	103
Hardness (mg/L)	50.6	49.4	51.9
NTU (ntu)	0.31	0.37	0.22
pH (pH)	7.92	7.92	7.91
TDS (mg/L)	71	73	63
TSS (mg/L)	<1.0	<1.0	1.2
Total Metals			
Aluminum (Al)-Total (mg/L)	0.0975	0.0258	0.0168
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00030	0.00015	0.00013
Barium (Ba)-Total (mg/L)	0.00906	0.00605	0.00555
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050

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	E306455 : QUL-ZOO-1		
	25-Jun-19	**30-Jul-19**	**29-Aug-19**
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	0.0000198	<0.0000050	0.0000248
Calcium (Ca)-Total (mg/L)	16.5	15.0	16.5
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.0240	0.00127	0.00179
Iron (Fe)-Total (mg/L)	0.082	0.030	<0.030
Lead (Pb)-Total (mg/L)	0.000062	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.92	1.93	2.01
Manganese (Mn)-Total (mg/L)	0.00524	0.00177	0.00131
Molybdenum (Mo)-Tota (mg/L)	0.000328	0.000348	0.000339
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.518	0.503	0.487
Selenium (Se)-Total (mg/L)	0.000154	0.000103	0.000110
Silicon (Si)-Total (mg/L)	1.83	1.76	1.60
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.931	0.950	0.935
Strontium (Sr)-Total (mg/L)	0.123	0.112	0.122
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	0.000163	0.000143	0.000143
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030

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	E306455 : QUL-ZOO-1						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	3	3	45.80000	47.00000	46.50000	48.07500	0.62450
Ammonia (as N) (mg/L)	3	2	0.00250	0.02140	0.01020	0.00828	0.00992
Chloride (mg/L)	3	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	3	0	0.00050	0.00050	0.00050	0.00140	0.00000
Diss-Phosphorus (mg/L)	3	0	0.00100	0.00100	0.00100	0.00280	0.00000
Floride (mg/L)	3	3	0.03000	0.03500	0.03267	0.03400	0.00252
Nitrate (N) (mg/L)	3	3	0.04530	0.09890	0.06393	0.10428	0.03030
Nitrate and Nitrite (mg/L)	3	3	0.04530	0.09890	0.06393	0.10428	0.03030
Nitrite (N) (mg/L)	3	0	0.00050	0.00050	0.00050	0.00155	0.00000
Sulphate (mg/L)	3	3	5.84000	6.00000	5.92333	6.43500	0.08021
Total Nitrogen (mg/L)	3	3	0.16400	0.25800	0.20333	0.17100	0.04884
Total Phosphorus (mg/L)	3	3	0.00460	0.00760	0.00613	0.00363	0.00150
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	3	3	0.00980	0.01160	0.01050	0.01215	0.00096
Diss-Antimony (Sb) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	3	2	0.00005	0.00012	0.00009	0.00016	0.00004
Diss-Barium (Ba) (mg/L)	3	3	0.00519	0.00590	0.00557	0.00576	0.00036
Diss-Beryllium (Be) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Bismuth (Bi) (mg/L)	3	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Boron (B) (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	3	2	0.00000	0.00002	0.00002	0.00000	0.00001
Diss-Calcium (Ca) (mg/L)	3	3	16.50000	17.40000	16.96667	17.50000	0.45092
Diss-Chromium (Cr) (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	3	3	0.00054	0.00058	0.00056	0.00067	0.00002
Diss-Iron (Fe) (mg/L)	3	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	3	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Lithium (Li) (mg/L)	3	0	0.00050	0.00050	0.00050	0.00050	0.00000
Diss-Magnesium (Mg) (mg/L)	3	3	1.98000	2.03000	2.01000	2.11500	0.02646
Diss-Manganese (Mn) (mg/L)	3	3	0.00013	0.00062	0.00034	0.00124	0.00025
Diss-Molybdenum (Mo) (mg/L)	3	3	0.00032	0.00035	0.00034	0.00038	0.00002
Diss-Nickel (Ni) (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	3	3	0.48100	0.50700	0.49267	0.54600	0.01320

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	E306455 : QUL-ZOO-1						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	3	3	0.00009	0.00010	0.00010	0.00011	0.00001
Diss-Silicon (Si) (mg/L)	3	3	1.58000	1.67000	1.62333	1.73000	0.04509
Diss-Silver (Ag) (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	3	3	0.91300	0.99200	0.94367	0.99750	0.04236
Diss-Strontium (Sr) (mg/L)	3	3	0.12300	0.12900	0.12600	0.12800	0.00300
Diss-Thallium (Tl) (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	3	3	0.00014	0.00016	0.00015	0.00015	0.00001
Diss-Vanadium (V) (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Zinc (Zn) (mg/L)	3	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	3	3	63.00000	73.00000	69.00000	80.00000	5.29150
Field Tests							
Cond (in situ) (µs/cm)	3	3	100.30000	104.40000	102.70000	109.32500	2.13776
NTU - in situ (ntu)	3	3	0.03000	0.24000	0.15000	0.73250	0.10817
pH (in situ) (pH)	3	3	7.92000	8.14000	8.05667	8.35000	0.11930
Sample Depth (m)	3	3	0.00000	0.00000	0.00000	0.00000	0.00000
Sample Taken							
Secchi Depth (m)	3	3	5.50000	9.00000	7.66667	13.33750	1.89297
Temp (in situ) (Degrees Celcius)	3	3	12.33400	18.26700	16.27267	19.28925	3.41108
Organic / Inorganic							
DOC (mg/L)	3	3	1.59000	2.34000	1.98000	2.36000	0.37590
Physical Test							
Conductivity (µs/cm)	3	3	100.00000	105.00000	102.66667	103.00000	2.51661
Hardness (mg/L)	3	3	49.40000	51.90000	50.63333	52.27500	1.25033
NTU (ntu)	3	3	0.22000	0.37000	0.30000	0.36500	0.07550
pH (pH)	3	3	7.91000	7.92000	7.91667	7.99750	0.00577
TDS (mg/L)	3	3	63.00000	73.00000	69.00000	80.00000	5.29150
TSS (mg/L)	3	1	0.50000	1.20000	0.73333	0.50000	0.40415
Total Metals							
Aluminum (Al)-Total (mg/L)	3	3	0.01680	0.09750	0.04670	0.03582	0.04422
Antimony (Sb)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00012	0.00000
Arsenic (As)-Total (mg/L)	3	3	0.00013	0.00030	0.00019	0.00016	0.00009
Barium (Ba)-Total (mg/L)	3	3	0.00555	0.00906	0.00689	0.00603	0.00190
Beryllium (Be)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000

Grid Format Report : QUL-ZOO-1

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	E306455 : QUL-ZOO-1						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	3	0	0.00003	0.00003	0.00003	0.00003	0.00000
Boron (B)-Total (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	3	2	0.00000	0.00002	0.00002	0.00000	0.00001
Calcium (Ca)-Total (mg/L)	3	3	15.00000	16.50000	16.00000	17.52500	0.86603
Chromium (Cr)-Total (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	3	3	0.00127	0.02400	0.00902	0.00315	0.01298
Iron (Fe)-Total (mg/L)	3	2	0.01500	0.08200	0.04233	0.04275	0.03516
Lead (Pb)-Total (mg/L)	3	1	0.00003	0.00006	0.00004	0.00003	0.00002
Lithium (Li)-Total (mg/L)	3	0	0.00050	0.00050	0.00050	0.00050	0.00000
Magnesium (Mg)-Total (mg/L)	3	3	1.92000	2.01000	1.95333	2.16000	0.04933
Manganese (Mn)-Total (mg/L)	3	3	0.00131	0.00524	0.00277	0.00208	0.00215
Molybdenum (Mo)-Tota (mg/L)	3	3	0.00033	0.00035	0.00034	0.00041	0.00001
Nickel (Ni)-Total (mg/L)	3	0	0.00025	0.00025	0.00025	0.00045	0.00000
Potassium (K)-Total (mg/L)	3	3	0.48700	0.51800	0.50267	0.54500	0.01550
Selenium (Se)-Total (mg/L)	3	3	0.00010	0.00015	0.00012	0.00012	0.00003
Silicon (Si)-Total (mg/L)	3	3	1.60000	1.83000	1.73000	1.95500	0.11790
Silver (Ag)-Total (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	3	3	0.93100	0.95000	0.93867	1.01575	0.01002
Strontium (Sr)-Total (mg/L)	3	3	0.11200	0.12300	0.11900	0.13125	0.00608
Thallium (Tl)-Total (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	3	3	0.00014	0.00016	0.00015	0.00015	0.00001
Vanadium (V)-Total (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Zinc (Zn)-Total (mg/L)	3	0	0.00150	0.00150	0.00150	0.00150	0.00000

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	E306456 : QUL-ZOO-7		
	25-Jun-19	30-Jul-19	29-Aug-19
Anions and Nutrients			
Alkalinity (CaCO3) (mg/L)	45.5	44.6	46.4
Ammonia (as N) (mg/L)	<0.0050	0.0086	0.0074
Chloride (mg/L)	<0.50	<0.50	<0.50
Diss-Orthophosphate (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Phosphorus (mg/L)	<0.0020	<0.0020	<0.0020
Floride (mg/L)	0.034	0.030	0.036
Nitrate (N) (mg/L)	0.0921	0.0477	0.0438
Nitrate and Nitrite (mg/L)	0.0921	0.0477	0.0438
Nitrite (N) (mg/L)	<0.0010	<0.0010	<0.0010
Sulphate (mg/L)	5.88	5.79	5.91
Total Nitrogen (mg/L)	0.263	0.208	0.136
Total Phosphorus (mg/L)	0.0042	0.0077	0.0063
Dissolved Metals			
Aluminum (Al)-Diss (mg/L)	0.0117	0.0108	0.0096
Diss-Antimony (Sb) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010	0.00011	0.00010
Diss-Barium (Ba) (mg/L)	0.00522	0.00598	0.00597
Diss-Beryllium (Be) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Bismuth (Bi) (mg/L)	<0.000050	<0.000050	<0.000050
Diss-Boron (B) (mg/L)	<0.010	<0.010	<0.010
Diss-Cadmium (Cd) (mg/L)	0.0000161	0.0000056	0.0000343
Diss-Calcium (Ca) (mg/L)	16.8	17.4	17.5
Diss-Chromium (Cr) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050	0.00063	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030	<0.030	<0.030
Diss-Lead (Pb) (mg/L)	0.000858	<0.000050	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010	<0.0010	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.92	2.03	2.06
Diss-Manganese (Mn) (mg/L)	0.00085	0.00018	<0.00010
Diss-Molybdenum (Mo) (mg/L)	0.000304	0.000392	0.000324
Diss-Nickel (Ni) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Potassium (K) (mg/L)	0.481	0.536	0.497
Diss-Selenium (mg/L)	0.000071	0.000122	0.000060

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	E306456 : QUL-ZOO-7		
	25-Jun-19	**30-Jul-19**	**29-Aug-19**
Diss-Silicon (Si) (mg/L)	1.76	1.72	1.58
Diss-Silver (Ag) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Sodium (Na) (mg/L)	0.891	0.998	0.910
Diss-Strontium (Sr) (mg/L)	0.121	0.122	0.134
Diss-Thallium (Tl) (mg/L)	<0.000010	<0.000010	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010	<0.00010	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010	<0.010	<0.010
Diss-Uranium (U) (mg/L)	0.000156	0.000139	0.000147
Diss-Vanadium (V) (mg/L)	<0.00050	<0.00050	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030	<0.0030	<0.0030
TDS (mg/L)	67	76	62
Field Tests			
Cond (in situ) (µs/cm)	102.5	99.1	102.3
NTU - in situ (ntu)	0	0.95	0.56
pH (in situ) (pH)	7.93	7.99	7.99
Sample Depth (m)	0	0	0
Sample Taken	Yes	Yes	Yes
Secchi Depth (m)	9	5.5	8.5
Temp (in situ) (Degrees Celcius)	15.261	17.679	16.813
Organic / Inorganic			
DOC (mg/L)	2.09	2.88	1.95
Physical Test			
Conductivity (µs/cm)	103	98.4	102
Hardness (mg/L)	49.8	51.8	52.3
NTU (ntu)	0.34	0.50	0.14
pH (pH)	7.93	7.89	7.93
TDS (mg/L)	67	76	62
TSS (mg/L)	<1.0	1.8	<1.0
Total Metals			
Aluminum (Al)-Total (mg/L)	0.0151	0.0304	0.0128
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00011	0.00017	0.00013
Barium (Ba)-Total (mg/L)	0.00523	0.00609	0.00534
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050

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	E306456 : QUL-ZOO-7		
	25-Jun-19	**30-Jul-19**	**29-Aug-19**
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	0.0000181	0.0000064	0.0000438
Calcium (Ca)-Total (mg/L)	16.4	15.6	16.9
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00060	0.00179	0.00066
Iron (Fe)-Total (mg/L)	<0.030	0.046	<0.030
Lead (Pb)-Total (mg/L)	0.00149	0.000101	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.84	1.87	1.98
Manganese (Mn)-Total (mg/L)	0.00127	0.00221	0.00121
Molybdenum (Mo)-Tota (mg/L)	0.000304	0.000396	0.000341
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L)	0.503	0.492	0.493
Selenium (Se)-Total (mg/L)	0.000114	0.000146	0.000097
Silicon (Si)-Total (mg/L)	1.72	1.78	1.58
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.901	0.933	0.917
Strontium (Sr)-Total (mg/L)	0.117	0.115	0.124
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	0.000149	0.000144	0.000146
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030

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	E306456 : QUL-ZOO-7						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	3	3	44.60000	46.40000	45.50000	47.67500	0.90000
Ammonia (as N) (mg/L)	3	2	0.00250	0.00860	0.00617	0.00795	0.00323
Chloride (mg/L)	3	0	0.25000	0.25000	0.25000	0.25000	0.00000
Diss-Orthophosphate (mg/L)	3	0	0.00050	0.00050	0.00050	0.00130	0.00000
Diss-Phosphorus (mg/L)	3	0	0.00100	0.00100	0.00100	0.00230	0.00000
Floride (mg/L)	3	3	0.03000	0.03600	0.03333	0.03475	0.00306
Nitrate (N) (mg/L)	3	3	0.04380	0.09210	0.06120	0.10043	0.02683
Nitrate and Nitrite (mg/L)	3	3	0.04380	0.09210	0.06120	0.10043	0.02683
Nitrite (N) (mg/L)	3	0	0.00050	0.00050	0.00050	0.00125	0.00000
Sulphate (mg/L)	3	3	5.79000	5.91000	5.86000	6.39500	0.06245
Total Nitrogen (mg/L)	3	3	0.13600	0.26300	0.20233	0.18950	0.06369
Total Phosphorus (mg/L)	3	3	0.00420	0.00770	0.00607	0.00433	0.00176
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	3	3	0.00960	0.01170	0.01070	0.01175	0.00105
Diss-Antimony (Sb) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Arsenic (As) (mg/L)	3	2	0.00005	0.00011	0.00009	0.00016	0.00003
Diss-Barium (Ba) (mg/L)	3	3	0.00522	0.00598	0.00572	0.00573	0.00044
Diss-Beryllium (Be) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Bismuth (Bi) (mg/L)	3	0	0.00003	0.00003	0.00003	0.00003	0.00000
Diss-Boron (B) (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Cadmium (Cd) (mg/L)	3	3	0.00001	0.00003	0.00002	0.00000	0.00001
Diss-Calcium (Ca) (mg/L)	3	3	16.80000	17.50000	17.23333	17.65000	0.37859
Diss-Chromium (Cr) (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Cobalt (Co) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Copper (Cu) (mg/L)	3	1	0.00025	0.00063	0.00038	0.00058	0.00022
Diss-Iron (Fe) (mg/L)	3	0	0.01500	0.01500	0.01500	0.01500	0.00000
Diss-Lead (Pb) (mg/L)	3	1	0.00003	0.00086	0.00030	0.00003	0.00048
Diss-Lithium (Li) (mg/L)	3	0	0.00050	0.00050	0.00050	0.00095	0.00000
Diss-Magnesium (Mg) (mg/L)	3	3	1.92000	2.06000	2.00333	2.14000	0.07371
Diss-Manganese (Mn) (mg/L)	3	2	0.00005	0.00085	0.00036	0.00100	0.00043
Diss-Molybdenum (Mo) (mg/L)	3	3	0.00030	0.00039	0.00034	0.00037	0.00005
Diss-Nickel (Ni) (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Potassium (K) (mg/L)	3	3	0.48100	0.53600	0.50467	0.54525	0.02829

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	E306456 : QUL-ZOO-7						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	3	3	0.00006	0.00012	0.00008	0.00012	0.00003
Diss-Silicon (Si) (mg/L)	3	3	1.58000	1.76000	1.68667	1.82250	0.09452
Diss-Silver (Ag) (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Sodium (Na) (mg/L)	3	3	0.89100	0.99800	0.93300	0.94650	0.05709
Diss-Strontium (Sr) (mg/L)	3	3	0.12100	0.13400	0.12567	0.12875	0.00723
Diss-Thallium (Tl) (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Diss-Tin (Sn) (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Diss-Titanium (Ti) (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Diss-Uranium (U) (mg/L)	3	3	0.00014	0.00016	0.00015	0.00015	0.00001
Diss-Vanadium (V) (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Diss-Zinc (Zn) (mg/L)	3	0	0.00150	0.00150	0.00150	0.00150	0.00000
TDS (mg/L)	3	3	62.00000	76.00000	68.33333	78.00000	7.09460
Field Tests							
Cond (in situ) (µs/cm)	3	3	99.10000	102.50000	101.30000	108.41000	1.90788
NTU - in situ (ntu)	3	3	0.00000	0.95000	0.50333	0.49000	0.47753
pH (in situ) (pH)	3	3	7.93000	7.99000	7.97000	8.09700	0.03464
Sample Depth (m)	3	3	0.00000	0.00000	0.00000	0.00000	0.00000
Sample Taken							
Secchi Depth (m)	3	3	5.50000	9.00000	7.66667	13.51750	1.89297
Temp (in situ) (Degrees Celcius)	3	3	15.26100	17.67900	16.58433	18.58980	1.22511
Organic / Inorganic							
DOC (mg/L)	3	3	1.95000	2.88000	2.30667	2.19250	0.50143
Physical Test							
Conductivity (µs/cm)	3	3	98.40000	103.00000	101.13333	102.50000	2.41937
Hardness (mg/L)	3	3	49.80000	52.30000	51.30000	52.75000	1.32288
NTU (ntu)	3	3	0.14000	0.50000	0.32667	0.42750	0.18037
pH (pH)	3	3	7.89000	7.93000	7.91667	7.95750	0.02309
TDS (mg/L)	3	3	62.00000	76.00000	68.33333	78.00000	7.09460
TSS (mg/L)	3	1	0.50000	1.80000	0.93333	2.45000	0.75056
Total Metals							
Aluminum (Al)-Total (mg/L)	3	3	0.01280	0.03040	0.01943	0.02465	0.00957
Antimony (Sb)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00013	0.00000
Arsenic (As)-Total (mg/L)	3	3	0.00011	0.00017	0.00014	0.00013	0.00003
Barium (Ba)-Total (mg/L)	3	3	0.00523	0.00609	0.00555	0.00556	0.00047
Beryllium (Be)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000

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	E306456 : QUL-ZOO-7						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	3	0	0.00003	0.00003	0.00003	0.00003	0.00000
Boron (B)-Total (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Cadmium (Cd)-Total (mg/L)	3	3	0.00001	0.00004	0.00002	0.00000	0.00002
Calcium (Ca)-Total (mg/L)	3	3	15.60000	16.90000	16.30000	17.00000	0.65574
Chromium (Cr)-Total (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Cobalt (Co)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Copper (Cu)-Total (mg/L)	3	3	0.00060	0.00179	0.00102	0.00090	0.00067
Iron (Fe)-Total (mg/L)	3	1	0.01500	0.04600	0.02533	0.02700	0.01790
Lead (Pb)-Total (mg/L)	3	2	0.00003	0.00149	0.00054	0.00003	0.00082
Lithium (Li)-Total (mg/L)	3	0	0.00050	0.00050	0.00050	0.00050	0.00000
Magnesium (Mg)-Total (mg/L)	3	3	1.84000	1.98000	1.89667	2.04250	0.07371
Manganese (Mn)-Total (mg/L)	3	3	0.00121	0.00221	0.00156	0.00184	0.00056
Molybdenum (Mo)-Tota (mg/L)	3	3	0.00030	0.00040	0.00035	0.00036	0.00005
Nickel (Ni)-Total (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Potassium (K)-Total (mg/L)	3	3	0.49200	0.50300	0.49600	0.52400	0.00608
Selenium (Se)-Total (mg/L)	3	3	0.00010	0.00015	0.00012	0.00012	0.00002
Silicon (Si)-Total (mg/L)	3	3	1.58000	1.78000	1.69333	1.91000	0.10263
Silver (Ag)-Total (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Sodium (Na)-Total (mg/L)	3	3	0.90100	0.93300	0.91700	0.98700	0.01600
Strontium (Sr)-Total (mg/L)	3	3	0.11500	0.12400	0.11867	0.13300	0.00473
Thallium (Tl)-Total (mg/L)	3	0	0.00001	0.00001	0.00001	0.00001	0.00000
Tin (Sn)-Total (mg/L)	3	0	0.00005	0.00005	0.00005	0.00005	0.00000
Titanium (Ti)-Total (mg/L)	3	0	0.00500	0.00500	0.00500	0.00500	0.00000
Uranium (U)-Total (mg/L)	3	3	0.00014	0.00015	0.00015	0.00015	0.00000
Vanadium (V)-Total (mg/L)	3	0	0.00025	0.00025	0.00025	0.00025	0.00000
Zinc (Zn)-Total (mg/L)	3	0	0.00150	0.00150	0.00150	0.00150	0.00000

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 :
	25-Jun-19
Anions and Nutrients	
Alkalinity (CaCO3) (mg/L)	46.3
Ammonia (as N) (mg/L)	<0.0050
Chloride (mg/L)	<0.50
Diss-Orthophosphate (mg/L)	<0.0010
Diss-Phosphorus (mg/L)	<0.0020
Floride (mg/L)	0.039
Nitrate (N) (mg/L)	0.102
Nitrate and Nitrite (mg/L)	0.102
Nitrite (N) (mg/L)	<0.0010
Sulphate (mg/L)	5.97
Total Nitrogen (mg/L)	0.219
Total Phosphorus (mg/L)	0.0038
Dissolved Metals	
Aluminum (Al)-Diss (mg/L)	0.0109
Diss-Antimony (Sb) (mg/L)	<0.00010
Diss-Arsenic (As) (mg/L)	<0.00010
Diss-Barium (Ba) (mg/L)	0.00518
Diss-Beryllium (Be) (mg/L)	<0.00010
Diss-Bismuth (Bi) (mg/L)	<0.000050
Diss-Boron (B) (mg/L)	<0.010
Diss-Cadmium (Cd) (mg/L)	0.0000183
Diss-Calcium (Ca) (mg/L)	16.6
Diss-Chromium (Cr) (mg/L)	<0.00050
Diss-Cobalt (Co) (mg/L)	<0.00010
Diss-Copper (Cu) (mg/L)	<0.00050
Diss-Iron (Fe) (mg/L)	<0.030
Diss-Lead (Pb) (mg/L)	<0.000050
Diss-Lithium (Li) (mg/L)	<0.0010
Diss-Magnesium (Mg) (mg/L)	1.90
Diss-Manganese (Mn) (mg/L)	0.00053
Diss-Molybdenum (Mo) (mg/L)	0.000329
Diss-Nickel (Ni) (mg/L)	<0.00050
Diss-Potassium (K) (mg/L)	0.466
Diss-Selenium (mg/L)	0.000085

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

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Mount Polley Mining Corporation
IMPERIAL METALS CORPORATION

	E306457 : 25-Jun-19
Diss-Silicon (Si) (mg/L)	1.70
Diss-Silver (Ag) (mg/L)	<0.000010
Diss-Sodium (Na) (mg/L)	0.889
Diss-Strontium (Sr) (mg/L)	0.123
Diss-Thallium (Tl) (mg/L)	<0.000010
Diss-Tin (Sn) (mg/L)	<0.00010
Diss-Titanium (Ti) (mg/L)	<0.010
Diss-Uranium (U) (mg/L)	0.000158
Diss-Vanadium (V) (mg/L)	<0.00050
Diss-Zinc (Zn) (mg/L)	<0.0030
TDS (mg/L)	65
Field Tests	
Cond (in situ) (µs/cm)	103.6
NTU - in situ (ntu)	0
pH (in situ) (pH)	7.94
Sample Depth (m)	0
Sample Taken	Yes
Secchi Depth (m)	9.5
Temp (in situ) (Degrees Celcius)	13.757
Organic / Inorganic	
DOC (mg/L)	2.05
Physical Test	
Conductivity (µs/cm)	104
Hardness (mg/L)	49.3
NTU (ntu)	0.26
pH (pH)	7.94
TDS (mg/L)	65
TSS (mg/L)	<1.0
Total Metals	
Aluminum (Al)-Total (mg/L)	0.0134
Antimony (Sb)-Total (mg/L)	<0.00010
Arsenic (As)-Total (mg/L)	0.00011
Barium (Ba)-Total (mg/L)	0.00527
Beryllium (Be)-Total (mg/L)	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.000050

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

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	E306457 : 25-Jun-19
Boron (B)-Total (mg/L)	<0.010
Cadmium (Cd)-Total (mg/L)	0.0000169
Calcium (Ca)-Total (mg/L)	16.5
Chromium (Cr)-Total (mg/L)	<0.00050
Cobalt (Co)-Total (mg/L)	<0.00010
Copper (Cu)-Total (mg/L)	0.00058
Iron (Fe)-Total (mg/L)	<0.030
Lead (Pb)-Total (mg/L)	0.000069
Lithium (Li)-Total (mg/L)	<0.0010
Magnesium (Mg)-Total (mg/L)	1.81
Manganese (Mn)-Total (mg/L)	0.00106
Molybdenum (Mo)-Tota (mg/L)	0.000314
Nickel (Ni)-Total (mg/L)	<0.00050
Potassium (K)-Total (mg/L)	0.493
Selenium (Se)-Total (mg/L)	0.000112
Silicon (Si)-Total (mg/L)	1.77
Silver (Ag)-Total (mg/L)	<0.000010
Sodium (Na)-Total (mg/L)	0.888
Strontium (Sr)-Total (mg/L)	0.125
Thallium (Tl)-Total (mg/L)	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010
Uranium (U)-Total (mg/L)	0.000151
Vanadium (V)-Total (mg/L)	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

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	E306457 : QUL-ZOO-8-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Anions and Nutrients							
Alkalinity (CaCO3) (mg/L)	1	1	46.30000	46.30000	46.30000	49.68500	
Ammonia (as N) (mg/L)	1	0	0.00250	0.00250	0.00250	0.00653	
Chloride (mg/L)	1	0	0.25000	0.25000	0.25000	0.25000	
Diss-Orthophosphate (mg/L)	1	0	0.00050	0.00050	0.00050	0.00143	
Diss-Phosphorus (mg/L)	1	0	0.00100	0.00100	0.00100	0.00172	
Floride (mg/L)	1	1	0.03900	0.03900	0.03900	0.03500	
Nitrate (N) (mg/L)	1	1	0.10200	0.10200	0.10200	0.11285	
Nitrate and Nitrite (mg/L)	1	1	0.10200	0.10200	0.10200	0.09335	
Nitrite (N) (mg/L)	1	0	0.00050	0.00050	0.00050	0.00050	
Sulphate (mg/L)	1	1	5.97000	5.97000	5.97000	6.53950	
Total Nitrogen (mg/L)	1	1	0.21900	0.21900	0.21900	0.16855	
Total Phosphorus (mg/L)	1	1	0.00380	0.00380	0.00380	0.00327	
Dissolved Metals							
Aluminum (Al)-Diss (mg/L)	1	1	0.01090	0.01090	0.01090	0.01146	
Diss-Antimony (Sb) (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	
Diss-Arsenic (As) (mg/L)	1	0	0.00005	0.00005	0.00005	0.00012	
Diss-Barium (Ba) (mg/L)	1	1	0.00518	0.00518	0.00518	0.00532	
Diss-Beryllium (Be) (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	
Diss-Bismuth (Bi) (mg/L)	1	0	0.00003	0.00003	0.00003	0.00025	
Diss-Boron (B) (mg/L)	1	0	0.00500	0.00500	0.00500	0.00500	
Diss-Cadmium (Cd) (mg/L)	1	1	0.00002	0.00002	0.00002	0.00001	
Diss-Calcium (Ca) (mg/L)	1	1	16.60000	16.60000	16.60000	17.53000	
Diss-Chromium (Cr) (mg/L)	1	0	0.00025	0.00025	0.00025	0.00025	
Diss-Cobalt (Co) (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	
Diss-Copper (Cu) (mg/L)	1	0	0.00025	0.00025	0.00025	0.00057	
Diss-Iron (Fe) (mg/L)	1	0	0.01500	0.01500	0.01500	0.01500	
Diss-Lead (Pb) (mg/L)	1	0	0.00003	0.00003	0.00003	0.00004	
Diss-Lithium (Li) (mg/L)	1	0	0.00050	0.00050	0.00050	0.00077	
Diss-Magnesium (Mg) (mg/L)	1	1	1.90000	1.90000	1.90000	1.97200	
Diss-Manganese (Mn) (mg/L)	1	1	0.00053	0.00053	0.00053	0.00094	
Diss-Molybdenum (Mo) (mg/L)	1	1	0.00033	0.00033	0.00033	0.00032	
Diss-Nickel (Ni) (mg/L)	1	0	0.00025	0.00025	0.00025	0.00025	
Diss-Potassium (K) (mg/L)	1	1	0.46600	0.46600	0.46600	0.58065	

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 : QUL-ZOO-8-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Diss-Selenium (mg/L)	1	1	0.00009	0.00009	0.00009	0.00025	
Diss-Silicon (Si) (mg/L)	1	1	1.70000	1.70000	1.70000	1.60900	
Diss-Silver (Ag) (mg/L)	1	0	0.00001	0.00001	0.00001	0.00001	
Diss-Sodium (Na) (mg/L)	1	1	0.88900	0.88900	0.88900	0.91095	
Diss-Strontium (Sr) (mg/L)	1	1	0.12300	0.12300	0.12300	0.13825	
Diss-Thallium (Tl) (mg/L)	1	0	0.00001	0.00001	0.00001	0.00001	
Diss-Tin (Sn) (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	
Diss-Titanium (Ti) (mg/L)	1	0	0.00500	0.00500	0.00500	0.00500	
Diss-Uranium (U) (mg/L)	1	1	0.00016	0.00016	0.00016	0.00016	
Diss-Vanadium (V) (mg/L)	1	0	0.00025	0.00025	0.00025	0.00050	
Diss-Zinc (Zn) (mg/L)	1	0	0.00150	0.00150	0.00150	0.00150	
TDS (mg/L)	1	1	65.00000	65.00000	65.00000	78.95000	
Field Tests							
Cond (in situ) (µs/cm)	1	1	103.60000	103.60000	103.60000	108.36000	
NTU - in situ (ntu)	1	1	0.00000	0.00000	0.00000	0.43600	
pH (in situ) (pH)	1	1	7.94000	7.94000	7.94000	8.06500	
Sample Depth (m)	1	1	0.00000	0.00000	0.00000	0.00000	
Sample Taken							
Secchi Depth (m)	1	1	9.50000	9.50000	9.50000	12.61250	
Temp (in situ) (Degrees Celcius)	1	1	13.75700	13.75700	13.75700	17.86265	
Organic / Inorganic							
DOC (mg/L)	1	1	2.05000	2.05000	2.05000	2.32950	
Physical Test							
Conductivity (µs/cm)	1	1	104.00000	104.00000	104.00000	106.95000	
Hardness (mg/L)	1	1	49.30000	49.30000	49.30000	51.59500	
NTU (ntu)	1	1	0.26000	0.26000	0.26000	0.49250	
pH (pH)	1	1	7.94000	7.94000	7.94000	7.97300	
TDS (mg/L)	1	1	65.00000	65.00000	65.00000	78.95000	
TSS (mg/L)	1	0	0.50000	0.50000	0.50000	5.40000	
Total Metals							
Aluminum (Al)-Total (mg/L)	1	1	0.01340	0.01340	0.01340	0.02543	
Antimony (Sb)-Total (mg/L)	1	0	0.00005	0.00005	0.00005	0.00012	
Arsenic (As)-Total (mg/L)	1	1	0.00011	0.00011	0.00011	0.00014	
Barium (Ba)-Total (mg/L)	1	1	0.00527	0.00527	0.00527	0.00539	
Beryllium (Be)-Total (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-20

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Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 : QUL-ZOO-8-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Bismuth (Bi)-Total (mg/L)	1	0	0.00003	0.00003	0.00003	0.00025	
Boron (B)-Total (mg/L)	1	0	0.00500	0.00500	0.00500	0.00500	
Cadmium (Cd)-Total (mg/L)	1	1	0.00002	0.00002	0.00002	0.00001	
Calcium (Ca)-Total (mg/L)	1	1	16.50000	16.50000	16.50000	17.62500	
Chromium (Cr)-Total (mg/L)	1	0	0.00025	0.00025	0.00025	0.00025	
Cobalt (Co)-Total (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	
Copper (Cu)-Total (mg/L)	1	1	0.00058	0.00058	0.00058	0.00113	
Iron (Fe)-Total (mg/L)	1	0	0.01500	0.01500	0.01500	0.01500	
Lead (Pb)-Total (mg/L)	1	1	0.00007	0.00007	0.00007	0.00020	
Lithium (Li)-Total (mg/L)	1	0	0.00050	0.00050	0.00050	0.00068	
Magnesium (Mg)-Total (mg/L)	1	1	1.81000	1.81000	1.81000	1.93650	
Manganese (Mn)-Total (mg/L)	1	1	0.00106	0.00106	0.00106	0.00126	
Molybdenum (Mo)-Tota (mg/L)	1	1	0.00031	0.00031	0.00031	0.00034	
Nickel (Ni)-Total (mg/L)	1	0	0.00025	0.00025	0.00025	0.00025	
Potassium (K)-Total (mg/L)	1	1	0.49300	0.49300	0.49300	0.48555	
Selenium (Se)-Total (mg/L)	1	1	0.00011	0.00011	0.00011	0.00025	
Silicon (Si)-Total (mg/L)	1	1	1.77000	1.77000	1.77000	1.64900	
Silver (Ag)-Total (mg/L)	1	0	0.00001	0.00001	0.00001	0.00001	
Sodium (Na)-Total (mg/L)	1	1	0.88800	0.88800	0.88800	0.87385	
Strontium (Sr)-Total (mg/L)	1	1	0.12500	0.12500	0.12500	0.14365	
Thallium (Tl)-Total (mg/L)	1	0	0.00001	0.00001	0.00001	0.00001	
Tin (Sn)-Total (mg/L)	1	0	0.00005	0.00005	0.00005	0.00005	
Titanium (Ti)-Total (mg/L)	1	0	0.00500	0.00500	0.00500	0.00500	
Uranium (U)-Total (mg/L)	1	1	0.00015	0.00015	0.00015	0.00017	
Vanadium (V)-Total (mg/L)	1	0	0.00025	0.00025	0.00025	0.00050	
Zinc (Zn)-Total (mg/L)	1	0	0.00150	0.00150	0.00150	0.00150	

Grid Format Report : Bootjack Lake South Station B2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-DI							
	25-Jun-19	4-Sep-19	22-Jun-20	30-Aug-20	22-Jun-21	30-Aug-21	21-Jun-22	28-Aug-22
Chlorophyll a (ug/L)	2.03	0.091	2.47	2.38	20.2	2.30	6.60	2.18

Grid Format Report : Bootjack Lake South Station B2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	10	10	0.09100	20.20000	6.26310		7.08928

Grid Format Report : Bootjack Lake South Station B2 surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : 4-Sep-19
Chlorophyll a (ug/L)	<0.010

Grid Format Report : Bootjack Lake South Station B2 surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	0	0.00500	0.00500	0.00500	1.58800	

Grid Format Report : BOL-B2-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-1-DI			
	31-Jul-19	29-Jul-20	27-Jul-21	26-Jul-22
Chlorophyll a (ug/L)	2.58	1.39	1.50	1.82

Grid Format Report : BOL-B2-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-1-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.39000	2.58000	1.82250		0.53693

Grid Format Report : BOL-B2-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

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	E215897 : 31-Jul-19
Chlorophyll a (ug/L)	2.41

Grid Format Report : BOL-B2-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-1-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.41000	2.41000	2.41000		

Grid Format Report : BOL-B2-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-2-DI			
	31-Jul-19	29-Jul-20	27-Jul-21	26-Jul-22
Chlorophyll a (ug/L)	2.49	1.94	1.75	2.07

Grid Format Report : BOL-B2-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-2-DI						
	Sample (n)	**Count >MDL**	**Min**	**Max**	**Mean**	**95th Percentile**	**St Dev**
Chlorophyll a (ug/L)	5	5	1.65000	2.49000	1.98000		0.32848

Grid Format Report : BOL-B2-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : 31-Jul-19
Chlorophyll a (ug/L)	2.23

Grid Format Report : BOL-B2-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.23000	2.23000	2.23000		

Grid Format Report : BOL-B2-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-3-DI			
	31-Jul-19	29-Jul-20	27-Jul-21	26-Jul-22
Chlorophyll a (ug/L)	2.71	2.10	1.72	1.94

Grid Format Report : BOL-B2-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-3-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.72000	2.71000	2.11750		0.42461

Grid Format Report : BOL-B2-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : 31-Jul-19
Chlorophyll a (ug/L)	2.61

Grid Format Report : BOL-B2-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-3-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.61000	2.61000	2.61000		

Grid Format Report : BOL-B2-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-4-DI			
	31-Jul-19	29-Jul-20	27-Jul-21	26-Jul-22
Chlorophyll a (ug/L)	2.91	2.59	1.55	2.50

Grid Format Report : BOL-B2-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-4-DI						
	Sample (n)	**Count >MDL**	**Min**	**Max**	**Mean**	**95th Percentile**	**St Dev**
Chlorophyll a (ug/L)	4	4	1.55000	2.91000	2.38750		0.58540

Grid Format Report : BOL-B2-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : 31-Jul-19
Chlorophyll a (ug/L)	2.17

Grid Format Report : BOL-B2-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-4-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.17000	2.17000	2.17000		

Grid Format Report : BOL-B2-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-5-DI			
	31-Jul-19	29-Jul-20	27-Jul-21	26-Jul-22
Chlorophyll a (ug/L)	3.10	2.24	1.96	2.09

Grid Format Report : BOL-B2-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-5-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.96000	3.10000	2.34750		0.51455

Grid Format Report : BOL-B2-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : 31-Jul-19
Chlorophyll a (ug/L)	2.17

Grid Format Report : BOL-B2-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : BOL-B2-5-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.17000	2.17000	2.17000		

Grid Format Report : Polley Lake North Station P1-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley Mining Corporation
IMPERIAL METALS CORPORATION

	E207974 : 24-Jun-19
Chlorophyll a (ug/L)	1.16

Grid Format Report : Polley Lake North Station P1-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207974 : P1-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.16000	1.16000	1.16000	39.19000	

Grid Format Report : Polley Lake South Station P2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-DI							
	24-Jun-19	28-Aug-19	22-Jun-20	30-Aug-20	22-Jun-21	30-Aug-21	21-Jun-22	25-Aug-22
Chlorophyll a (ug/L)	1.40	0.400	1.20	2.68	1.69	1.02	2.60	3.47

Grid Format Report : Polley Lake South Station P2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	9	9	0.40000	3.47000	1.86222		0.96947

Grid Format Report : Polley Lake South Station P2-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-S	
	24-Jun-19	28-Aug-19
Chlorophyll a (ug/L)	1.11	0.528

Grid Format Report : Polley Lake South Station P2-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	0.52800	1.11000	0.81900	11.87100	0.41154

Grid Format Report : POL-P2-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-1-DI			
	29-Jul-19	27-Jul-20	26-Jul-21	25-Jul-22
Chlorophyll a (ug/L)	2.18	1.57	0.947	2.57

Grid Format Report : POL-P2-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-1-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	5	5	0.94700	2.57000	1.96540		0.69975

Grid Format Report : POL-P2-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 :
	29-Jul-19
Chlorophyll a (ug/L)	1.54

Grid Format Report : POL-P2-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-1-S						
	Sample (n)	**Count >MDL**	**Min**	**Max**	**Mean**	**95th Percentile**	**St Dev**
Chlorophyll a (ug/L)	1	1	1.54000	1.54000	1.54000		

Grid Format Report : POL-P2-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-2-DI			
	29-Jul-19	27-Jul-20	26-Jul-21	25-Jul-22
Chlorophyll a (ug/L)	2.69	2.04	1.30	2.46

Grid Format Report : POL-P2-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.30000	2.69000	2.12250		0.61081

Grid Format Report : POL-P2-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 :
	29-Jul-19
Chlorophyll a (ug/L)	1.22

Grid Format Report : POL-P2-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.22000	1.22000	1.22000		

Grid Format Report : POL-P2-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-3-DI			
	29-Jul-19	27-Jul-20	26-Jul-21	25-Jul-22
Chlorophyll a (ug/L)	2.26	1.62	1.09	2.55

Grid Format Report : POL-P2-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-3-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.09000	2.55000	1.88000		0.65447

Grid Format Report : POL-P2-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 :
	29-Jul-19
Chlorophyll a (ug/L)	1.62

Grid Format Report : POL-P2-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-3-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.62000	1.62000	1.62000		

Grid Format Report : POL-P2-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-4-DI			
	29-Jul-19	27-Jul-20	26-Jul-21	25-Jul-22
Chlorophyll a (ug/L)	2.60	1.83	1.39	3.78

Grid Format Report : POL-P2-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-4-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.39000	3.78000	2.40000		1.04712

Grid Format Report : POL-P2-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 :
	29-Jul-19
Chlorophyll a (ug/L)	1.20

Grid Format Report : POL-P2-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-4-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.20000	1.20000	1.20000		

Grid Format Report : POL-P2-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-5-DI			
	29-Jul-19	27-Jul-20	26-Jul-21	25-Jul-22
Chlorophyll a (ug/L)	2.58	1.75	1.42	2.73

Grid Format Report : POL-P2-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-5-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	5	5	1.42000	2.73000	2.20800		0.58427

Grid Format Report : POL-P2-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 :
	29-Jul-19
Chlorophyll a (ug/L)	1.53

Grid Format Report : POL-P2-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : POL-P2-5-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.53000	1.53000	1.53000		

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a	
	19-Jun-19	19-Aug-19
Chlorophyll a (ug/L)	0.703	0.746

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	0.70300	0.74600	0.72450	0.83500	0.03041

Grid Format Report : QUL-18-0m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-0	
	19-Jun-19	19-Aug-19
Chlorophyll a (ug/L)	1.09	1.28

Grid Format Report : QUL-18-0m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	1.09000	1.28000	1.18500	0.90000	0.13435

Grid Format Report : QUL-2a-0m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-0	
	19-Jun-19	20-Aug-19
Chlorophyll a (ug/L)	0.862	1.36

Grid Format Report : QUL-2a-0m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	0.86200	1.36000	1.11100	0.96300	0.35214

Grid Format Report : QUL-58-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304876 : QUL-58-S	
	19-Jun-19	20-Aug-19
Chlorophyll a (ug/L)	1.21	1.53

Grid Format Report : QUL-58-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304876 : QUL-58-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	1.21000	1.53000	1.37000	0.80840	0.22627

Grid Format Report : QUL-ZOO-1

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO	
	25-Jun-19	29-Aug-19
Chlorophyll a (ug/L)	1.10	0.758

Grid Format Report : QUL-ZOO-1

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	0.75800	1.10000	0.92900	0.97350	0.24183

Grid Format Report : QUL-ZOO-1-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-1-DI		
	30-Jul-19	28-Jul-20	27-Jul-22
Chlorophyll a (ug/L)	2.21	1.64	2.76

Grid Format Report : QUL-ZOO-1-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-1-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.48000	2.76000	2.02250		0.58300

Grid Format Report : QUL-ZOO-1-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : 30-Jul-19
Chlorophyll a (ug/L)	1.51

Grid Format Report : QUL-ZOO-1-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-1-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.51000	1.51000	1.51000		

Grid Format Report : QUL-ZOO-1-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-2-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	27-Jul-22
Chlorophyll a (ug/L)	1.99	1.47	1.06	2.50

Grid Format Report : QUL-ZOO-1-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	5	5	1.06000	2.50000	1.79400		0.54884

Grid Format Report : QUL-ZOO-1-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 :
	30-Jul-19
Chlorophyll a (ug/L)	2.06

Grid Format Report : QUL-ZOO-1-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.06000	2.06000	2.06000		

Grid Format Report : QUL-ZOO-1-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-3-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	28-Jul-22
Chlorophyll a (ug/L)	1.92	1.46	1.10	3.13

Grid Format Report : QUL-ZOO-1-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-3-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.10000	3.13000	1.90250		0.88447

Grid Format Report : QUL-ZOO-1-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : 30-Jul-19
Chlorophyll a (ug/L)	1.65

Grid Format Report : QUL-ZOO-1-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-3-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.65000	1.65000	1.65000		

Grid Format Report : QUL-ZOO-1-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-4-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	28-Jul-22
Chlorophyll a (ug/L)	2.17	1.64	0.991	5.48

Grid Format Report : QUL-ZOO-1-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-4-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	0.99100	5.48000	2.57025		1.99885

Grid Format Report : QUL-ZOO-1-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : 30-Jul-19
Chlorophyll a (ug/L)	1.22

Grid Format Report : QUL-ZOO-1-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-4-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.22000	1.22000	1.22000		

Grid Format Report : QUL-ZOO-1-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-5-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	28-Jul-22
Chlorophyll a (ug/L)	1.90	1.75	1.14	2.59

Grid Format Report : QUL-ZOO-1-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-5-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.14000	2.59000	1.84500		0.59557

Grid Format Report : QUL-ZOO-1-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : 30-Jul-19
Chlorophyll a (ug/L)	1.59

Grid Format Report : QUL-ZOO-1-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-5-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	1.59000	1.59000	1.59000		

Grid Format Report : QUL-ZOO-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-DI								
	25-Jun-19	**29-Aug-19**	**23-Jun-20**	**27-Aug-20**	**23-Jun-21**	**28-Jul-21**	**29-Aug-21**	**22-Jun-22**	**28-Aug-22**
Chlorophyll a (ug/L)	1.39	0.521	1.19	1.47	1.15	0.969	1.22	1.63	1.04

Grid Format Report : QUL-ZOO-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

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IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	15	15	0.44200	1.63000	1.16280		0.33951

Grid Format Report : QUL-ZOO-7

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

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	E306456 : QUL-ZOO	
	25-Jun-19	29-Aug-19
Chlorophyll a (ug/L)	0.478	0.485

Grid Format Report : QUL-ZOO-7

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	0.47800	0.48500	0.48150	0.77600	0.00495

Grid Format Report : QUL-ZOO-7-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

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	E306456 : QUL-ZOO-7-1-DI		
	30-Jul-19	28-Jul-20	27-Jul-22
Chlorophyll a (ug/L)	2.08	1.49	3.97

Grid Format Report : QUL-ZOO-7-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-1-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.28000	3.97000	2.20500		1.22443

Grid Format Report : QUL-ZOO-7-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

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IMPERIAL METALS CORPORATION

	E306456 : 30-Jul-19
Chlorophyll a (ug/L)	2.00

Grid Format Report : QUL-ZOO-7-1-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-1-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.00000	2.00000	2.00000		

Grid Format Report : QUL-ZOO-7-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-2-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	27-Jul-22
Chlorophyll a (ug/L)	1.78	1.48	1.11	2.26

Grid Format Report : QUL-ZOO-7-2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.11000	2.26000	1.65750		0.48624

Grid Format Report : QUL-ZOO-7-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

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	E306456 : 30-Jul-19
Chlorophyll a (ug/L)	2.42

Grid Format Report : QUL-ZOO-7-2-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.42000	2.42000	2.42000		

Grid Format Report : QUL-ZOO-7-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-3-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	27-Jul-22
Chlorophyll a (ug/L)	2.06	1.63	1.12	2.48

Grid Format Report : QUL-ZOO-7-3-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-3-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.12000	2.48000	1.82250		0.58289

Grid Format Report : QUL-ZOO-7-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

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Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : 30-Jul-19
Chlorophyll a (ug/L)	2.49

Grid Format Report : QUL-ZOO-7-3-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley Mining Corporation
IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-3-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	2	2	2.25000	2.49000	2.37000		0.16971

Grid Format Report : QUL-ZOO-7-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

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IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-4-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	27-Jul-22
Chlorophyll a (ug/L)	0.974	1.61	1.29	4.24

Grid Format Report : QUL-ZOO-7-4-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-4-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	0.97400	4.24000	2.02850		1.49702

Grid Format Report : QUL-ZOO-7-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : 30-Jul-19
Chlorophyll a (ug/L)	2.40

Grid Format Report : QUL-ZOO-7-4-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-4-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.40000	2.40000	2.40000		

Grid Format Report : QUL-ZOO-7-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

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Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-5-DI			
	30-Jul-19	28-Jul-20	28-Jul-21	27-Jul-22
Chlorophyll a (ug/L)	1.97	1.53	1.04	3.15

Grid Format Report : QUL-ZOO-7-5-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-5-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	4	4	1.04000	3.15000	1.92250		0.90220

Grid Format Report : QUL-ZOO-7-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

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Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : 30-Jul-19
Chlorophyll a (ug/L)	2.17

Grid Format Report : QUL-ZOO-7-5-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-5-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	2.17000	2.17000	2.17000		

Grid Format Report : QUL-ZOO-7-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-DI								
	25-Jun-19	29-Aug-19	23-Jun-20	27-Aug-20	23-Jun-21	28-Jul-21	29-Aug-21	22-Jun-22	28-Aug-22
Chlorophyll a (ug/L)	1.25	0.571	1.22	1.93	1.07	1.14	1.36	2.02	1.09

Grid Format Report : QUL-ZOO-7-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

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Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	12	12	0.57100	2.02000	1.32758		0.42301

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 :
	25-Jun-19
Chlorophyll a (ug/L)	0.662

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-08

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 : QUL-ZOO-8-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Chlorophyll a (ug/L)	1	1	0.66200	0.66200	0.66200	1.28915	

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-005	fz23-092-006	fz23-092-007	fz23-092-008	fz23-092-029
Lake							Polley	Bootjack	Quesnel	Quesnel	Polley
Client Sample ID							POL-P2_ZOO-1_2023-06	BOL-B2_ZOO-1_2023-06	QUL-ZOO-1_ZOO-1_2023-06	QUL-ZOO-7_ZOO-1_2023-06	POL-P2_ZOO-1_2023-07
Date Sampled							20-Jun-23	21-Jun-23	21-Jun-23	21-Jun-23	27-Jul-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438		133	29	100	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647	250				105
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	6,063	4,000		250	240
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632					75
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5					
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11					
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171				50	
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226					
			Total Cladocera			**31,230**	**6,313**	**4,133**	**29**	**400**	**420**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331					30
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174					15
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	250	2,933	343	1,850	375
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496	63	267			15
			Total Calanoida			**33,277**	**313**	**3,200**	**343**	**1,850**	**435**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375	750		14		
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349	250				
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	6,125	28,133	3,243	11,550	2,430
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50					
			Total Cyclopoida			**127,336**	**7,125**	**28,133**	**3,257**	**11,550**	**2,430**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600		1,600	200	9,300	300
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	15,500	39,600	2,750	1,300	8,550
			Total Copepoda Nauplii			**209,742**	**15,500**	**41,200**	**2,950**	**10,600**	**8,850**
			Total Crustacean Zooplankton			**401,584**	**29,250**	**76,667**	**6,579**	**24,400**	**12,135**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89					
			Total Diptera			**89**	**0**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	10,500	400	200	100	450
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492	750				300
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200					
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	40,000	94,400	1,050	4,400	6,450
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	500		600	1,200	2,100
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625	500	1,200	50		150
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200					
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0					
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700	250		50		
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150	1,000	5,200	150		600
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	3,000		200	400	300
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225				100	
			Total Rotifera			**771,167**	**56,500**	**101,200**	**2,300**	**6,200**	**10,350**
			Total Zooplankton			**1,172,839**	**85,750**	**177,867**	**8,879**	**30,600**	**22,485**
			Total Unique Taxa		**26**		**12**	**8**	**10**	**10**	**12**

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-030	fz23-092-031	fz23-092-032	fz23-092-033	fz23-092-034
Lake							Polley	Polley	Polley	Polley	Bootjack
Client Sample ID							POL-P2_ZOO-2_2023-07	POL-P2_ZOO-3_2023-07	POL-P2_ZOO-4_2023-07	POL-P2_ZOO-5_2023-07	BOL-B2_ZOO-1_2023-07
Date Sampled							27-Jul-23	27-Jul-23	27-Jul-23	27-Jul-23	27-Jul-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438			13	47	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647	54	104	88	47	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	232	250	275	306	256
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632	107		63	71	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5					
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11					
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171		21			
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226					
			Total Cladocera			**31,230**	**393**	**375**	**438**	**471**	**256**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331	18	42	38		
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174	54	21	38		8
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	446	271	275	306	136
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496		21			
			Total Calanoida			**33,277**	**518**	**354**	**350**	**306**	**144**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375					24
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349					8
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	2,946	3,416	3,025	4,353	1,920
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50					
			Total Cyclopoida			**127,336**	**2,946**	**3,416**	**3,025**	**4,353**	**1,952**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600	500	500			600
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	11,000	10,125	16,500	6,267	10,800
			Total Copepoda Nauplii			**209,742**	**11,500**	**10,625**	**16,500**	**6,267**	**11,400**
			Total Crustacean Zooplankton			**401,584**	**15,357**	**14,770**	**20,313**	**11,396**	**13,752**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89					
			Total Diptera			**89**	**0**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	1,000	1,250	1,500	133	400
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492	500	1,125	500	667	200
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200					
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	10,500	6,125	11,500	6,533	18,000
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	1,500	1,375	2,500	2,000	1,400
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625	500	375	250	400	
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200					
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0					
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700	250				
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150		500			400
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	1,750	875	750	133	600
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225		125			
			Total Rotifera			**771,167**	**16,000**	**11,750**	**17,000**	**9,867**	**21,000**
			Total Zooplankton			**1,172,839**	**31,357**	**26,520**	**37,313**	**21,263**	**34,752**
			Total Unique Taxa		**26**		**12**	**13**	**12**	**12**	**9**

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-035	fz23-092-036	fz23-092-037	fz23-092-038	fz23-092-039
Lake							Bootjack	Bootjack	Bootjack	Bootjack	Quesnel
Client Sample ID							BOL-B2_ZOO-2_2023-07	BOL-B2_ZOO-3_2023-07	BOL-B2_ZOO-4_2023-07	BOL-B2_ZOO-5_2023-07	QUL-ZOO-1_ZOO-1_2023-07
Date Sampled							27-Jul-23	27-Jul-23	27-Jul-23	27-Jul-23	26-Jul-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438					75
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	543	2,062	900	127	450
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632				82	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45				45	
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5					
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11					
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171					
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226					
			Total Cladocera			**31,230**	**543**	**2,062**	**900**	**255**	**525**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331			30		
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174			15		
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250					250
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25					25
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	43	246	180	82	1,200
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496	86	31		9	
			Total Calanoida			**33,277**	**129**	**277**	**225**	**91**	**1,475**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375	114	123	90	91	50
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349		31	60		
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	2,157	4,154	2,400	1,573	3,025
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50					
			Total Cyclopoida			**127,336**	**2,271**	**4,308**	**2,550**	**1,664**	**3,075**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600		200			
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	9,000	5,600	15,300	7,800	2,200
			Total Copepoda Nauplii			**209,742**	**9,000**	**5,800**	**15,300**	**7,800**	**2,200**
			Total Crustacean Zooplankton			**401,584**	**11,943**	**12,446**	**18,975**	**9,809**	**7,275**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89	29	31	15		
			Total Diptera			**89**	**29**	**31**	**15**	**0**	**0**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	200	200	300	400	500
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492		200		600	200
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200	200				
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	15,600	12,200	15,000	17,400	7,000
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	800	1,400	1,800	600	8,400
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625	1,000	400	900	400	
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200					
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0					
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700					
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150	1,000	1,200	900	2,000	700
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100					100
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	600	2,200	1,800	1,200	400
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225					
			Total Rotifera			**771,167**	**19,400**	**17,800**	**20,700**	**22,600**	**17,300**
			Total Zooplankton			**1,172,839**	**31,371**	**30,277**	**39,690**	**32,409**	**24,575**
			Total Unique Taxa		**26**		**11**	**11**	**10**	**11**	**11**

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-040	fz23-092-041	fz23-092-042	fz23-092-043	fz23-092-044
Lake							Quesnel	Quesnel	Quesnel	Quesnel	Quesnel
Client Sample ID							QUL-ZOO-1_ZOO-2_2023-07	QUL-ZOO-1_ZOO-3_2023-07	QUL-ZOO-1_ZOO-4_2023-07	QUL-ZOO-1_ZOO-5_2023-07	QUL-ZOO-7_ZOO-1_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23	26-Jul-23	26-Jul-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438	520	300	1,150	280	950
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	520	567	600	220	1,150
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232	40	67	100		
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5					
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11					
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171			50		
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226	40		100		
			Total Cladocera			**31,230**	**1,120**	**933**	**2,000**	**500**	**2,100**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33		33			
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	2,040	2,600	4,150	1,580	2,800
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496					
			Total Calanoida			**33,277**	**2,040**	**2,633**	**4,150**	**1,580**	**2,800**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375	40		50		
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349					
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	4,600	3,900	5,500	2,280	6,450
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50					
			Total Cyclopoida			**127,336**	**4,640**	**3,900**	**5,550**	**2,280**	**6,450**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600					
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	2,600	3,800	5,200	1,700	4,200
			Total Copepoda Nauplii			**209,742**	**2,600**	**3,800**	**5,200**	**1,700**	**4,200**
			Total Crustacean Zooplankton			**401,584**	**10,400**	**11,267**	**16,900**	**6,060**	**15,550**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89					
			Total Diptera			**89**	**0**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	200	400	600	200	800
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492					
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200					
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	9,800	11,200	25,000	6,400	9,400
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	19,400	18,800	36,600	10,900	19,800
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625	200		400	200	
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200					200
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0					
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700	600			100	400
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150	1,800	800	2,200	900	2,000
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	3,200	2,600	8,600	1,700	4,600
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200		200			
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225					
			Total Rotifera			**771,167**	**35,200**	**34,000**	**73,400**	**20,400**	**37,200**
			Total Zooplankton			**1,172,839**	**45,600**	**45,267**	**90,300**	**26,460**	**52,750**
			Total Unique Taxa		**26**		**14**	**10**	**13**	**11**	**11**

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-045	fz23-092-046	fz23-092-047	fz23-092-048	fz23-092-053
Lake							Quesnel	Quesnel	Quesnel	Quesnel	Polley
Client Sample ID							QUL-ZOO-7_ZOO-2_2023-07	QUL-ZOO-7_ZOO-3_2023-07	QUL-ZOO-7_ZOO-4_2023-07	QUL-ZOO-7_ZOO-5_2023-07	POL-P2_ZOO-1_2023-08
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23	26-Jul-23	28-Aug-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438	200	84	400	250	188
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	675	84	1,320	575	694
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632					206
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232				25	
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5		5			
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11		11			
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171	50				
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226	25	11		50	
			Total Cladocera			**31,230**	**950**	**195**	**1,720**	**900**	**1,088**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331					131
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174		5			19
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	1,275	442	2,680	2,175	300
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496		5			
			Total Calanoida			**33,277**	**1,275**	**453**	**2,680**	**2,175**	**450**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375					
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349					
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	3,375	911	4,800	2,775	3,263
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50	50				
			Total Cyclopoida			**127,336**	**3,425**	**911**	**4,800**	**2,775**	**3,263**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600		100	200		
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	1,000	600	1,000	2,400	4,350
			Total Copepoda Nauplii			**209,742**	**1,000**	**700**	**1,200**	**2,400**	**4,350**
			Total Crustacean Zooplankton			**401,584**	**6,650**	**2,258**	**10,400**	**8,250**	**9,150**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89					
			Total Diptera			**89**	**0**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	800	100	600	1,400	450
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492					450
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200					
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	11,000	4,200	11,200	11,800	1,800
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	25,400	8,300	22,800	21,000	6,300
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625			600		
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200					
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0					
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700	600	100	600	2,400	1,350
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150	2,800	1,400	3,000	2,400	
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	5,400	1,200	4,600	2,600	450
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225					
			Total Rotifera			**771,167**	**46,000**	**15,300**	**43,400**	**41,600**	**10,800**
			Total Zooplankton			**1,172,839**	**52,650**	**17,558**	**53,800**	**49,850**	**19,950**
			Total Unique Taxa		**26**		**12**	**14**	**11**	**12**	**11**

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-054	fz23-092-055	fz23-092-056	fz23-092-029_QA	fz23-092-039_QA
Lake							Bootjack	Quesnel	Quesnel	Polley	Quesnel
Client Sample ID							BOL-B2_ZOO-1_2023-08	QUL-ZOO-1_ZOO-1_2023-08	QUL-ZOO-7_ZOO-1_2023-08	POL-P2_ZOO-1_2023-07_QA	QUL-ZOO-1_ZOO-1_2023-07_QA
Date Sampled							28-Aug-23	27-Aug-23	27-Aug-23	27-Jul-23	26-Jul-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438	29	475	217		175
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647				105	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	457	725	283	240	325
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632	29			30	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45					
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232					25
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5					
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11					
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171					
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226					
			Total Cladocera			**31,230**	**514**	**1,200**	**500**	**375**	**525**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331	43			30	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174				15	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	14	1,925	1,050	330	1,125
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496				15	
			Total Calanoida			**33,277**	**57**	**1,925**	**1,050**	**390**	**1,125**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375	29				
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349					
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	2,500	2,675	2,083	2,850	2,750
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50					
			Total Cyclopoida			**127,336**	**2,529**	**2,675**	**2,083**	**2,850**	**2,750**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600	100			300	
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	3,500	1,600	1,900	9,900	1,700
			Total Copepoda Nauplii			**209,742**	**3,600**	**1,600**	**1,900**	**10,200**	**1,700**
			Total Crustacean Zooplankton			**401,584**	**6,700**	**7,400**	**5,533**	**13,815**	**6,100**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89	14				
			Total Diptera			**89**	**14**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	2,600	400	500		200
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492				600	
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200					
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	3,100	4,200	2,100	6,000	6,900
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	2,000	19,800	6,500	1,650	7,100
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625	100			150	
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200					
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0					
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700		4,600	2,400		200
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150		200			3,000
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	6,800	6,400	2,200	450	700
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225					
			Total Rotifera			**771,167**	**14,600**	**35,600**	**13,700**	**8,850**	**18,100**
			Total Zooplankton			**1,172,839**	**21,314**	**43,000**	**19,233**	**22,665**	**24,200**
			Total Unique Taxa		**26**		**11**	**10**	**9**	**10**	**11**

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Zooplankton Total Abundance Data Matrix for Minnow Envrionemtnal Inc., Mount Polley, 2023

Biologica Sample ID							fz23-092-054_QA
Lake							Bootjack
Client Sample ID							BOL-B2_ZOO-1_2023-08_QA
Date Sampled							28-Aug-23
Groupcode	Major Group	Family	Taxon	Stage	Total Unique Taxa	Total Abundance (#/sample)	Total Abundance (#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	5,438	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia longiremis	F	1	647	
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	23,823	443
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulex	F	1	632	143
CRCL	Crustacea Cladocera	Daphniidae	Daphnia sp.	F		45	
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis rammneri	F	1	232	
CRCL	Crustacea Cladocera	Daphniidae	Scapholeberis sp.	F		5	
CRCL	Crustacea Cladocera	Holopediidae	Holopedium sp.	F	1	11	
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	171	
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	226	
			Total Cladocera			**31,230**	**586**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	331	43
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		174	14
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIf	1	250	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Hesperodiaptomus sp.	VIm		25	
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm	1	33	
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		31,968	86
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		496	
			Total Calanoida			**33,277**	**143**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	1,375	14
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		349	14
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		125,562	2,400
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	VIm		50	
			Total Cyclopoida			**127,336**	**2,428**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		13,600	200
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		196,142	2,700
			Total Copepoda Nauplii			**209,742**	**2,900**
			Total Crustacean Zooplankton			**401,584**	**6,057**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	----	1	89	43
			Total Diptera			**89**	**43**
ROTI	Rotifera	Conochilidae	Conochilus sp.	----	1	26,583	4,600
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,492	200
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	200	
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	377,358	4,600
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	243,775	1,500
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	7,625	100
ROTI	Rotifera	Brachionidae	Notholca sp.	----	1	200	
ROTI	Rotifera	Euchlanidae	Euchlanis sp.	----	1	0	100
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	13,700	
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	31,150	100
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	100	
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	64,558	8,900
ROTI	Rotifera	Synchaetidae	Synchaetidae indet.	----		200	
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	225	
			Total Rotifera			**771,167**	**20,100**
			Total Zooplankton			**1,172,839**	**26,200**
			Total Unique Taxa		**26**		**13**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fz23-092-005		fz23-092-006		fz23-092-007		fz23-092-008		fz23-092-029	
Lake							Polley		Bootjack		Quesnel		Quesnel		Polley	
Client Sample ID							POL-P2_ZOO-1_2023-06		BOL-B2_ZOO-1_2023-06		QUL-ZOO-1_ZOO-1_2023-06		QUL-ZOO-7_ZOO-1_2023-06		POL-P2_ZOO-1_2023-07	
Date Sampled							20-Jun-23		21-Jun-23		21-Jun-23		21-Jun-23		27-Jul-23	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass	
					DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	204.39	1,021.94	1.59	7.97	18.70	93.50	2.19	10.93	11.79	58.97	2.39	11.95
			Total Calanoida		**204.39**	**1,021.94**	**1.59**	**7.97**	**18.70**	**93.50**	**2.19**	**10.93**	**11.79**	**58.97**	**2.39**	**11.95**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	497.88	2,489.40	24.31	121.56	111.67	558.37	12.87	64.36	45.85	229.24	9.65	48.23
			Total Cyclopoida		**497.88**	**2,489.40**	**24.31**	**121.56**	**111.67**	**558.37**	**12.87**	**64.36**	**45.85**	**229.24**	**9.65**	**48.23**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	18.67	93.34	1.48	7.38	3.77	18.85	0.26	1.31	0.12	0.62	0.81	4.07
			Total Copepoda Nauplii		**18.67**	**93.34**	**1.48**	**7.38**	**3.77**	**18.85**	**0.26**	**1.31**	**0.12**	**0.62**	**0.81**	**4.07**
			Total Crustacean Zooplankton		**720.94**	**3,604.68**	**27.38**	**136.91**	**134.14**	**670.71**	**15.32**	**76.60**	**57.76**	**288.82**	**12.85**	**64.25**
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	0.63	6.34	0.02	0.20	0.11	1.06	0.00	0.03			0.01	0.12
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	4.33	43.34	0.46	4.59	1.08	10.84	0.01	0.12	0.05	0.51	0.07	0.74
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	10.66	106.55	0.02	0.22			0.03	0.26	0.05	0.52	0.09	0.92
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.81	38.08	0.18	1.77			0.01	0.12	0.02	0.24	0.02	0.18
			Total Rotifera		**19.43**	**194.31**	**0.68**	**6.79**	**1.19**	**11.90**	**0.05**	**0.53**	**0.13**	**1.27**	**0.20**	**1.96**
			Total Zooplankton		**740.37**	**3,798.99**	**28.06**	**143.69**	**135.33**	**682.61**	**15.37**	**77.13**	**57.89**	**290.09**	**13.05**	**66.21**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fz23-092-030		fz23-092-031		fz23-092-032		fz23-092-033		fz23-092-034	
Lake							Polley		Polley		Polley		Polley		Bootjack	
Client Sample ID							POL-P2_ZOO-2_2023-07		POL-P2_ZOO-3_2023-07		POL-P2_ZOO-4_2023-07		POL-P2_ZOO-5_2023-07		BOL-B2_ZOO-1_2023-07	
Date Sampled							27-Jul-23		27-Jul-23		27-Jul-23		27-Jul-23		27-Jul-23	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass	
					DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	204.39	1,021.94	2.85	14.23	1.73	8.63	1.75	8.77	1.95	9.75	0.87	4.33
			Total Calanoida		**204.39**	**1,021.94**	**2.85**	**14.23**	**1.73**	**8.63**	**1.75**	**8.77**	**1.95**	**9.75**	**0.87**	**4.33**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	497.88	2,489.40	11.70	58.48	13.56	67.80	12.01	60.04	17.28	86.39	7.62	38.11
			Total Cyclopoida		**497.88**	**2,489.40**	**11.70**	**58.48**	**13.56**	**67.80**	**12.01**	**60.04**	**17.28**	**86.39**	**7.62**	**38.11**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	18.67	93.34	1.05	5.23	0.96	4.82	1.57	7.85	0.60	2.98	1.03	5.14
			Total Copepoda Nauplii		**18.67**	**93.34**	**1.05**	**5.23**	**0.96**	**4.82**	**1.57**	**7.85**	**0.60**	**2.98**	**1.03**	**5.14**
			Total Crustacean Zooplankton		**720.94**	**3,604.68**	**15.59**	**77.94**	**16.25**	**81.25**	**15.33**	**76.66**	**19.83**	**99.13**	**9.52**	**47.58**
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	0.63	6.34			0.01	0.10					0.01	0.08
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	4.33	43.34	0.12	1.21	0.07	0.70	0.13	1.32	0.08	0.75	0.21	2.07
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	10.66	106.55	0.07	0.66	0.06	0.60	0.11	1.09	0.09	0.87	0.06	0.61
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.81	38.08	0.10	1.03	0.05	0.52	0.04	0.44	0.01	0.08	0.04	0.35
			Total Rotifera		**19.43**	**194.31**	**0.29**	**2.89**	**0.19**	**1.92**	**0.29**	**2.86**	**0.17**	**1.70**	**0.31**	**3.11**
			Total Zooplankton		**740.37**	**3,798.99**	**15.88**	**80.84**	**16.44**	**83.17**	**15.62**	**79.51**	**20.00**	**100.83**	**9.83**	**50.70**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fz23-092-035		fz23-092-036		fz23-092-037		fz23-092-038		fz23-092-039	
Lake							Bootjack		Bootjack		Bootjack		Bootjack		Quesnel	
Client Sample ID							BOL-B2_ZOO-2_2023-07		BOL-B2_ZOO-3_2023-07		BOL-B2_ZOO-4_2023-07		BOL-B2_ZOO-5_2023-07		QUL-ZOO-1_ZOO-1_2023-07	
Date Sampled							27-Jul-23		27-Jul-23		27-Jul-23		27-Jul-23		26-Jul-23	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass	
					DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	204.39	1,021.94	0.27	1.37	1.57	7.85	1.15	5.74	0.52	2.61	7.65	38.25
			Total Calanoida		**204.39**	**1,021.94**	**0.27**	**1.37**	**1.57**	**7.85**	**1.15**	**5.74**	**0.52**	**2.61**	**7.65**	**38.25**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	497.88	2,489.40	8.56	42.81	16.49	82.44	9.53	47.63	6.24	31.21	12.01	60.04
			Total Cyclopoida		**497.88**	**2,489.40**	**8.56**	**42.81**	**16.49**	**82.44**	**9.53**	**47.63**	**6.24**	**31.21**	**12.01**	**60.04**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	18.67	93.34	0.86	4.28	0.53	2.67	1.46	7.28	0.74	3.71	0.21	1.05
			Total Copepoda Nauplii		**18.67**	**93.34**	**0.86**	**4.28**	**0.53**	**2.67**	**1.46**	**7.28**	**0.74**	**3.71**	**0.21**	**1.05**
			Total Crustacean Zooplankton		**720.94**	**3,604.68**	**9.69**	**48.46**	**18.59**	**92.95**	**12.13**	**60.65**	**7.51**	**37.53**	**19.87**	**99.33**
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	0.63	6.34	0.02	0.20	0.02	0.24	0.02	0.18	0.04	0.41	0.01	0.14
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	4.33	43.34	0.18	1.79	0.14	1.40	0.17	1.72	0.20	2.00	0.08	0.80
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	10.66	106.55	0.03	0.35	0.06	0.61	0.08	0.79	0.03	0.26	0.37	3.67
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.81	38.08	0.04	0.35	0.13	1.30	0.11	1.06	0.07	0.71	0.02	0.24
			Total Rotifera		**19.43**	**194.31**	**0.27**	**2.70**	**0.36**	**3.55**	**0.38**	**3.75**	**0.34**	**3.38**	**0.49**	**4.85**
			Total Zooplankton		**740.37**	**3,798.99**	**9.96**	**51.16**	**18.95**	**96.51**	**12.51**	**64.41**	**7.84**	**40.91**	**20.35**	**104.19**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fz23-092-040		fz23-092-041		fz23-092-042		fz23-092-043		fz23-092-044	
Lake							Quesnel		Quesnel		Quesnel		Quesnel		Quesnel	
Client Sample ID							QUL-ZOO-1_ZOO-2_2023-07		QUL-ZOO-1_ZOO-3_2023-07		QUL-ZOO-1_ZOO-4_2023-07		QUL-ZOO-1_ZOO-5_2023-07		QUL-ZOO-7_ZOO-1_2023-07	
Date Sampled							26-Jul-23		26-Jul-23		26-Jul-23		26-Jul-23		26-Jul-23	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass	
					DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	204.39	1,021.94	13.60	68.00	16.57	82.87	26.46	132.28	10.07	50.36	17.85	89.25
			Total Calanoida		**204.39**	**1,021.94**	**13.60**	**68.00**	**16.57**	**82.87**	**26.46**	**132.28**	**10.07**	**50.36**	**17.85**	**89.25**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	497.88	2,489.40	17.73	88.65	15.48	77.40	21.83	109.16	9.05	45.25	25.60	128.01
			Total Cyclopoida		**497.88**	**2,489.40**	**17.73**	**88.65**	**15.48**	**77.40**	**21.83**	**109.16**	**9.05**	**45.25**	**25.60**	**128.01**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	18.67	93.34	0.25	1.24	0.36	1.81	0.49	2.47	0.16	0.81	0.40	2.00
			Total Copepoda Nauplii		**18.67**	**93.34**	**0.25**	**1.24**	**0.36**	**1.81**	**0.49**	**2.47**	**0.16**	**0.81**	**0.40**	**2.00**
			Total Crustacean Zooplankton		**720.94**	**3,604.68**	**31.58**	**157.89**	**32.42**	**162.09**	**48.78**	**243.92**	**19.28**	**96.42**	**43.85**	**219.26**
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	0.63	6.34	0.04	0.37	0.02	0.16	0.04	0.45	0.02	0.18	0.04	0.41
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	4.33	43.34	0.11	1.13	0.13	1.29	0.29	2.87	0.07	0.74	0.11	1.08
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	10.66	106.55	0.85	8.48	0.82	8.22	1.60	16.00	0.48	4.76	0.87	8.65
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.81	38.08	0.19	1.89	0.15	1.53	0.51	5.07	0.10	1.00	0.27	2.71
			Total Rotifera		**19.43**	**194.31**	**1.19**	**11.86**	**1.12**	**11.20**	**2.44**	**24.39**	**0.67**	**6.69**	**1.29**	**12.85**
			Total Zooplankton		**740.37**	**3,798.99**	**32.76**	**169.75**	**33.54**	**173.29**	**51.22**	**268.30**	**19.95**	**103.11**	**45.14**	**232.12**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fz23-092-045		fz23-092-046		fz23-092-047		fz23-092-048		fz23-092-053	
Lake							Quesnel		Quesnel		Quesnel		Quesnel		Polley	
Client Sample ID							QUL-ZOO-7_ZOO-2_2023-07		QUL-ZOO-7_ZOO-3_2023-07		QUL-ZOO-7_ZOO-4_2023-07		QUL-ZOO-7_ZOO-5_2023-07		POL-P2_ZOO-1_2023-08	
Date Sampled							26-Jul-23		26-Jul-23		26-Jul-23		26-Jul-23		28-Aug-23	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass	
					DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	204.39	1,021.94	8.13	40.64	2.82	14.09	17.08	85.42	13.87	69.33	1.91	9.56
			Total Calanoida		**204.39**	**1,021.94**	**8.13**	**40.64**	**2.82**	**14.09**	**17.08**	**85.42**	**13.87**	**69.33**	**1.91**	**9.56**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	497.88	2,489.40	13.40	66.98	3.61	18.07	19.05	95.27	11.02	55.08	12.95	64.75
			Total Cyclopoida		**497.88**	**2,489.40**	**13.40**	**66.98**	**3.61**	**18.07**	**19.05**	**95.27**	**11.02**	**55.08**	**12.95**	**64.75**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	18.67	93.34	0.10	0.48	0.06	0.29	0.10	0.48	0.23	1.14	0.41	2.07
			Total Copepoda Nauplii		**18.67**	**93.34**	**0.10**	**0.48**	**0.06**	**0.29**	**0.10**	**0.48**	**0.23**	**1.14**	**0.41**	**2.07**
			Total Crustacean Zooplankton		**720.94**	**3,604.68**	**21.62**	**108.10**	**6.49**	**32.45**	**36.23**	**181.17**	**25.11**	**125.55**	**15.28**	**76.38**
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	0.63	6.34	0.06	0.57	0.03	0.28	0.06	0.61	0.05	0.49		
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	4.33	43.34	0.13	1.26	0.05	0.48	0.13	1.29	0.14	1.36	0.02	0.21
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	10.66	106.55	1.11	11.10	0.36	3.63	1.00	9.97	0.92	9.18	0.28	2.75
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.81	38.08	0.32	3.18	0.07	0.71	0.27	2.71	0.15	1.53	0.03	0.27
			Total Rotifera		**19.43**	**194.31**	**1.61**	**16.12**	**0.51**	**5.10**	**1.46**	**14.58**	**1.26**	**12.56**	**0.32**	**3.23**
			Total Zooplankton		**740.37**	**3,798.99**	**23.23**	**124.22**	**7.00**	**37.55**	**37.69**	**195.74**	**26.36**	**138.10**	**15.60**	**79.61**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fz23-092-054		fz23-092-055		fz23-092-056		fz23-092-029_QA		fz23-092-039_QA		fz23-092-054_QA	
Lake							Bootjack		Quesnel		Quesnel		Polley		Quesnel		Bootjack	
Client Sample ID							BOL-B2_ZOO-1_2023-08		QUL-ZOO-1_ZOO-1_2023-08		QUL-ZOO-7_ZOO-1_2023-08		POL-P2_ZOO-1_2023-07_QA		QUL-ZOO-1_ZOO-1_2023-07_QA		BOL-B2_ZOO-1_2023-08_QA	
Date Sampled							28-Aug-23		27-Aug-23		27-Aug-23		27-Jul-23		26-Jul-23		28-Aug-23	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass		Total Biomass	
					DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)	DW (mg/sample)	WW (mg/sample)
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	204.39	1,021.94	0.09	0.46	12.27	61.36	6.69	33.47	2.10	10.52	7.17	35.86	0.55	2.73
			Total Calanoida		**204.39**	**1,021.94**	**0.09**	**0.46**	**12.27**	**61.36**	**6.69**	**33.47**	**2.10**	**10.52**	**7.17**	**35.86**	**0.55**	**2.73**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	497.88	2,489.40	9.92	49.62	10.62	53.09	8.27	41.35	11.31	56.56	10.92	54.58	9.53	47.63
			Total Cyclopoida		**497.88**	**2,489.40**	**9.92**	**49.62**	**10.62**	**53.09**	**8.27**	**41.35**	**11.31**	**56.56**	**10.92**	**54.58**	**9.53**	**47.63**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	18.67	93.34	0.33	1.67	0.15	0.76	0.18	0.90	0.94	4.71	0.16	0.81	0.26	1.28
			Total Copepoda Nauplii		**18.67**	**93.34**	**0.33**	**1.67**	**0.15**	**0.76**	**0.18**	**0.90**	**0.94**	**4.71**	**0.16**	**0.81**	**0.26**	**1.28**
			Total Crustacean Zooplankton		**720.94**	**3,604.68**	**10.35**	**51.74**	**23.04**	**115.21**	**15.14**	**75.72**	**14.36**	**71.79**	**18.25**	**91.25**	**10.33**	**51.65**
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	0.63	6.34			0.00	0.04					0.06	0.61	0.00	0.02
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	4.33	43.34	0.04	0.36	0.05	0.48	0.02	0.24	0.07	0.69	0.08	0.79	0.05	0.53
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	10.66	106.55	0.09	0.87	0.87	8.65	0.28	2.84	0.07	0.72	0.31	3.10	0.07	0.66
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.81	38.08	0.40	4.01	0.38	3.77	0.13	1.30	0.03	0.27	0.04	0.41	0.52	5.25
			Total Rotifera		**19.43**	**194.31**	**0.52**	**5.24**	**1.30**	**12.95**	**0.44**	**4.38**	**0.17**	**1.68**	**0.49**	**4.92**	**0.65**	**6.45**
			Total Zooplankton		**740.37**	**3,798.99**	**10.87**	**56.98**	**24.34**	**128.16**	**15.58**	**80.10**	**14.53**	**73.47**	**18.74**	**96.17**	**10.98**	**58.10**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-001	fp23-092-002	fp23-092-003
Client Sample ID							POL-P2_PHYTO-1_2023-06	BOL-B2_PHYTO-1_2023-06	QUL-ZOO-1_PHYTO-1_2023-06
Date Sampled							20-Jun-23	21-Jun-23	21-Jun-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090	23,816		6,698
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977	2,977		
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801	2,977		1,340
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931	8,931		
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513	83,358	89,837	9,378
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134			
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			1,340
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981	14,885		10,717
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			
Diatoms	Bacillariophyta			Centric diatom		73,594,549	29,771	14,185	87,079
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**166,715**	**104,022**	**116,552**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555		37,826	
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091	148,853	330,979	
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723		4,728	
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	86,335	28,370	2,679
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272			
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300	23,816	127,663	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652		75,652	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			13,397
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026	8,931		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361	2,977		1,340
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739		56,739	
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380			
				Total Green Algae		**3,381,329**	**270,912**	**661,957**	**17,416**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-001	fp23-092-002	fp23-092-003
Client Sample ID							POL-P2_PHYTO-1_2023-06	BOL-B2_PHYTO-1_2023-06	QUL-ZOO-1_PHYTO-1_2023-06
Date Sampled							20-Jun-23	21-Jun-23	21-Jun-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648	8,931	33,098	36,171
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359	11,908	609,946	2,679
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			2,679
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			1,340
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971	145,876		6,698
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939	14,885		8,038
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278	8,931		91,098
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530			1,340
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174		14,185	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813	83,358	9,457	6,698
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712	5,954	9,457	2,679
				Total Golden Algae		**11,024,839**	**279,843**	**676,142**	**159,421**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	53,587	52,011	14,736
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	151,830	28,370	75,022
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			1,340
				Total Cryptomonads		**4,592,883**	**205,417**	**80,380**	**91,098**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			1,340
				Total Euglenoids		**35,485**	**0**	**0**	**1,340**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226		9,021,529	
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587	276,866	33,098	
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335		378,261	
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638			
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	125,036	179,674	
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	8,931		16,076
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165			
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**410,834**	**9,612,562**	**16,076**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208		9,457	2,679
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**0**	**9,457**	**2,679**
				Total Phytoplankton		**285,383,278**	**1,333,721**	**11,144,520**	**404,582**
				Total Unique Taxa	**62**		**21**	**19**	**22**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-004	fp23-092-009	fp23-092-010
Client Sample ID							QUL-ZOO-7_PHYTO-1_2023-06	POL-P2_PHYTO-1_2023-07	POL-P2_PHYTO-2_2023-07
Date Sampled							21-Jun-23	27-Jul-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090	29,473		12,366
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134			
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981	21,435		
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289	8,038	9,457	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			
Diatoms	Bacillariophyta			Centric diatom		73,594,549	345,636	113,478	18,549
Diatoms	Bacillariophyta			Pennate diatom		17,094		4,728	
				Total Diatoms		**75,548,735**	**404,582**	**127,663**	**30,916**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555			
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091		56,739	111,296
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	5,359	33,098	86,564
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272		4,728	
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300		18,913	37,099
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136		18,913	
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473	16,076		
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361		18,913	6,183
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			49,465
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380			
				Total Green Algae		**3,381,329**	**21,435**	**151,304**	**290,606**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-004	fp23-092-009	fp23-092-010
Client Sample ID							QUL-ZOO-7_PHYTO-1_2023-06	POL-P2_PHYTO-1_2023-07	POL-P2_PHYTO-2_2023-07
Date Sampled							21-Jun-23	27-Jul-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648	18,755	4,728	
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359	8,038		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717	8,038		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870	21,435		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038	8,038		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666	8,038		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971	13,397		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939	26,794		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325		4,728	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278	123,250		
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530	5,359		
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938		439,729	1,032,580
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813	10,717		6,183
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712			6,183
				Total Golden Algae		**11,024,839**	**251,859**	**449,185**	**1,044,946**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	8,038	14,185	12,366
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	120,571	151,304	166,944
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**128,609**	**165,489**	**179,310**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			
				Total Euglenoids		**35,485**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226		16,495,626	4,711,534
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899		70,924	49,465
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221		840,685	463,734
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587		4,323,127	4,048,254
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638		992,936	
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567		3,625,003	1,692,800
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	18,755	85,109	37,099
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165		33,098	24,732
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044	128,609		
				Total Blue-green Algae		**190,227,928**	**147,364**	**26,466,508**	**11,027,617**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208		18,913	
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**0**	**18,913**	**0**
				Total Phytoplankton		**285,383,278**	**953,849**	**27,379,063**	**12,573,396**
				Total Unique Taxa	**62**		**17**	**21**	**16**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-011	fp23-092-012	fp23-092-013
Client Sample ID							POL-P2_PHYTO-3_2023-07	POL-P2_PHYTO-4_2023-07	POL-P2_PHYTO-5_2023-07
Date Sampled							27-Jul-23	27-Jul-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090	5,359	21,435	
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152		32,152	
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134		16,076	
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981	10,717		6,183
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259	16,076		6,183
Diatoms	Bacillariophyta			Centric diatom		73,594,549	123,250	21,435	
Diatoms	Bacillariophyta			Pennate diatom		17,094			12,366
				Total Diatoms		**75,548,735**	**155,402**	**91,098**	**24,732**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555			
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			6,183
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091	48,228		111,296
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	10,717	75,022	6,183
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272			
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300	10,717	26,793	30,916
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361	5,359		6,183
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380			
				Total Green Algae		**3,381,329**	**75,022**	**101,815**	**160,761**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-011	fp23-092-012	fp23-092-013
Client Sample ID							POL-P2_PHYTO-3_2023-07	POL-P2_PHYTO-4_2023-07	POL-P2_PHYTO-5_2023-07
Date Sampled							27-Jul-23	27-Jul-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648		5,359	
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325		16,076	6,183
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278			
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530	5,359		
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938	819,881	728,783	1,224,257
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813		5,359	
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712		5,359	
				Total Golden Algae		**11,024,839**	**825,240**	**760,935**	**1,230,440**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	10,717	10,717	18,549
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	155,402	101,815	92,747
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**166,120**	**112,533**	**111,296**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			
				Total Euglenoids		**35,485**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226	13,091,304	9,967,948	19,665,742
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899	117,891	160,761	68,014
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221	1,286,088	350,102	828,537
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587	3,038,978	3,111,774	2,431,391
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638			556,480
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	982,786	2,235,343	1,748,938
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	37,511	26,793	24,732
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165	26,793		18,549
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**18,581,352**	**15,852,721**	**25,342,385**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			6,183
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	10,717	5,359	18,549
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**10,717**	**5,359**	**24,732**
				Total Phytoplankton		**285,383,278**	**19,813,853**	**16,924,461**	**26,894,347**
				Total Unique Taxa	**62**		**18**	**18**	**21**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-014	fp23-092-015	fp23-092-016
Client Sample ID							BOL-B2_PHYTO-1_2023-07	BOL-B2_PHYTO-2_2023-07	BOL-B2_PHYTO-3_2023-07
Date Sampled							27-Jul-23	27-Jul-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090		13,979	
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			2,977
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801		3,495	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513		3,495	5,954
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134	53,587	27,958	59,541
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			
Diatoms	Bacillariophyta			Centric diatom		73,594,549	5,359	3,495	8,931
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**58,946**	**52,422**	**77,403**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174	2,679		
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555	5,359	6,990	
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091	72,342		5,954
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	24,114	17,474	29,771
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			2,977
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272	2,679	10,484	5,954
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300	56,266	48,927	47,633
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136	104,495	157,266	35,725
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361	5,359		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380		3,495	2,977
				Total Green Algae		**3,381,329**	**273,294**	**244,636**	**130,990**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-014	fp23-092-015	fp23-092-016
Client Sample ID							BOL-B2_PHYTO-1_2023-07	BOL-B2_PHYTO-2_2023-07	BOL-B2_PHYTO-3_2023-07
Date Sampled							27-Jul-23	27-Jul-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648	21,435	41,938	23,816
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359		3,495	2,977
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325	2,679	13,979	17,862
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278			
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884	2,679	10,484	
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530	8,038		2,977
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938		34,948	44,656
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174		6,990	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813		3,495	5,954
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712		3,495	5,954
				Total Golden Algae		**11,024,839**	**34,832**	**118,823**	**104,197**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	21,435	20,969	23,816
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	222,386	398,408	318,545
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834		3,495	
				Total Cryptomonads		**4,592,883**	**243,821**	**422,871**	**342,361**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990	10,717	3,495	2,977
				Total Euglenoids		**35,485**	**10,717**	**3,495**	**2,977**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226	2,657,915	5,032,518	7,541,038
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899	5,359	10,484	
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958		27,958	
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221	785,537	1,056,829	875,254
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587	58,946	255,121	358,363
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335	2,668,633		839,530
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638		891,175	595,411
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	3,610,871	1,467,818	547,778
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	5,359	17,474	14,885
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165	8,038		2,977
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044	21,435		
				Total Blue-green Algae		**190,227,928**	**9,822,091**	**8,759,378**	**10,775,237**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			2,977
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	13,397	13,979	8,931
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**13,397**	**13,979**	**11,908**
				Total Phytoplankton		**285,383,278**	**10,457,097**	**9,615,605**	**11,445,075**
				Total Unique Taxa	**62**		**25**	**28**	**28**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-017	fp23-092-018	fp23-092-019
Client Sample ID							BOL-B2_PHYTO-4_2023-07	BOL-B2_PHYTO-5_2023-07	QUL-ZOO-1_PHYTO-1_2023-07
Date Sampled							27-Jul-23	27-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090			
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801	6,990		
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513	20,969		
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134	31,453	35,725	
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981			15,458
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259	3,495		
Diatoms	Bacillariophyta			Centric diatom		73,594,549	31,453	8,931	4,513,674
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**94,360**	**44,656**	**4,529,132**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174	3,495		
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555	6,990		
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091	3,495	11,908	
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723	10,484	5,954	
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	76,886	23,816	15,458
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272	3,495	5,954	
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300	20,969	47,633	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447	6,990		
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366		11,908	15,458
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136	83,875	17,862	
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235		29,771	
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725		11,908	
Green Algae	Chlorophyta			Chlorophyte		18,380		2,977	
				Total Green Algae		**3,381,329**	**216,678**	**169,692**	**30,916**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-017	fp23-092-018	fp23-092-019
Client Sample ID							BOL-B2_PHYTO-4_2023-07	BOL-B2_PHYTO-5_2023-07	QUL-ZOO-1_PHYTO-1_2023-07
Date Sampled							27-Jul-23	27-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648	41,938	68,472	
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359	13,979	26,794	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666			30,916
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939			15,458
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325		23,816	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278		2,977	
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884		2,977	15,458
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530			
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938	62,906	107,174	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813	17,474	5,954	15,458
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712	3,495	5,954	
				Total Golden Algae		**11,024,839**	**139,792**	**244,119**	**77,289**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	41,938	35,725	46,373
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	286,574	291,751	108,205
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**328,512**	**327,476**	**154,578**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495	3,495		
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990	10,484	2,977	
				Total Euglenoids		**35,485**	**13,979**	**2,977**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226	10,307,925	6,990,126	
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221	1,328,026	648,337	
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587	272,595	229,233	
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335	1,404,911		
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638		881,208	
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	407,727	1,041,969	
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	20,969	8,931	
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165		2,977	
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**13,742,153**	**9,802,782**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185		2,977	
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	6,990	11,908	
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685	3,495		
				Total Dinoflagellates		**572,078**	**10,484**	**14,885**	**0**
				Total Phytoplankton		**285,383,278**	**14,545,958**	**10,606,587**	**4,791,914**
				Total Unique Taxa	**62**		**29**	**29**	**8**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-020	fp23-092-021	fp23-092-022
Client Sample ID							QUL-ZOO-1_PHYTO-2_2023-07	QUL-ZOO-1_PHYTO-3_2023-07	QUL-ZOO-1_PHYTO-4_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090		30,916	
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134			
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981		61,831	15,458
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289	15,458		92,747
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			15,458
Diatoms	Bacillariophyta			Centric diatom		73,594,549	4,544,590	4,683,710	4,931,034
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**4,560,048**	**4,776,457**	**5,054,697**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555			15,458
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091			
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674		15,458	
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			15,458
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272			
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380			
				Total Green Algae		**3,381,329**	**0**	**15,458**	**30,916**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-020	fp23-092-021	fp23-092-022
Client Sample ID							QUL-ZOO-1_PHYTO-2_2023-07	QUL-ZOO-1_PHYTO-3_2023-07	QUL-ZOO-1_PHYTO-4_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648			
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666	61,831	46,373	61,831
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939	15,458	15,458	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278			15,458
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530			
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938	92,747		
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813			46,373
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712	15,458		
				Total Golden Algae		**11,024,839**	**185,493**	**61,831**	**123,662**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	15,458	30,916	15,458
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	61,831	61,831	77,289
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**77,289**	**92,747**	**92,747**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			
				Total Euglenoids		**35,485**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226			
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587			
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638			
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567			
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	15,458		
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165			
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**15,458**	**0**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	30,916	30,916	15,458
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**30,916**	**30,916**	**15,458**
				Total Phytoplankton		**285,383,278**	**4,869,203**	**4,977,408**	**5,317,479**
				Total Unique Taxa	**62**		**7**	**7**	**10**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-023	fp23-092-024	fp23-092-025
Client Sample ID							QUL-ZOO-1_PHYTO-5_2023-07	QUL-ZOO-7_PHYTO-1_2023-07	QUL-ZOO-7_PHYTO-2_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090			
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095	20,095		
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134			
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893		15,458	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981		15,458	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289	80,380		80,380
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			
Diatoms	Bacillariophyta			Centric diatom		73,594,549	6,309,869	4,822,830	6,792,152
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**6,410,345**	**4,853,746**	**6,872,533**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555			
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091			
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723		15,458	
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674			
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272			
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380			
				Total Green Algae		**3,381,329**	**0**	**15,458**	**0**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID					Grand Total		fp23-092-023	fp23-092-024	fp23-092-025
Client Sample ID							QUL-ZOO-1_PHYTO-5_2023-07	QUL-ZOO-7_PHYTO-1_2023-07	QUL-ZOO-7_PHYTO-2_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Unique Taxa	Density (cells/L)	Total Density (cells/L)	Total Density (cells/L)	Total Density (cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648			
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939		30,916	20,095
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278			
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530		15,458	
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938	120,571	30,916	80,380
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813			
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712			
				Total Golden Algae		**11,024,839**	**120,571**	**77,289**	**100,476**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	20,095	15,458	40,190
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	100,476	61,831	40,190
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**120,571**	**77,289**	**80,380**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			
				Total Euglenoids		**35,485**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226			
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587			
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638			
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567			
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368			
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165			
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**0**	**0**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208		61,831	40,190
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			20,095
				Total Dinoflagellates		**572,078**	**0**	**61,831**	**60,285**
				Total Phytoplankton		**285,383,278**	**6,651,486**	**5,085,612**	**7,113,674**
				Total Unique Taxa	**62**		**5**	**9**	**7**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-026	fp23-092-027	fp23-092-028
Client Sample ID							QUL-ZOO-7_PHYTO-3_2023-07	QUL-ZOO-7_PHYTO-4_2023-07	QUL-ZOO-7_PHYTO-5_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090			
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134			
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981	60,285	15,458	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289	20,095	61,831	20,095
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			
Diatoms	Bacillariophyta			Centric diatom		73,594,549	5,968,252	4,374,554	6,731,867
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**6,048,633**	**4,451,843**	**6,751,962**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555		15,458	40,190
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091			
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723			20,095
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674		30,916	20,095
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815	40,190		20,095
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272			
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447		15,458	
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026	20,095		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			
Green Algae	Chlorophyta			Chlorophyte		18,380			
				Total Green Algae		**3,381,329**	**60,285**	**61,831**	**100,476**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-026	fp23-092-027	fp23-092-028
Client Sample ID							QUL-ZOO-7_PHYTO-3_2023-07	QUL-ZOO-7_PHYTO-4_2023-07	QUL-ZOO-7_PHYTO-5_2023-07
Date Sampled							26-Jul-23	26-Jul-23	26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648			
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			20,095
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666	80,380	30,916	60,285
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939	20,095	15,458	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278	20,095	46,373	
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530			
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813	40,190		
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712			
				Total Golden Algae		**11,024,839**	**160,761**	**92,747**	**80,380**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	40,190		40,190
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	40,190	77,289	261,237
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**80,380**	**77,289**	**301,427**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			
				Total Euglenoids		**35,485**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226			
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587			
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638			
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	1,205,707	618,312	
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368			
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165			
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**1,205,707**	**618,312**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	20,095	46,373	40,190
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685	20,095		
				Total Dinoflagellates		**572,078**	**40,190**	**46,373**	**40,190**
				Total Phytoplankton		**285,383,278**	**7,595,957**	**5,348,395**	**7,274,435**
				Total Unique Taxa	**62**		**11**	**9**	**10**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-049	fp23-092-050	fp23-092-051
Client Sample ID							POL-P2_PHYTO-1_2023-08	BOL-B2_PHYTO-1_2023-08	QUL-ZOO-1_PHYTO-1_2023-08
Date Sampled							28-Aug-23	28-Aug-23	27-Aug-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090	10,048		
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513	110,523		
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134		26,794	
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			20,095
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289			281,332
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259	10,048		
Diatoms	Bacillariophyta			Centric diatom		73,594,549			9,886,801
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**130,618**	**26,794**	**10,188,228**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555			20,095
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091			
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723		11,908	20,095
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	100,476	14,885	
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			20,095
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272		2,977	
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300		5,954	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361	10,048		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725		23,816	
Green Algae	Chlorophyta			Chlorophyte		18,380		8,931	
				Total Green Algae		**3,381,329**	**110,523**	**68,472**	**60,285**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-049	fp23-092-050	fp23-092-051
Client Sample ID							POL-P2_PHYTO-1_2023-08	BOL-B2_PHYTO-1_2023-08	QUL-ZOO-1_PHYTO-1_2023-08
Date Sampled							28-Aug-23	28-Aug-23	27-Aug-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648		23,816	
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359	10,048	65,495	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278			
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884			20,095
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530			
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938	3,255,410		
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813	10,048		20,095
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977		2,977	
Golden Algae	Ochrophyta			Chrysophyte		99,712		35,725	
				Total Golden Algae		**11,024,839**	**3,275,505**	**128,013**	**40,190**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	40,190	41,679	
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	180,856	250,073	20,095
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**221,046**	**291,751**	**20,095**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			
				Total Euglenoids		**35,485**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226	7,572,513	3,956,507	
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221	60,285	4,065,807	
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587	582,759	119,082	
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921		204,921	
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638	301,427		
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	8,750,245	2,355,560	
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	60,285		
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165			
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**17,327,514**	**10,701,877**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185	10,048		
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0			
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	30,143	8,931	40,190
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**40,190**	**8,931**	**40,190**
				Total Phytoplankton		**285,383,278**	**21,105,397**	**11,225,839**	**10,348,989**
				Total Unique Taxa	**62**		**18**	**17**	**9**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-052	fp23-092-001_QA	fp23-092-018_QA
Client Sample ID							QUL-ZOO-7_PHYTO-1_2023-08	POL-P2_PHYTO-1_2023-06_QA	BOL-B2_PHYTO-5_2023-07_QA
Date Sampled							27-Aug-23	20-Jun-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090		23,816	20,839
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977			2,977
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513		101,220	2,977
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134			62,518
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981	20,095		
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289	100,476		
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259			
Diatoms	Bacillariophyta			Centric diatom		73,594,549	9,223,662	11,908	8,931
Diatoms	Bacillariophyta			Pennate diatom		17,094			
				Total Diatoms		**75,548,735**	**9,344,233**	**136,945**	**98,243**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555	40,190		5,954
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183			
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091		235,187	26,794
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0			29,771
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674		47,633	44,656
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272			2,977
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300		47,633	29,771
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136			38,702
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473			
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026		2,977	
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361			
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739			
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235			23,816
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725			11,908
Green Algae	Chlorophyta			Chlorophyte		18,380			5,954
				Total Green Algae		**3,381,329**	**40,190**	**333,430**	**220,302**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-052	fp23-092-001_QA	fp23-092-018_QA
Client Sample ID							QUL-ZOO-7_PHYTO-1_2023-08	POL-P2_PHYTO-1_2023-06_QA	BOL-B2_PHYTO-5_2023-07_QA
Date Sampled							27-Aug-23	20-Jun-23	27-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648	40,190	2,977	17,862
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359			5,954
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038			
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666	20,095		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971		151,830	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939	60,285	17,862	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325			2,977
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278	20,095		
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884	40,190		2,977
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530		2,977	2,977
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938			44,656
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174			
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813		50,610	8,931
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977			
Golden Algae	Ochrophyta			Chrysophyte		99,712		14,885	5,954
				Total Golden Algae		**11,024,839**	**180,856**	**241,142**	**92,289**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987		62,518	23,816
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062		110,151	279,843
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834			
				Total Cryptomonads		**4,592,883**	**0**	**172,669**	**303,660**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495			
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990			2,977
				Total Euglenoids		**35,485**	**0**	**0**	**2,977**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226			5,575,281
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958			
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221		44,656	719,852
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587		276,866	133,968
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638			841,018
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567		235,187	1,136,044
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368			14,885
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165			5,954
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044			
				Total Blue-green Algae		**190,227,928**	**0**	**556,709**	**8,427,002**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185			2,977
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0		2,977	
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	20,095		20,839
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685			
				Total Dinoflagellates		**572,078**	**20,095**	**2,977**	**23,816**
				Total Phytoplankton		**285,383,278**	**9,585,375**	**1,443,872**	**9,168,289**
				Total Unique Taxa	**62**		**7**	**16**	**31**

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Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-028_QA
Client Sample ID							QUL-ZOO-7_PHYTO-5_2023-07_QA
Date Sampled							26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density
					Unique Taxa	Density (cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	154,090	
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	2,977	
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	2,977	
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	20,095	
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		14,801	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	8,931	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	32,152	
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	323,513	
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	251,134	
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia sp.	1	36,893	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		267,981	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	770,289	20,095
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	51,259	
Diatoms	Bacillariophyta			Centric diatom		73,594,549	6,651,486
Diatoms	Bacillariophyta			Pennate diatom		17,094	
				Total Diatoms		**75,548,735**	**6,671,581**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	6,174	
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.	1	188,555	
Green Algae	Chlorophyta	Chlamydomonadales	Chlamydomonadaceae	Chlamydomonas sp.	1	6,183	
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	901,091	
Green Algae	Chlorophyta	Chlorellales	Chlorellaceae	Dictyosphaerium sp.		0	
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	88,723	20,095
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	703,674	
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	98,815	
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	36,272	
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	503,300	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	75,652	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	22,447	20,095
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	27,366	
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	418,136	
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		29,473	
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	29,026	
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	56,361	
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Quadrigula sp.	1	56,739	
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	79,235	
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	35,725	
Green Algae	Chlorophyta			Chlorophyte		18,380	
				Total Green Algae		**3,381,329**	**40,190**

biologica

Total Phytoplankton Density (cells/L) for Minnow Environmental Inc. Mount Polley, 2023

Biologica Sample ID							fp23-092-028_QA
Client Sample ID							QUL-ZOO-7_PHYTO-5_2023-07_QA
Date Sampled							26-Jul-23
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density
					Unique Taxa	Density (cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	368,648	
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	755,359	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	10,717	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon bavaricum	1	42,870	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	8,038	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	400,666	80,380
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	165,971	20,095
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		242,939	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	85,325	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	328,278	
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	91,884	
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	38,530	
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	8,074,938	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	21,174	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		286,813	
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	2,977	
Golden Algae	Ochrophyta			Chrysophyte		99,712	
				Total Golden Algae		**11,024,839**	**100,476**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	684,987	40,190
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nannoplanctica	1	3,903,062	140,666
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	4,834	
				Total Cryptomonads		**4,592,883**	**180,856**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Euglena sp.	1	3,495	
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	31,990	
				Total Euglenoids		**35,485**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	117,012,226	
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	482,899	
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	27,958	
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	12,589,221	
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	19,139,587	
Blue-green Algae	Cyanophyta	Pseudanabaenales	Pseudanabaenaceae	Pseudanabaena sp.	1	204,921	
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	5,291,335	
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	4,218,638	
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	30,595,567	
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	398,368	
Blue-green Algae	Cyanophyta			Cyanophyte (coccoid unicell)		117,165	
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		150,044	
				Total Blue-green Algae		**190,227,928**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	22,185	
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum		0	
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.	1	506,208	20,095
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	43,685	
				Total Dinoflagellates		**572,078**	**20,095**
				Total Phytoplankton		**285,383,278**	**7,013,199**
				Total Unique Taxa	**62**		**8**

Table C.3.1: **Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2019 to 2023**

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Chlorophyll-a (µg/L)	Diatom (cells/L)	Chlorophyte (cells/L)	Chrysophyte (cells/L)	Cryptomonad (cells/L)	Cyanobacteria (cells/L)
2019	BOL-B2	Reference	Jun 25	-	16,710,532	19.0	0.114	0.0594	2.03	80,380	168,799	417,979	257,218	15,778,118
			Jul 31	1	16,818,503	17.0	0.135	0.0680	2.58	48,228	116,552	522,473	156,742	15,974,508
			Jul 31	2	13,739,324	23.0	0.286	0.0609	2.49	63,156	688,976	1,016,239	206,693	11,758,519
			Jul 31	3	20,677,883	24.0	0.173	0.0504	2.71	16,076	152,723	614,911	257,218	19,636,956
			Jul 31	4	18,345,174	20.0	0.118	0.0567	2.91	20,095	337,598	534,530	188,894	17,264,057
			Jul 31	5	15,019,218	17.0	0.131	0.0677	3.10	10,717	401,902	324,201	88,419	14,193,978
			Sep 4	-	5,919,483	25.0	0.334	0.0601	0.0910	6,430	181,660	41,798	141,470	5,522,403
	POL-P2	Exposed	Jun 24	-	3,958,740	21.0	0.464	0.0889	1.40	18,755	100,476	95,117	99,136	3,642,576
			Jul 29	1	25,314,116	17.0	0.143	0.0686	2.18	114,829	172,244	895,668	126,312	23,999,321
			Jul 29	2	19,520,978	13.0	0.181	0.0939	2.69	45,932	482,283	1,194,225	114,829	17,677,968
			Jul 29	3	16,181,958	16.0	0.284	0.0873	2.26	63,156	235,400	1,010,498	149,278	14,723,626
			Jul 29	4	12,479,073	17.0	0.225	0.0759	2.60	64,304	281,332	795,767	92,438	11,241,213
			Jul 29	5	21,754,408	14.0	0.146	0.0836	2.58	40,190	206,693	970,307	132,054	20,405,164
			Aug 28	-	732,162	15.0	0.655	0.193	0.400	42,811	61,159	32,327	151,150	444,714
2020	BOL-B2	Reference	Jun 22	-	1,240,656	21.0	0.786	0.222	2.47	234,152	559,169	132,803	178,235	136,297
			Jul 29	1	15,951,510	25.0	0.120	0.0455	1.39	34,162	62,295	40,190	245,161	15,567,693
			Jul 29	2	16,813,067	20.0	0.129	0.0574	1.94	0	68,149	43,685	174,740	16,526,493
			Jul 29	3	14,903,672	20.0	0.191	0.0618	2.10	4,728	134,756	42,554	257,690	14,463,944
			Jul 29	4	15,433,056	19.0	0.230	0.0683	2.59	4,728	156,033	101,658	210,408	14,960,229
			Jul 29	5	15,745,121	16.0	0.160	0.0744	2.24	2,364	99,294	66,196	226,957	15,350,311
			Aug 30	-	13,795,274	16.0	0.566	0.144	2.38	0	287,515	58,740	191,677	13,257,343
	POL-P2	Exposed	Jun 22	-	696,631	21.0	0.775	0.212	1.20	135,307	77,701	8,038	187,554	282,671
			Jul 27	1	7,654,935	21.0	0.399	0.0792	1.57	12,366	420,452	491,558	247,325	6,480,143
			Jul 27	2	8,306,655	17.0	0.496	0.117	2.04	8,038	357,693	622,949	305,446	7,008,510
			Jul 27	3	5,379,539	17.0	0.332	0.0881	1.62	32,748	226,256	339,384	297,706	4,483,446
			Jul 27	4	11,202,774	18.0	0.181	0.0678	1.83	9,275	228,775	404,994	287,515	10,269,124
			Jul 27	5	9,006,513	16.0	0.196	0.0777	1.75	5,359	222,386	332,239	214,348	8,226,822
			Aug 30	-	7,656,332	17.0	0.673	0.180	2.68	10,717	345,636	219,707	251,859	6,825,733
2021	BOL-B2	Reference	Jun 22	-	2,824,035	23.0	0.773	0.192	20.2	58,946	428,696	916,338	187,554	1,232,501
			Jul 27	1	2,668,930	19.0	0.315	0.0768	1.50	4,466	56,564	50,610	324,499	2,228,326
			Jul 27	2	3,038,383	24.0	0.256	0.0560	1.65	16,076	53,051	32,152	323,130	2,604,328
			Jul 27	3	4,013,088	20.0	0.262	0.0678	1.72	12,179	36,537	30,447	213,130	3,717,141
			Jul 27	4	5,506,064	19.0	0.191	0.0651	1.55	13,397	28,011	32,883	226,527	5,200,375
			Jul 27	5	3,461,184	20.0	0.245	0.0662	1.96	38,583	56,266	20,899	326,345	3,019,092
			Aug 30	-	5,314,570	27.0	0.501	0.0742	2.30	23,641	267,147	104,022	276,603	4,631,335
	POL-P2	Exposed	Jun 22	-	3,443,995	17.0	0.493	0.116	1.69	43,282	86,564	680,143	219,501	2,411,415
			Jul 26	1	7,608,014	19.0	0.134	0.0608	0.947	26,124	108,514	215,018	176,837	7,081,522
			Jul 26	2	5,924,516	15.0	0.212	0.0846	1.30	2,364	122,935	368,805	182,038	5,248,374
			Jul 26	3	5,961,554	13.0	0.189	0.0948	1.09	11,164	93,777	189,787	305,892	5,360,933
			Jul 26	4	4,784,649	13.0	0.218	0.0984	1.39	0	142,675	172,818	249,180	4,219,976
			Jul 26	5	6,664,489	13.0	0.198	0.0959	1.42	2,364	170,218	196,223	338,071	5,957,614
			Aug 30	-	1,697,368	21.0	0.492	0.0938	1.02	12,057	103,155	14,736	258,557	1,303,504

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.1: Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2019 to 2023

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Chlorophyll-a (µg/L)	Diatom (cells/L)	Chlorophyte (cells/L)	Chrysophyte (cells/L)	Cryptomonad (cells/L)	Cyanobacteria (cells/L)
2022	BOL-B2	Reference	Jun 21	-	2,081,855	28.0	0.704	0.121	6.28	211,669	80,381	318,843	227,745	1,232,501
			Jul 26	1	1,921,549	29.0	0.734	0.130	1.82	69,764	66,731	160,761	142,562	1,480,215
			Jul 26	2	4,093,135	30.0	0.684	0.106	2.07	68,409	172,733	198,386	123,136	3,527,051
			Jul 26	3	2,531,093	26.0	0.730	0.142	1.94	71,449	64,304	225,065	153,616	2,014,871
			Jul 26	4	1,928,735	29.0	0.599	0.0859	2.50	53,587	125,036	207,203	151,830	1,385,720
			Jul 26	5	3,809,516	30.0	0.552	0.0744	2.09	19,716	131,945	107,680	151,661	3,398,514
			Aug 28	-	1,388,071	31.0	0.622	0.0852	2.18	35,166	129,614	36,171	45,214	1,137,886
	POL-P2	Exposed	Jun 21	-	1,026,397	17.0	0.744	0.230	2.60	510,107	253,508	37,099	166,944	52,556
			Jul 25	1	4,035,101	15.0	0.784	0.309	2.57	257,218	375,109	803,805	251,859	2,347,111
			Jul 25	2	3,531,383	21.0	0.861	0.343	2.46	144,685	439,413	841,316	203,631	1,902,338
			Jul 25	3	3,933,286	20.0	0.831	0.295	2.55	198,272	471,566	707,348	246,500	2,309,600
			Jul 25	4	6,608,867	16.0	0.800	0.312	3.78	43,282	636,861	1,174,792	166,944	4,586,988
			Jul 25	5	5,177,576	17.0	0.744	0.230	2.73	128,609	348,315	787,729	289,370	3,618,194
			Aug 25	-	9,239,164	27.0	0.461	0.0688	3.47	53,587	251,859	192,913	155,402	8,582,724
2023	BOL-B2	Reference	Jun 21	-	11,144,520	19.0	0.339	0.0796	2.30	104,022	661,957	676,142	80,380	9,612,562
			Jul 27	1	10,457,097	27.0	0.745	0.145	2.53	58,946	273,294	34,832	243,821	9,822,091
			Jul 27	2	9,615,605	29.0	0.679	0.108	2.54	52,422	244,636	118,823	422,871	8,759,378
			Jul 27	3	11,445,075	29.0	0.548	0.0763	2.61	77,403	130,990	104,197	342,361	10,775,237
			Jul 27	4	14,545,958	30.0	0.479	0.0639	3.08	94,360	216,678	139,792	328,512	13,742,153
			Jul 27	5	10,606,587	30.0	0.544	0.0731	2.52	44,656	169,692	244,119	327,476	9,802,782
			Aug 28	-	11,225,839	17.0	0.700	0.196	4.25	26,794	68,472	128,013	291,751	10,701,877
	POL-P2	Exposed	Jun 20	-	1,333,721	22.0	0.892	0.421	2.64	166,715	270,912	279,843	205,417	410,834
			Jul 27	1	27,379,063	23.0	0.592	0.107	3.56	127,663	151,304	449,185	165,489	26,466,508
			Jul 27	2	12,573,396	18.0	0.729	0.205	3.47	30,916	290,606	1,044,946	179,310	11,027,617
			Jul 27	3	19,813,853	20.0	0.531	0.107	4.08	155,402	75,022	825,240	166,120	18,581,352
			Jul 27	4	16,924,461	19.0	0.599	0.131	3.89	91,098	101,815	760,935	112,533	15,852,721
			Jul 27	5	26,894,347	22.0	0.449	0.0826	3.79	24,732	160,761	1,230,440	111,296	25,342,385
			Aug 28	-	21,105,397	18.0	0.674	0.171	2.62	130,618	110,523	3,275,505	221,046	17,327,514

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.1: **Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2019 to 2023**

Year	Area	Type	Date	Replicate	Dinoflagellates (cells/L)	Euglenophytes (cells/L)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cryptomonads (%)	Cyanobacteria (%)	Dinoflagellates (%)	Euglenophytes (%)
2019	BOL-B2	Reference	Jun 25	-	8,038	0	0.481	1.01	2.50	1.54	94.4	0.0481	0
			Jul 31	1	0	0	0.287	0.693	3.11	0.932	95.0	0	0
			Jul 31	2	5,741	0	0.460	5.01	7.40	1.50	85.6	0.0418	0
			Jul 31	3	0	0	0.0777	0.739	2.97	1.24	95.0	0	0
			Jul 31	4	0	0	0.110	1.84	2.91	1.03	94.1	0	0
			Jul 31	5	0	0	0.0714	2.68	2.16	0.589	94.5	0	0
			Sep 4	-	6,430	19,291	0.109	3.07	0.706	2.39	93.3	0.109	0.326
	POL-P2	Exposed	Jun 24	-	0	2,679	0.474	2.54	2.40	2.50	92.0	0	0.0677
			Jul 29	1	5,741	0	0.454	0.680	3.54	0.499	94.8	0.0227	0
			Jul 29	2	0	5,741	0.235	2.47	6.12	0.588	90.6	0	0.0294
			Jul 29	3	0	0	0.390	1.45	6.24	0.922	91.0	0	0
			Jul 29	4	4,019	0	0.515	2.25	6.38	0.741	90.1	0.0322	0
			Jul 29	5	0	0	0.185	0.950	4.46	0.607	93.8	0	0
			Aug 28	-	0	0	5.85	8.35	4.42	20.6	60.7	0	0
2020	BOL-B2	Reference	Jun 22	-	0	0	18.9	45.1	10.7	14.4	11.0	0	0
			Jul 29	1	2,010	0	0.214	0.391	0.252	1.54	97.6	0.0126	0
			Jul 29	2	0	0	0	0.405	0.260	1.04	98.3	0	0
			Jul 29	3	0	0	0.0317	0.904	0.286	1.73	97.0	0	0
			Jul 29	4	0	0	0.0306	1.01	0.659	1.36	96.9	0	0
			Jul 29	5	0	0	0.0150	0.631	0.420	1.44	97.5	0	0
			Aug 30	-	0	0	0	2.08	0.426	1.39	96.1	0	0
	POL-P2	Exposed	Jun 22	-	5,359	0	19.4	11.2	1.15	26.9	40.6	0.769	0
			Jul 27	1	3,092	0	0.162	5.49	6.42	3.23	84.7	0.0404	0
			Jul 27	2	4,019	0	0.0968	4.31	7.50	3.68	84.4	0.0484	0
			Jul 27	3	0	0	0.609	4.21	6.31	5.53	83.3	0	0
			Jul 27	4	3,092	0	0.0828	2.04	3.62	2.57	91.7	0.0276	0
			Jul 27	5	5,359	0	0.0595	2.47	3.69	2.38	91.3	0.0595	0
			Aug 30	-	2,679	0	0.140	4.51	2.87	3.29	89.2	0.0350	0
2021	BOL-B2	Reference	Jun 22	-	0	0	2.09	15.2	32.5	6.64	43.6	0	0
			Jul 27	1	2,977	1,489	0.167	2.12	1.90	12.2	83.5	0.112	0.0558
			Jul 27	2	3,215	6,430	0.529	1.75	1.06	10.6	85.7	0.106	0.212
			Jul 27	3	3,654	0	0.303	0.910	0.759	5.31	92.6	0.0910	0
			Jul 27	4	1,218	3,654	0.243	0.509	0.597	4.11	94.5	0.0221	0.0664
			Jul 27	5	0	0	1.11	1.63	0.604	9.43	87.2	0	0
			Aug 30	-	9,457	2,364	0.445	5.03	1.96	5.20	87.1	0.178	0.0445
	POL-P2	Exposed	Jun 22	-	0	3,092	1.26	2.51	19.8	6.37	70.0	0	0.0898
			Jul 26	1	0	0	0.343	1.43	2.83	2.32	93.1	0	0
			Jul 26	2	0	0	0.0399	2.08	6.23	3.07	88.6	0	0
			Jul 26	3	0	0	0.187	1.57	3.18	5.13	89.9	0	0
			Jul 26	4	0	0	0	2.98	3.61	5.21	88.2	0	0
			Jul 26	5	0	0	0.0355	2.55	2.94	5.07	89.4	0	0
			Aug 30	-	5,359	0	0.710	6.08	0.868	15.2	76.8	0.316	0

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.1: **Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2019 to 2023**

Year	Area	Type	Date	Replicate	Dinoflagellates (cells/L)	Euglenophytes (cells/L)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cryptomonads (%)	Cyanobacteria (%)	Dinoflagellates (%)	Euglenophytes (%)
2022	BOL-B2	Reference	Jun 21	-	10,717	0	10.2	3.86	15.3	10.9	59.2	0.515	0
			Jul 26	1	1,517	0	3.63	3.47	8.37	7.42	77.0	0.0789	0
			Jul 26	2	3,420	0	1.67	4.22	4.85	3.01	86.2	0.0836	0
			Jul 26	3	1,786	0	2.82	2.54	8.89	6.07	79.6	0.0706	0
			Jul 26	4	5,359	0	2.78	6.48	10.7	7.87	71.8	0.278	0
			Jul 26	5	0	0	0.518	3.46	2.83	3.98	89.2	0	0
			Aug 28	-	2,010	2,010	2.53	9.34	2.61	3.26	82.0	0.145	0.145
	POL-P2	Exposed	Jun 21	-	6,183	0	49.7	24.7	3.61	16.3	5.12	0.602	0
			Jul 25	1	0	0	6.37	9.30	19.9	6.24	58.2	0	0
			Jul 25	2	0	0	4.10	12.4	23.8	5.77	53.9	0	0
			Jul 25	3	0	0	5.04	12.0	18.0	6.27	58.7	0	0
			Jul 25	4	0	0	0.655	9.64	17.8	2.53	69.4	0	0
			Jul 25	5	5,359	0	2.48	6.73	15.2	5.59	69.9	0.103	0
			Aug 25	-	2,679	0	0.580	2.73	2.09	1.68	92.9	0.0290	0
2023	BOL-B2	Reference	Jun 21	-	9,457	0	0.933	5.94	6.07	0.721	86.2	0.0849	0
			Jul 27	1	13,397	10,717	0.564	2.61	0.333	2.33	93.9	0.128	0.102
			Jul 27	2	13,979	3,495	0.545	2.54	1.24	4.40	91.1	0.145	0.0363
			Jul 27	3	11,908	2,977	0.676	1.14	0.910	2.99	94.2	0.104	0.0260
			Jul 27	4	10,484	13,979	0.649	1.49	0.961	2.26	94.5	0.0721	0.0961
			Jul 27	5	14,885	2,977	0.421	1.60	2.30	3.09	92.4	0.140	0.0281
			Aug 28	-	8,931	0	0.239	0.610	1.14	2.60	95.3	0.0796	0
	POL-P2	Exposed	Jun 20	-	0	0	12.5	20.3	21.0	15.4	30.8	0	0
			Jul 27	1	18,913	0	0.466	0.553	1.64	0.604	96.7	0.0691	0
			Jul 27	2	0	0	0.246	2.31	8.31	1.43	87.7	0	0
			Jul 27	3	10,717	0	0.784	0.379	4.16	0.838	93.8	0.0541	0
			Jul 27	4	5,359	0	0.538	0.602	4.50	0.665	93.7	0.0317	0
			Jul 27	5	24,732	0	0.0920	0.598	4.58	0.414	94.2	0.0920	0
			Aug 28	-	40,190	0	0.619	0.524	15.5	1.05	82.1	0.190	0

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.2: Summary Statistics for Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (cells/L)	2019	BOL-B2	Reference	5	16,920,021	2,733,715	13,739,324	16,818,503	20,677,883
		POL-P2	Exposed	5	19,050,107	4,954,229	12,479,073	19,520,978	25,314,116
	2020	BOL-B2	Reference	5	15,769,285	704,558	14,903,672	15,745,121	16,813,067
		POL-P2	Exposed	5	8,310,083	2,113,646	5,379,539	8,306,655	11,202,774
	2021	BOL-B2	Reference	5	3,737,530	1,108,008	2,668,930	3,461,184	5,506,064
		POL-P2	Exposed	5	6,188,644	1,040,862	4,784,649	5,961,554	7,608,014
	2022	BOL-B2	Reference	5	2,856,805	1,034,200	1,921,549	2,531,093	4,093,135
		POL-P2	Exposed	5	4,657,243	1,250,831	3,531,383	4,035,101	6,608,867
	2023	BOL-B2	Reference	5	11,334,064	1,909,187	9,615,605	10,606,587	14,545,958
		POL-P2	Exposed	5	20,717,024	6,404,296	12,573,396	19,813,853	27,379,063
Richness (# of Taxa)	2019	BOL-B2	Reference	5	20.2	3.27	17.0	20.0	24.0
		POL-P2	Exposed	5	15.4	1.82	13.0	16.0	17.0
	2020	BOL-B2	Reference	5	20.0	3.24	16.0	20.0	25.0
		POL-P2	Exposed	5	17.8	1.92	16.0	17.0	21.0
	2021	BOL-B2	Reference	5	20.4	2.07	19.0	20.0	24.0
		POL-P2	Exposed	5	14.6	2.61	13.0	13.0	19.0
	2022	BOL-B2	Reference	5	28.8	1.64	26.0	29.0	30.0
		POL-P2	Exposed	5	17.8	2.59	15.0	17.0	21.0
	2023	BOL-B2	Reference	5	29.0	1.22	27.0	29.0	30.0
		POL-P2	Exposed	5	20.4	2.07	18.0	20.0	23.0
Simpson's Diversity	2019	BOL-B2	Reference	5	0.168	0.0686	0.118	0.135	0.286
		POL-P2	Exposed	5	0.196	0.0595	0.143	0.181	0.284
	2020	BOL-B2	Reference	5	0.166	0.0453	0.120	0.160	0.230
		POL-P2	Exposed	5	0.321	0.134	0.181	0.332	0.496
	2021	BOL-B2	Reference	5	0.254	0.0442	0.191	0.256	0.315
		POL-P2	Exposed	5	0.190	0.0333	0.134	0.198	0.218
	2022	BOL-B2	Reference	5	0.660	0.0813	0.552	0.684	0.734
		POL-P2	Exposed	5	0.804	0.0448	0.744	0.800	0.861
	2023	BOL-B2	Reference	5	0.599	0.109	0.479	0.548	0.745
		POL-P2	Exposed	5	0.580	0.103	0.449	0.592	0.729
Simpson's Evenness	2019	BOL-B2	Reference	5	0.0607	0.00749	0.0504	0.0609	0.0680
		POL-P2	Exposed	5	0.0819	0.00985	0.0686	0.0836	0.0939
	2020	BOL-B2	Reference	5	0.0615	0.0110	0.0455	0.0618	0.0744
		POL-P2	Exposed	5	0.0859	0.0186	0.0678	0.0792	0.117
	2021	BOL-B2	Reference	5	0.0664	0.00743	0.0560	0.0662	0.0768
		POL-P2	Exposed	5	0.0869	0.0155	0.0608	0.0948	0.0984
	2022	BOL-B2	Reference	5	0.108	0.0287	0.0744	0.106	0.142
		POL-P2	Exposed	5	0.298	0.0420	0.230	0.309	0.343
	2023	BOL-B2	Reference	5	0.0932	0.0333	0.0639	0.0763	0.145
		POL-P2	Exposed	5	0.126	0.0473	0.0826	0.107	0.205
Chlorophyll-a (µg/L)	2019	BOL-B2	Reference	5	2.76	0.248	2.49	2.71	3.10
		POL-P2	Exposed	5	2.46	0.227	2.18	2.58	2.69
	2020	BOL-B2	Reference	5	2.05	0.441	1.39	2.10	2.59
		POL-P2	Exposed	5	1.76	0.186	1.57	1.75	2.04
	2021	BOL-B2	Reference	5	1.68	0.180	1.50	1.65	1.96
		POL-P2	Exposed	5	1.23	0.204	0.947	1.30	1.42
	2022	BOL-B2	Reference	5	2.08	0.257	1.82	2.07	2.50
		POL-P2	Exposed	5	2.82	0.547	2.46	2.57	3.78
	2023	BOL-B2	Reference	5	2.66	0.240	2.52	2.54	3.08
		POL-P2	Exposed	5	3.76	0.247	3.47	3.79	4.08
Diatoms (cells/L)	2019	BOL-B2	Reference	5	31,655	22,813	10,717	20,095	63,156
		POL-P2	Exposed	5	65,682	29,426	40,190	63,156	114,829
	2020	BOL-B2	Reference	5	9,196	14,093	0	4,728	34,162
		POL-P2	Exposed	5	13,557	11,019	5,359	9,275	32,748
	2021	BOL-B2	Reference	5	16,940	12,845	4,466	13,397	38,583
		POL-P2	Exposed	5	8,403	10,784	0	2,364	26,124
	2022	BOL-B2	Reference	5	56,585	21,810	19,716	68,409	71,449
		POL-P2	Exposed	5	154,413	80,005	43,282	144,685	257,218
	2023	BOL-B2	Reference	5	65,557	20,143	44,656	58,946	94,360
		POL-P2	Exposed	5	85,962	57,807	24,732	91,098	155,402
Chlorophyte (cells/L)	2019	BOL-B2	Reference	5	339,550	229,468	116,552	337,598	688,976
		POL-P2	Exposed	5	275,590	122,268	172,244	235,400	482,283
	2020	BOL-B2	Reference	5	104,105	40,927	62,295	99,294	156,033
		POL-P2	Exposed	5	291,113	92,165	222,386	228,775	420,452
	2021	BOL-B2	Reference	5	46,086	13,037	28,011	53,051	56,564
		POL-P2	Exposed	5	127,624	29,890	93,777	122,935	170,218
	2022	BOL-B2	Reference	5	112,150	46,315	64,304	125,036	172,733
		POL-P2	Exposed	5	454,253	113,305	348,315	439,413	636,861
	2023	BOL-B2	Reference	5	207,058	57,171	130,990	216,678	273,294
		POL-P2	Exposed	5	155,902	83,152	75,022	151,304	290,606
Chrysophyte (cells/L)	2019	BOL-B2	Reference	5	602,471	254,857	324,201	534,530	1,016,239
		POL-P2	Exposed	5	973,293	148,109	795,767	970,307	1,194,225
	2020	BOL-B2	Reference	5	58,857	26,125	40,190	43,685	101,658
		POL-P2	Exposed	5	438,225	121,526	332,239	404,994	622,949
	2021	BOL-B2	Reference	5	33,398	10,759	20,899	32,152	50,610
		POL-P2	Exposed	5	228,530	79,856	172,818	196,223	368,805
	2022	BOL-B2	Reference	5	179,819	46,661	107,680	198,386	225,065
		POL-P2	Exposed	5	862,998	181,026	707,348	803,805	1,174,792
	2023	BOL-B2	Reference	5	128,353	75,751	34,832	118,823	244,119
		POL-P2	Exposed	5	862,149	296,310	449,185	825,240	1,230,440
Cryptomonad (cells/L)	2019	BOL-B2	Reference	5	179,593	62,613	88,419	188,894	257,218
		POL-P2	Exposed	5	122,982	21,120	92,438	126,312	149,278
	2020	BOL-B2	Reference	5	222,991	32,395	174,740	226,957	257,690
		POL-P2	Exposed	5	270,468	38,539	214,348	287,515	305,446
	2021	BOL-B2	Reference	5	282,726	57,624	213,130	323,130	326,345
		POL-P2	Exposed	5	250,404	72,201	176,837	249,180	338,071
	2022	BOL-B2	Reference	5	144,561	12,731	123,136	151,661	153,616
		POL-P2	Exposed	5	231,661	47,256	166,944	246,500	289,370
	2023	BOL-B2	Reference	5	333,008	63,577	243,821	328,512	422,871
		POL-P2	Exposed	5	146,950	32,458	111,296	165,489	179,310
Cyanobacteria (cells/L)	2019	BOL-B2	Reference	5	15,765,604	2,991,785	11,758,519	15,974,508	19,636,956
		POL-P2	Exposed	5	17,609,458	4,937,955	11,241,213	17,677,968	23,999,321
	2020	BOL-B2	Reference	5	15,373,734	769,046	14,463,944	15,350,311	16,526,493
		POL-P2	Exposed	5	7,293,609	2,142,697	4,483,446	7,008,510	10,269,124
	2021	BOL-B2	Reference	5	3,353,852	1,170,714	2,228,326	3,019,092	5,200,375
		POL-P2	Exposed	5	5,573,684	1,049,356	4,219,976	5,360,933	7,081,522
	2022	BOL-B2	Reference	5	2,361,274	1,034,754	1,385,720	2,014,871	3,527,051
		POL-P2	Exposed	5	2,952,846	1,117,738	1,902,338	2,347,111	4,586,988
	2023	BOL-B2	Reference	5	10,580,328	1,905,944	8,759,378	9,822,091	13,742,153
		POL-P2	Exposed	5	19,454,117	6,491,976	11,027,617	18,581,352	26,466,508

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2023, see Appendix Table C.3.1.

Table C.3.2: Summary Statistics for Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Dinoflagellates (cells/L)	2019	BOL-B2	Reference	5	1,148	2,568	0	0	5,741
		POL-P2	Exposed	5	1,952	2,742	0	0	5,741
	2020	BOL-B2	Reference	5	402	899	0	0	2,010
		POL-P2	Exposed	5	3,112	1,972	0	3,092	5,359
	2021	BOL-B2	Reference	5	2,213	1,545	0	2,977	3,654
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	2,416	2,044	0	1,786	5,359
		POL-P2	Exposed	5	1,072	2,396	0	0	5,359
	2023	BOL-B2	Reference	5	12,931	1,744	10,484	13,397	14,885
		POL-P2	Exposed	5	11,944	9,996	0	10,717	24,732
Euglenophytes (cells/L)	2019	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	1,148	2,568	0	0	5,741
	2020	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0
	2021	BOL-B2	Reference	5	2,315	2,745	0	1,489	6,430
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0
	2023	BOL-B2	Reference	5	6,829	5,173	2,977	3,495	13,979
		POL-P2	Exposed	5	0	0	0	0	0
Diatoms (%)	2019	BOL-B2	Reference	5	0.201	0.169	0.0714	0.110	0.460
		POL-P2	Exposed	5	0.356	0.141	0.185	0.390	0.515
	2020	BOL-B2	Reference	5	0.0583	0.0881	0	0.0306	0.214
		POL-P2	Exposed	5	0.202	0.231	0.0595	0.0968	0.609
	2021	BOL-B2	Reference	5	0.472	0.384	0.167	0.303	1.11
		POL-P2	Exposed	5	0.121	0.144	0	0.0399	0.343
	2022	BOL-B2	Reference	5	2.28	1.21	0.518	2.78	3.63
		POL-P2	Exposed	5	3.73	2.23	0.655	4.10	6.37
	2023	BOL-B2	Reference	5	0.571	0.100	0.421	0.564	0.676
		POL-P2	Exposed	5	0.425	0.268	0.0920	0.466	0.784
Chlorophytes (%)	2019	BOL-B2	Reference	5	2.19	1.78	0.693	1.84	5.01
		POL-P2	Exposed	5	1.56	0.786	0.680	1.45	2.47
	2020	BOL-B2	Reference	5	0.668	0.283	0.391	0.631	1.01
		POL-P2	Exposed	5	3.70	1.42	2.04	4.21	5.49
	2021	BOL-B2	Reference	5	1.38	0.656	0.509	1.63	2.12
		POL-P2	Exposed	5	2.12	0.655	1.43	2.08	2.98
	2022	BOL-B2	Reference	5	4.04	1.49	2.54	3.47	6.48
		POL-P2	Exposed	5	10.0	2.31	6.73	9.64	12.4
	2023	BOL-B2	Reference	5	1.88	0.662	1.14	1.60	2.61
		POL-P2	Exposed	5	0.888	0.801	0.379	0.598	2.31
Chrysophytes (%)	2019	BOL-B2	Reference	5	3.71	2.09	2.16	2.97	7.40
		POL-P2	Exposed	5	5.35	1.28	3.54	6.12	6.38
	2020	BOL-B2	Reference	5	0.375	0.172	0.252	0.286	0.659
		POL-P2	Exposed	5	5.51	1.76	3.62	6.31	7.50
	2021	BOL-B2	Reference	5	0.983	0.544	0.597	0.759	1.90
		POL-P2	Exposed	5	3.76	1.41	2.83	3.18	6.23
	2022	BOL-B2	Reference	5	7.13	3.22	2.83	8.37	10.7
		POL-P2	Exposed	5	18.9	3.20	15.2	18.0	23.8
	2023	BOL-B2	Reference	5	1.15	0.724	0.333	0.961	2.30
		POL-P2	Exposed	5	4.64	2.38	1.64	4.50	8.31
Cryptomonads (%)	2019	BOL-B2	Reference	5	1.06	0.343	0.589	1.03	1.50
		POL-P2	Exposed	5	0.671	0.165	0.499	0.607	0.922
	2020	BOL-B2	Reference	5	1.42	0.254	1.04	1.44	1.73
		POL-P2	Exposed	5	3.48	1.26	2.38	3.23	5.53
	2021	BOL-B2	Reference	5	8.33	3.47	4.11	9.43	12.2
		POL-P2	Exposed	5	4.16	1.36	2.32	5.07	5.21
	2022	BOL-B2	Reference	5	5.67	2.12	3.01	6.07	7.87
		POL-P2	Exposed	5	5.28	1.57	2.53	5.77	6.27
	2023	BOL-B2	Reference	5	3.01	0.860	2.26	2.99	4.40
		POL-P2	Exposed	5	0.790	0.387	0.414	0.665	1.43
Cyanobacteria (%)	2019	BOL-B2	Reference	5	92.8	4.07	85.6	94.5	95.0
		POL-P2	Exposed	5	92.0	2.11	90.1	91.0	94.8
	2020	BOL-B2	Reference	5	97.5	0.538	96.9	97.5	98.3
		POL-P2	Exposed	5	87.1	4.07	83.3	84.7	91.7
	2021	BOL-B2	Reference	5	88.7	4.65	83.5	87.2	94.5
		POL-P2	Exposed	5	89.8	1.93	88.2	89.4	93.1
	2022	BOL-B2	Reference	5	80.8	6.99	71.8	79.6	89.2
		POL-P2	Exposed	5	62.0	7.22	53.9	58.7	69.9
	2023	BOL-B2	Reference	5	93.2	1.42	91.1	93.9	94.5
		POL-P2	Exposed	5	93.2	3.31	87.7	93.8	96.7
Dinoflagellates (%)	2019	BOL-B2	Reference	5	0.00836	0.0187	0	0	0.0418
		POL-P2	Exposed	5	0.0110	0.0154	0	0	0.0322
	2020	BOL-B2	Reference	5	0.00252	0.00563	0	0	0.0126
		POL-P2	Exposed	5	0.0352	0.0228	0	0.0404	0.0595
	2021	BOL-B2	Reference	5	0.0661	0.0514	0	0.0910	0.112
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	0.102	0.104	0	0.0789	0.278
		POL-P2	Exposed	5	0.0207	0.0463	0	0	0.103
	2023	BOL-B2	Reference	5	0.118	0.0302	0.0721	0.128	0.145
		POL-P2	Exposed	5	0.0494	0.0353	0	0.0541	0.0920
Euglenophytes (%)	2019	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0.00588	0.0132	0	0	0.0294
	2020	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0
	2021	BOL-B2	Reference	5	0.0668	0.0866	0	0.0558	0.212
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0
	2023	BOL-B2	Reference	5	0.0578	0.0381	0.0260	0.0363	0.102
		POL-P2	Exposed	5	0	0	0	0	0

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2023, see Appendix Table C.3.1.

Table C.3.3: Zooplankton Community Metrics from Polley Lake (POL-P2) and Reference (Bootjack Lake; BOL-B2), 2019 to 2023

Year	Area	Type	Date	Replicate	Density (organisms/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Wet Weight Biomass (mg/L)	Dry Weight Biomass (mg/L)	Calanoida (organisms/L)	Cladocera (organisms/L)
2019	BOL-B2	Reference	Jun 25	-	36.1	11.0	0.351	0.140	0.161	0.0319	2.32	1.05
			Jul 31	1	6.31	10.0	0.653	0.288	0.0162	0.00311	0.101	0.204
			Jul 31	2	3.13	8.00	0.756	0.511	0.0196	0.00387	0.0725	0.367
			Jul 31	3	4.33	7.00	0.719	0.508	0.0342	0.00675	0.242	0.395
			Jul 31	4	4.88	9.00	0.725	0.404	0.0308	0.00608	0.186	0.296
			Jul 31	5	6.42	8.00	0.732	0.467	0.0377	0.00737	0.134	0.561
			Sep 4	-	1.92	10.0	0.841	0.629	0.0169	0.00334	0.0216	0.296
	POL-P2	Exposed	Jun 24	-	20.9	8.00	0.689	0.402	0.204	0.0408	0.0262	2.04
			Jul 29	1	17.4	8.00	0.473	0.237	0.122	0.0243	0.210	0.252
			Jul 29	2	18.2	10.0	0.599	0.250	0.163	0.0325	0.183	0.262
			Jul 29	3	5.99	10.0	0.694	0.327	0.0581	0.0116	0.0905	0.249
			Jul 29	4	4.67	8.00	0.711	0.433	0.0445	0.00889	0.118	0.219
			Jul 29	5	5.57	10.0	0.705	0.339	0.0544	0.0109	0.125	0.125
			Aug 28	-	38.4	7.00	0.646	0.404	0.375	0.0749	0.588	0.849
2020	BOL-B2	Reference	Jun 22	-	68.8	12.0	0.759	0.346	0.292	0.0575	1.02	4.70
			Jul 29	1	22.8	12.0	0.762	0.351	0.0729	0.0142	0.523	1.27
			Jul 29	2	27.6	12.0	0.724	0.302	0.0992	0.0193	0.364	0.909
			Jul 29	3	24.5	10.0	0.777	0.449	0.0979	0.0191	0.444	1.25
			Jul 29	4	36.7	10.0	0.729	0.369	0.0901	0.0172	0.525	0.891
			Jul 29	5	24.5	12.0	0.798	0.412	0.0598	0.0116	0.327	1.07
			Aug 30	-	7.32	7.00	0.701	0.478	0.0934	0.0185	0.296	1.86
	POL-P2	Exposed	Jun 22	-	44.2	11.0	0.623	0.241	0.0941	0.0187	0.113	1.58
			Jul 27	1	30.5	8.00	0.566	0.288	0.125	0.0249	0.340	0.905
			Jul 27	2	20.1	10.0	0.547	0.221	0.0849	0.0170	0.186	0.584
			Jul 27	3	26.3	7.00	0.495	0.283	0.118	0.0236	0.218	0.618
			Jul 27	4	33.2	8.00	0.494	0.247	0.118	0.0235	0.728	1.27
			Jul 27	5	35.1	12.0	0.513	0.171	0.127	0.0253	0.340	1.40
			Aug 30	-	13.1	8.00	0.587	0.302	0.0525	0.0105	0.196	0.712
2021	BOL-B2	Reference	Jun 22	-	70.3	10.0	0.553	0.224	0.106	0.0202	0.764	0.873
			Jul 27	1	14.8	9.00	0.694	0.363	0.0327	0.00624	0.400	0.280
			Jul 27	2	8.11	10.0	0.689	0.322	0.0236	0.00446	0.373	0.286
			Jul 27	3	18.4	11.0	0.671	0.276	0.0339	0.00626	0.301	0.443
			Jul 27	4	30.6	9.00	0.689	0.358	0.0543	0.00974	0.819	0.568
			Jul 27	5	21.7	10.0	0.643	0.280	0.0263	0.00487	0.190	0.475
			Aug 30	-	12.2	10.0	0.782	0.459	0.0174	0.00275	0.153	0.382
	POL-P2	Exposed	Jun 22	-	35.8	11.0	0.734	0.342	0.119	0.0235	0.431	1.38
			Jul 26	1	19.1	9.00	0.481	0.214	0.0362	0.00720	0.380	1.26
			Jul 26	2	8.13	10.0	0.668	0.301	0.0354	0.00706	0.0784	0.556
			Jul 26	3	9.70	10.0	0.607	0.255	0.0332	0.00663	0.0646	0.736
			Jul 26	4	13.6	10.0	0.686	0.318	0.0480	0.00956	0.373	1.31
			Jul 26	5	8.98	10.0	0.687	0.319	0.0384	0.00766	0.216	0.597
			Aug 30	-	9.94	10.0	0.645	0.282	0.0601	0.0120	0.154	0.308

Notes: "-" = only one sample (replicate) collected. organisms/L = organisms per litre. mg/L = milligrams per litre. Results displayed for POL-P2 (August 2019) in the table above differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepancy is due to an incorrect calculation for these results in the prior reporting years. Zooplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.3: Zooplankton Community Metrics from Polley Lake (POL-P2) and Reference (Bootjack Lake; BOL-B2), 2019 to 2023

Year	Area	Type	Date	Replicate	Density (organisms/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Wet Weight Biomass (mg/L)	Dry Weight Biomass (mg/L)	Calanoida (organisms/L)	Cladocera (organisms/L)
2022	BOL-B2	Reference	Jun 21	-	40.6	10.0	0.539	0.217	0.175	0.0347	0.475	2.04
			Jul 26	1	19.6	11.0	0.576	0.215	0.101	0.0198	0.129	0.272
			Jul 26	2	33.8	12.0	0.601	0.209	0.158	0.0308	0.309	0.509
			Jul 26	3	37.0	9.00	0.395	0.184	0.0849	0.0160	0.509	0.365
			Jul 26	4	27.8	10.0	0.566	0.230	0.0774	0.0149	0.306	0.418
			Jul 26	5	33.2	10.0	0.513	0.205	0.107	0.0204	0.357	0.959
			Aug 28	-	8.61	12.0	0.794	0.405	0.0611	0.0120	0.314	0.704
	POL-P2	Exposed	Jun 21	-	13.8	9.00	0.591	0.272	0.129	0.0258	0.0646	0.366
			Jul 25	1	20.4	10.0	0.732	0.372	0.161	0.0321	0.496	1.49
			Jul 25	2	22.1	11.0	0.547	0.201	0.0705	0.0140	0.354	0.639
			Jul 25	3	32.9	10.0	0.450	0.182	0.0939	0.0186	0.375	0.732
			Jul 25	4	23.0	11.0	0.609	0.233	0.0955	0.0189	0.586	0.860
			Jul 25	5	29.6	12.0	0.623	0.221	0.109	0.0215	0.699	1.14
			Aug 25	-	4.52	9.00	0.695	0.365	0.0810	0.0161	0.167	0.402
2023	BOL-B2	Reference	Jun 21	-	101	10.0	0.642	0.279	0.388	0.0770	1.82	2.35
			Jul 27	1	29.5	11.0	0.629	0.245	0.0430	0.00834	0.122	0.217
			Jul 27	2	29.0	10.0	0.659	0.294	0.0474	0.00923	0.119	0.503
			Jul 27	3	30.8	11.0	0.767	0.391	0.0983	0.0193	0.282	2.10
			Jul 27	4	44.9	9.00	0.696	0.366	0.0729	0.0142	0.255	1.02
			Jul 27	5	30.0	11.0	0.645	0.256	0.0379	0.00726	0.0842	0.236
			Aug 28	-	15.5	11.0	0.811	0.480	0.0415	0.00791	0.0416	0.374
	POL-P2	Exposed	Jun 20	-	32.4	12.0	0.721	0.299	0.0542	0.0106	0.118	2.38
			Jul 27	1	8.81	13.0	0.749	0.307	0.0259	0.00511	0.170	0.165
			Jul 27	2	13.3	13.0	0.747	0.304	0.0343	0.00674	0.220	0.167
			Jul 27	3	10.8	14.0	0.774	0.316	0.0339	0.00670	0.144	0.153
			Jul 27	4	21.1	12.0	0.695	0.273	0.0450	0.00884	0.198	0.248
			Jul 27	5	8.33	12.0	0.763	0.351	0.0395	0.00783	0.120	0.184
			Aug 28	-	7.82	12.0	0.810	0.438	0.0312	0.00611	0.176	0.426

Notes: "-" = only one sample (replicate) collected. organisms/L = organisms per litre. mg/L = milligrams per litre. Results displayed for POL-P2 (August 2019) in the table above differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepancy is due to an incorrect calculation for these results in the prior reporting years. Zooplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.3: Zooplankton Community Metrics from Polley Lake (POL-P2) and Reference (Bootjack Lake; BOL-B2), 2019 to 2023

Year	Area	Type	Date	Replicate	Copepod Nauplii (organisms/L)	Cyclopoida (organisms/L)	Rotifera (organisms/L)	Calanoida (%)	Cladocera (%)	Copepod Nauplii (%)	Cyclopoida (%)	Rotifera (%)
2019	BOL-B2	Reference	Jun 25	1	0.202	2.22	30.3	6.44	2.91	0.560	6.16	83.9
			Jul 31	1	0.896	0.437	4.67	1.60	3.24	14.2	6.93	74.0
			Jul 31	2	0.472	0.403	1.81	2.32	11.7	15.1	12.9	58.0
			Jul 31	3	0.157	0.784	2.75	5.58	9.12	3.63	18.1	63.5
			Jul 31	4	0.514	0.797	3.09	3.82	6.06	10.5	16.3	63.2
			Jul 31	5	0.326	1.00	4.39	2.09	8.74	5.09	15.7	68.4
			Sep 04	1	0.346	0.310	0.943	1.12	15.5	18.0	16.2	49.2
	POL-P2	Exposed	Jun 24	1	9.33	5.79	3.67	0.126	9.80	44.7	27.8	17.6
			Jul 29	1	12.3	4.07	0.629	1.20	1.44	70.4	23.4	3.61
			Jul 29	2	10.1	5.87	1.78	1.01	1.44	55.4	32.3	9.81
			Jul 29	3	2.52	1.95	1.19	1.51	4.15	42.0	32.5	19.8
			Jul 29	4	2.06	1.32	0.943	2.53	4.69	44.2	28.3	20.2
			Jul 29	5	2.16	1.85	1.31	2.25	2.25	38.7	33.2	23.6
			Aug 28	1	21.0	12.5	3.53	1.53	2.21	54.6	32.5	9.18
2020	BOL-B2	Reference	Jun 22	-	17.0	9.39	36.7	1.48	6.83	24.7	13.7	53.3
			Jul 29	1	2.73	3.02	15.3	2.29	5.58	11.9	13.2	66.9
			Jul 29	2	3.82	3.25	19.3	1.32	3.29	13.8	11.8	69.8
			Jul 29	3	4.88	2.24	15.7	1.81	5.11	19.9	9.13	64.0
			Jul 29	4	13.5	2.21	19.6	1.43	2.43	36.7	6.02	53.4
			Jul 29	5	6.00	2.76	14.4	1.33	4.37	24.5	11.3	58.6
			Aug 30	-	0.382	0.439	4.34	4.04	25.4	5.22	6.00	59.3
	POL-P2	Exposed	Jun 22	-	25.8	5.53	11.1	0.256	3.59	58.5	12.5	25.2
			Jul 27	1	19.1	6.60	3.58	1.11	2.97	62.5	21.7	11.8
			Jul 27	2	12.7	4.75	1.80	0.926	2.91	63.5	23.7	8.99
			Jul 27	3	17.6	6.58	1.27	0.829	2.35	67.0	25.0	4.83
			Jul 27	4	23.0	5.28	2.88	2.19	3.81	69.4	15.9	8.67
			Jul 27	5	23.6	6.79	2.97	0.969	4.00	67.2	19.4	8.47
			Aug 30	-	8.19	3.08	0.890	1.50	5.45	62.7	23.6	6.81
2021	BOL-B2	Reference	Jun 22	-	12.7	6.44	49.5	1.09	1.24	18.1	9.16	70.4
			Jul 27	1	2.60	1.44	10.1	2.70	1.89	17.5	9.72	68.2
			Jul 27	2	0.407	0.862	6.18	4.61	3.52	5.02	10.6	76.2
			Jul 27	3	1.86	1.76	14.0	1.64	2.41	10.1	9.60	76.2
			Jul 27	4	4.56	1.47	23.2	2.68	1.86	14.9	4.79	75.8
			Jul 27	5	4.14	1.33	15.5	0.877	2.19	19.1	6.14	71.7
			Aug 30	-	1.42	0.628	9.60	1.25	3.13	11.6	5.15	78.8
	POL-P2	Exposed	Jun 22	-	11.0	9.09	13.9	1.20	3.85	30.7	25.4	38.9
			Jul 26	1	13.9	1.48	2.04	1.99	6.61	73.0	7.74	10.7
			Jul 26	2	3.81	2.75	0.927	0.965	6.84	46.9	33.9	11.4
			Jul 26	3	5.54	2.51	0.853	0.666	7.59	57.1	25.8	8.79
			Jul 26	4	6.71	2.92	2.29	2.75	9.62	49.3	21.5	16.9
			Jul 26	5	4.10	2.65	1.41	2.40	6.65	45.7	29.6	15.7
			Aug 30	-	3.17	5.02	1.29	1.55	3.10	31.9	50.5	13.0

Notes: "-" = only one sample (replicate) collected. organisms/L = organisms per litre. mg/L = milligrams per litre. Results displayed for POL-P2 (August 2019) in the table above differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepancy is due to an incorrect calculation for these results in the prior reporting years. Zooplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.3: Zooplankton Community Metrics from Polley Lake (POL-P2) and Reference (Bootjack Lake; BOL-B2), 2019 to 2023

Year	Area	Type	Date	Replicate	Copepod Nauplii (organisms/L)	Cyclopoida (organisms/L)	Rotifera (organisms/L)	Calanoida (%)	Cladocera (%)	Copepod Nauplii (%)	Cyclopoida (%)	Rotifera (%)
2022	BOL-B2	Reference	Jun 21	-	5.98	4.38	27.8	1.17	5.01	14.7	10.8	68.3
			Jul 26	1	2.64	2.86	13.8	0.656	1.38	13.4	14.6	70.0
			Jul 26	2	5.18	4.24	23.6	0.915	1.51	15.3	12.5	69.7
			Jul 26	3	3.01	1.88	31.2	1.38	0.989	8.15	5.09	84.4
			Jul 26	4	5.81	1.58	19.7	1.10	1.50	20.9	5.69	70.8
			Jul 26	5	3.82	1.88	26.1	1.07	2.89	11.5	5.68	78.8
			Aug 28	-	1.30	0.858	5.44	3.64	8.18	15.1	9.96	63.2
	POL-P2	Exposed	Jun 21	-	0.776	4.74	7.89	0.467	2.65	5.61	34.3	57.0
			Jul 25	1	7.66	3.24	7.52	2.43	7.29	37.5	15.9	36.9
			Jul 25	2	14.3	1.03	5.78	1.60	2.89	64.7	4.65	26.2
			Jul 25	3	23.8	1.51	6.45	1.14	2.23	72.4	4.59	19.6
			Jul 25	4	13.3	1.46	6.83	2.55	3.74	57.7	6.34	29.7
			Jul 25	5	16.8	1.23	9.71	2.36	3.86	56.8	4.17	32.9
			Aug 25	-	1.45	1.95	0.548	3.69	8.89	32.1	43.2	12.2
2023	BOL-B2	Reference	Jun 21	-	23.4	16.0	57.6	1.80	2.32	23.2	15.8	56.9
			Jul 27	1	9.68	1.66	17.8	0.414	0.737	32.8	5.62	60.4
			Jul 27	2	8.33	2.10	18.0	0.410	1.73	28.7	7.25	61.9
			Jul 27	3	5.91	4.39	18.1	0.916	6.82	19.2	14.2	58.9
			Jul 27	4	17.3	2.89	23.4	0.567	2.27	38.6	6.43	52.2
			Jul 27	5	7.22	1.54	20.9	0.281	0.785	24.1	5.13	69.7
			Aug 28	-	2.62	1.84	10.6	0.268	2.41	16.9	11.9	68.5
	POL-P2	Exposed	Jun 20	-	5.85	2.69	21.3	0.364	7.36	18.1	8.31	65.9
			Jul 27	1	3.47	0.952	4.05	1.93	1.87	39.4	10.8	46.0
			Jul 27	2	4.88	1.25	6.79	1.65	1.25	36.7	9.40	51.0
			Jul 27	3	4.33	1.39	4.79	1.34	1.41	40.1	12.9	44.3
			Jul 27	4	9.34	1.71	9.62	0.938	1.17	44.2	8.11	45.6
			Jul 27	5	2.46	1.71	3.87	1.44	2.21	29.5	20.5	46.4
			Aug 28	-	1.70	1.28	4.23	2.26	5.45	21.8	16.4	54.1

Notes: "-" = only one sample (replicate) collected. organisms/L = organisms per litre. mg/L = milligrams per litre. Results displayed for POL-P2 (August 2019) in the table above differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepancy is due to an incorrect calculation for these results in the prior reporting years. Zooplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.4: Summary Statistics for Zooplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (organisms/L)	2019	BOL-B2	Reference	5	5.01	1.39	3.13	4.88	6.42
		POL-P2	Exposed	5	10.4	6.80	4.67	5.99	18.2
	2020	BOL-B2	Reference	5	27.2	5.58	22.8	24.5	36.7
		POL-P2	Exposed	5	29.0	5.99	20.1	30.5	35.1
	2021	BOL-B2	Reference	5	18.7	8.33	8.11	18.4	30.6
		POL-P2	Exposed	5	11.9	4.54	8.13	9.70	19.1
	2022	BOL-B2	Reference	5	30.3	6.79	19.6	33.2	37.0
		POL-P2	Exposed	5	25.6	5.36	20.4	23.0	32.9
	2023	BOL-B2	Reference	5	32.9	6.77	29.0	30.0	44.9
		POL-P2	Exposed	5	12.5	5.21	8.33	10.8	21.1
Richness (# of Taxa)	2019	BOL-B2	Reference	5	8.40	1.14	7.00	8.00	10.0
		POL-P2	Exposed	5	9.20	1.10	8.00	10.0	10.0
	2020	BOL-B2	Reference	5	11.2	1.10	10.0	12.0	12.0
		POL-P2	Exposed	5	9.00	2.00	7.00	8.00	12.0
	2021	BOL-B2	Reference	5	9.80	0.837	9.00	10.0	11.0
		POL-P2	Exposed	5	9.80	0.447	9.00	10.0	10.0
	2022	BOL-B2	Reference	5	10.4	1.14	9.00	10.0	12.0
		POL-P2	Exposed	5	10.8	0.837	10.0	11.0	12.0
	2023	BOL-B2	Reference	5	10.4	0.894	9.00	11.0	11.0
		POL-P2	Exposed	5	12.8	0.837	12.0	13.0	14.0
Simpson's Diversity	2019	BOL-B2	Reference	5	0.717	0.0385	0.653	0.725	0.756
		POL-P2	Exposed	5	0.637	0.102	0.473	0.694	0.711
	2020	BOL-B2	Reference	5	0.758	0.0314	0.724	0.762	0.798
		POL-P2	Exposed	5	0.523	0.0321	0.494	0.513	0.566
	2021	BOL-B2	Reference	5	0.677	0.0210	0.643	0.689	0.694
		POL-P2	Exposed	5	0.626	0.0872	0.481	0.668	0.687
	2022	BOL-B2	Reference	5	0.530	0.0821	0.395	0.566	0.601
		POL-P2	Exposed	5	0.592	0.103	0.450	0.609	0.732
	2023	BOL-B2	Reference	5	0.679	0.0551	0.629	0.659	0.767
		POL-P2	Exposed	5	0.746	0.0302	0.695	0.749	0.774
Simpson's Evenness	2019	BOL-B2	Reference	5	0.436	0.0932	0.288	0.467	0.511
		POL-P2	Exposed	5	0.317	0.0789	0.237	0.327	0.433
	2020	BOL-B2	Reference	5	0.377	0.0565	0.302	0.369	0.449
		POL-P2	Exposed	5	0.242	0.0482	0.171	0.247	0.288
	2021	BOL-B2	Reference	5	0.320	0.0411	0.276	0.322	0.363
		POL-P2	Exposed	5	0.282	0.0460	0.214	0.301	0.319
	2022	BOL-B2	Reference	5	0.208	0.0169	0.184	0.209	0.230
		POL-P2	Exposed	5	0.242	0.0756	0.182	0.221	0.372
	2023	BOL-B2	Reference	5	0.310	0.0654	0.245	0.294	0.391
		POL-P2	Exposed	5	0.310	0.0279	0.273	0.307	0.351
Wet Weight Biomass (mg/L)	2019	BOL-B2	Reference	5	0.0277	0.00936	0.0162	0.0308	0.0377
		POL-P2	Exposed	5	0.0883	0.0515	0.0445	0.0581	0.163
	2020	BOL-B2	Reference	5	0.0840	0.0171	0.0598	0.0901	0.0992
		POL-P2	Exposed	5	0.114	0.0170	0.0849	0.118	0.127
	2021	BOL-B2	Reference	5	0.0342	0.0120	0.0236	0.0327	0.0543
		POL-P2	Exposed	5	0.0383	0.00576	0.0332	0.0362	0.0480
	2022	BOL-B2	Reference	5	0.106	0.0315	0.0774	0.101	0.158
		POL-P2	Exposed	5	0.106	0.0338	0.0705	0.0955	0.161
	2023	BOL-B2	Reference	5	0.0599	0.0253	0.0379	0.0474	0.0983
		POL-P2	Exposed	5	0.0357	0.00709	0.0259	0.0343	0.0450
Dry Weight Biomass (mg/L)	2019	BOL-B2	Reference	5	0.00544	0.00185	0.00311	0.00608	0.00737
		POL-P2	Exposed	5	0.0176	0.0103	0.00889	0.0116	0.0325
	2020	BOL-B2	Reference	5	0.0163	0.00334	0.0116	0.0172	0.0193
		POL-P2	Exposed	5	0.0229	0.00340	0.0170	0.0236	0.0253
	2021	BOL-B2	Reference	5	0.00631	0.00208	0.00446	0.00624	0.00974
		POL-P2	Exposed	5	0.00762	0.00114	0.00663	0.00720	0.00956
	2022	BOL-B2	Reference	5	0.0204	0.00627	0.0149	0.0198	0.0308
		POL-P2	Exposed	5	0.0210	0.00676	0.0140	0.0189	0.0321
	2023	BOL-B2	Reference	5	0.0117	0.00502	0.00726	0.00923	0.0193
		POL-P2	Exposed	5	0.00704	0.00140	0.00511	0.00674	0.00884
Calanoida (organisms/L)	2019	BOL-B2	Reference	5	0.147	0.0678	0.0725	0.134	0.242
		POL-P2	Exposed	5	0.145	0.0493	0.0905	0.125	0.210
	2020	BOL-B2	Reference	5	0.437	0.0903	0.327	0.444	0.525
		POL-P2	Exposed	5	0.362	0.216	0.186	0.340	0.728
	2021	BOL-B2	Reference	5	0.417	0.239	0.190	0.373	0.819
		POL-P2	Exposed	5	0.222	0.153	0.0646	0.216	0.380
	2022	BOL-B2	Reference	5	0.322	0.136	0.129	0.309	0.509
		POL-P2	Exposed	5	0.502	0.145	0.354	0.496	0.699
	2023	BOL-B2	Reference	5	0.172	0.0894	0.0842	0.122	0.282
		POL-P2	Exposed	5	0.170	0.0401	0.120	0.170	0.220
Cladocera (organisms/L)	2019	BOL-B2	Reference	5	0.365	0.132	0.204	0.367	0.561
		POL-P2	Exposed	5	0.221	0.0561	0.125	0.249	0.262
	2020	BOL-B2	Reference	5	1.08	0.182	0.891	1.07	1.27
		POL-P2	Exposed	5	0.955	0.370	0.584	0.905	1.40
	2021	BOL-B2	Reference	5	0.410	0.125	0.280	0.443	0.568
		POL-P2	Exposed	5	0.892	0.366	0.556	0.736	1.31
	2022	BOL-B2	Reference	5	0.505	0.268	0.272	0.418	0.959
		POL-P2	Exposed	5	0.972	0.345	0.639	0.860	1.49
	2023	BOL-B2	Reference	5	0.815	0.788	0.217	0.503	2.10
		POL-P2	Exposed	5	0.183	0.0377	0.153	0.167	0.248
Copepod Nauplii (organisms/L)	2019	BOL-B2	Reference	5	0.473	0.275	0.157	0.472	0.896
		POL-P2	Exposed	5	5.81	4.95	2.06	2.52	12.3
	2020	BOL-B2	Reference	5	6.19	4.26	2.73	4.88	13.5
		POL-P2	Exposed	5	19.2	4.41	12.7	19.1	23.6
	2021	BOL-B2	Reference	5	2.71	1.69	0.407	2.60	4.56
		POL-P2	Exposed	5	6.82	4.15	3.81	5.54	13.9
	2022	BOL-B2	Reference	5	4.09	1.37	2.64	3.82	5.81
		POL-P2	Exposed	5	15.2	5.88	7.66	14.3	23.8
	2023	BOL-B2	Reference	5	9.69	4.48	5.91	8.33	17.3
		POL-P2	Exposed	5	4.89	2.65	2.46	4.33	9.34

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2023, see Appendix Table C.3.:

Table C.3.4: Summary Statistics for Zooplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Cyclopoida (organisms/L)	2019	BOL-B2	Reference	5	0.685	0.258	0.403	0.784	1.00
		POL-P2	Exposed	5	3.01	1.91	1.32	1.95	5.87
	2020	BOL-B2	Reference	5	2.70	0.465	2.21	2.76	3.25
		POL-P2	Exposed	5	6.00	0.923	4.75	6.58	6.79
	2021	BOL-B2	Reference	5	1.37	0.327	0.862	1.44	1.76
		POL-P2	Exposed	5	2.46	0.569	1.48	2.65	2.92
	2022	BOL-B2	Reference	5	2.49	1.09	1.58	1.88	4.24
		POL-P2	Exposed	5	1.69	0.888	1.03	1.46	3.24
	2023	BOL-B2	Reference	5	2.51	1.17	1.54	2.10	4.39
		POL-P2	Exposed	5	1.40	0.322	0.952	1.39	1.71
Rotifera (organisms/L)	2019	BOL-B2	Reference	5	3.34	1.18	1.81	3.09	4.67
		POL-P2	Exposed	5	1.17	0.430	0.629	1.19	1.78
	2020	BOL-B2	Reference	5	16.9	2.42	14.4	15.7	19.6
		POL-P2	Exposed	5	2.50	0.939	1.27	2.88	3.58
	2021	BOL-B2	Reference	5	13.8	6.38	6.18	14.0	23.2
		POL-P2	Exposed	5	1.50	0.646	0.853	1.41	2.29
	2022	BOL-B2	Reference	5	22.9	6.59	13.8	23.6	31.2
		POL-P2	Exposed	5	7.26	1.51	5.78	6.83	9.71
	2023	BOL-B2	Reference	5	19.7	2.47	17.8	18.1	23.4
		POL-P2	Exposed	5	5.82	2.42	3.87	4.79	9.62
Calanoida (%)	2019	BOL-B2	Reference	5	3.08	1.63	1.60	2.32	5.58
		POL-P2	Exposed	5	1.70	0.660	1.01	1.51	2.53
	2020	BOL-B2	Reference	5	1.64	0.417	1.32	1.43	2.29
		POL-P2	Exposed	5	1.21	0.561	0.829	0.969	2.19
	2021	BOL-B2	Reference	5	2.50	1.40	0.877	2.68	4.61
		POL-P2	Exposed	5	1.75	0.904	0.666	1.99	2.75
	2022	BOL-B2	Reference	5	1.02	0.265	0.656	1.07	1.38
		POL-P2	Exposed	5	2.02	0.615	1.14	2.36	2.55
	2023	BOL-B2	Reference	5	0.518	0.245	0.281	0.414	0.916
		POL-P2	Exposed	5	1.46	0.371	0.938	1.44	1.93
Cladocera (%)	2019	BOL-B2	Reference	5	7.78	3.24	3.24	8.74	11.7
		POL-P2	Exposed	5	2.80	1.53	1.44	2.25	4.69
	2020	BOL-B2	Reference	5	4.16	1.30	2.43	4.37	5.58
		POL-P2	Exposed	5	3.21	0.684	2.35	2.97	4.00
	2021	BOL-B2	Reference	5	2.37	0.680	1.86	2.19	3.52
		POL-P2	Exposed	5	7.46	1.27	6.61	6.84	9.62
	2022	BOL-B2	Reference	5	1.66	0.723	0.989	1.50	2.89
		POL-P2	Exposed	5	4.00	1.95	2.23	3.74	7.29
	2023	BOL-B2	Reference	5	2.47	2.52	0.737	1.73	6.82
		POL-P2	Exposed	5	1.58	0.443	1.17	1.41	2.21
Copepod Nauplii (%)	2019	BOL-B2	Reference	5	9.71	5.20	3.63	10.5	15.1
		POL-P2	Exposed	5	50.1	12.9	38.7	44.2	70.4
	2020	BOL-B2	Reference	5	21.4	9.92	11.9	19.9	36.7
		POL-P2	Exposed	5	65.9	2.85	62.5	67.0	69.4
	2021	BOL-B2	Reference	5	13.3	5.75	5.02	14.9	19.1
		POL-P2	Exposed	5	54.4	11.3	45.7	49.3	73.0
	2022	BOL-B2	Reference	5	13.9	4.75	8.15	13.4	20.9
		POL-P2	Exposed	5	57.8	13.0	37.5	57.7	72.4
	2023	BOL-B2	Reference	5	28.7	7.52	19.2	28.7	38.6
		POL-P2	Exposed	5	38.0	5.46	29.5	39.4	44.2
Cyclopoida (%)	2019	BOL-B2	Reference	5	14.0	4.37	6.93	15.7	18.1
		POL-P2	Exposed	5	29.9	4.15	23.4	32.3	33.2
	2020	BOL-B2	Reference	5	10.3	2.80	6.02	11.3	13.2
		POL-P2	Exposed	5	21.1	3.61	15.9	21.7	25.0
	2021	BOL-B2	Reference	5	8.18	2.55	4.79	9.60	10.6
		POL-P2	Exposed	5	23.7	10.0	7.74	25.8	33.9
	2022	BOL-B2	Reference	5	8.72	4.49	5.09	5.69	14.6
		POL-P2	Exposed	5	7.13	4.97	4.17	4.65	15.9
	2023	BOL-B2	Reference	5	7.73	3.73	5.13	6.43	14.2
		POL-P2	Exposed	5	12.3	4.88	8.11	10.8	20.5
Rotifera (%)	2019	BOL-B2	Reference	5	65.5	6.05	58.0	63.5	74.0
		POL-P2	Exposed	5	15.4	8.37	3.61	19.8	23.6
	2020	BOL-B2	Reference	5	62.5	6.59	53.4	64.0	69.8
		POL-P2	Exposed	5	8.55	2.47	4.83	8.67	11.8
	2021	BOL-B2	Reference	5	73.6	3.59	68.2	75.8	76.2
		POL-P2	Exposed	5	12.7	3.44	8.79	11.4	16.9
	2022	BOL-B2	Reference	5	74.7	6.59	69.7	70.8	84.4
		POL-P2	Exposed	5	29.1	6.58	19.6	29.7	36.9
	2023	BOL-B2	Reference	5	60.6	6.31	52.2	60.4	69.7
		POL-P2	Exposed	5	46.7	2.56	44.3	46.0	51.0

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022,see Appendix Table C.3.3.

Table C.3.5: **Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023**

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Chlorophyll-a (µg/L)	Diatom (cells/L)	Chlorophyte (cells/L)	Chrysophyte (cells/L)	Cryptomonad (cells/L)
2019	QUL-ZOO-7	Reference	Jun 25	-	608,882	17.0	0.757	0.242	1.25	309,465	84,400	58,276	156,742
			Jul 30	1	697,301	20.0	0.854	0.343	2.08	269,275	76,361	227,075	116,552
			Jul 30	2	803,805	24.0	0.903	0.427	1.78	279,322	114,542	208,989	102,485
			Jul 30	3	580,138	20.0	0.869	0.380	2.06	206,193	52,422	131,055	136,297
			Jul 30	4	606,873	19.0	0.876	0.425	0.974	241,142	32,152	202,961	112,533
			Jul 30	5	567,906	22.0	0.910	0.505	1.97	178,235	80,381	167,751	117,076
			Aug 29	-	1,181,593	20.0	0.781	0.229	0.571	380,468	75,022	484,962	109,853
	QUL-ZOO-1	Exposed	Jun 25	-	653,092	21.0	0.712	0.165	1.39	365,731	72,342	48,228	152,723
			Jul 30	1	711,367	19.0	0.853	0.359	2.21	287,360	60,285	190,904	118,561
			Jul 30	2	737,609	25.0	0.872	0.313	1.99	234,049	134,756	260,055	92,201
			Jul 30	3	770,707	20.0	0.854	0.342	1.92	212,772	47,283	319,158	122,935
			Jul 30	4	683,234	26.0	0.882	0.327	2.17	190,904	60,285	253,199	118,561
			Jul 30	5	787,256	20.0	0.863	0.364	1.90	255,326	85,109	276,603	156,033
			Aug 29	-	852,033	17.0	0.633	0.160	0.442	166,120	26,793	554,625	80,380
2020	QUL-ZOO-7	Reference	Jun 23	-	793,321	24.0	0.880	0.347	1.22	71,643	52,422	269,100	186,972
			Jul 28	1	836,903	24.0	0.824	0.237	1.28	134,756	108,750	198,587	340,435
			Jul 28	2	924,376	25.0	0.837	0.245	1.48	78,016	115,842	222,228	345,163
			Jul 28	3	801,795	20.0	0.797	0.246	1.63	86,409	70,333	128,609	343,627
			Jul 28	4	886,865	18.0	0.816	0.301	1.61	142,006	115,212	257,218	359,033
			Jul 28	5	998,573	23.0	0.890	0.395	1.53	120,571	170,036	389,536	247,325
			Aug 27	-	1,029,489	16.0	0.643	0.175	1.93	95,838	61,831	775,981	95,838
	QUL-ZOO-1	Exposed	Jun 23	-	622,075	24.0	0.879	0.345	1.15	92,612	43,685	260,363	145,034
			Jul 28	1	637,802	25.0	0.907	0.430	1.64	188,719	101,349	197,456	50,675
			Jul 28	2	998,573	23.0	0.890	0.395	1.47	120,571	170,036	389,536	247,325
			Jul 28	3	820,354	25.0	0.902	0.406	1.46	172,582	127,663	269,511	179,674
			Jul 28	4	1,619,976	21.0	0.857	0.334	1.64	238,050	151,486	439,001	244,233
			Jul 28	5	1,256,615	20.0	0.872	0.392	1.75	139,326	104,495	364,392	267,935
			Aug 27	-	1,425,208	19.0	0.833	0.315	1.47	207,134	132,937	544,114	108,205
2021	QUL-ZOO-7	Reference	Jun 23	-	757,184	24.0	0.874	0.331	1.07	91,634	62,697	181,660	73,950
			Jul 28	1	499,967	19.0	0.846	0.341	1.06	274,901	59,482	136,647	25,722
			Jul 28	2	699,310	25.0	0.907	0.431	1.11	331,570	52,247	116,552	124,590
			Jul 28	3	485,260	22.0	0.894	0.429	1.12	171,181	41,679	189,043	56,564
			Jul 28	4	605,150	19.0	0.881	0.442	1.29	186,023	37,894	126,312	25,262
			Jul 28	5	462,188	24.0	0.900	0.416	1.04	166,944	60,285	106,659	120,571
			Aug 29	-	629,647	28.0	0.905	0.377	1.34	204,970	48,228	29,473	85,739
	QUL-ZOO-1	Exposed	Jun 23	-	620,537	22.0	0.901	0.458	1.15	67,520	67,520	147,900	104,495
			Jul 28	1	555,674	23.0	0.909	0.476	0.969	225,415	85,623	192,214	41,938
			Jul 28	2	520,927	26.0	0.919	0.472	1.06	211,772	43,282	165,398	88,109
			Jul 28	3	527,715	23.0	0.922	0.555	1.10	185,225	57,664	195,709	76,886
			Jul 28	4	514,744	23.0	0.910	0.481	0.991	247,325	26,278	148,395	71,106
			Jul 28	5	683,234	28.0	0.857	0.250	1.14	95,308	47,080	143,537	41,339
			Aug 29	-	415,299	22.0	0.878	0.371	1.22	168,799	49,568	96,457	99,136

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.5: **Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023**

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Chlorophyll-a (µg/L)	Diatom (cells/L)	Chlorophyte (cells/L)	Chrysophyte (cells/L)	Cryptomonad (cells/L)
2022	QUL-ZOO-7	Reference	Jun 22	-	709,645	26.0	0.855	0.266	2.02	87,270	41,339	319,225	197,506
			Jul 27	1	1,511,153	20.0	0.480	0.0962	3.97	88,419	76,361	1,173,555	140,666
			Jul 27	2	1,107,853	25.0	0.702	0.134	2.26	139,792	41,938	698,961	213,183
			Jul 27	3	1,225,803	22.0	0.670	0.138	2.48	148,704	68,323	775,672	229,084
			Jul 27	4	1,278,050	21.0	0.746	0.188	4.24	192,913	100,476	703,329	265,256
			Jul 27	5	1,079,895	24.0	0.759	0.173	3.15	157,266	90,865	615,086	195,709
			Aug 28	-	436,734	29.0	0.897	0.335	1.09	230,424	40,190	41,530	96,457
	QUL-ZOO-1	Exposed	Jun 22	-	471,863	21.0	0.863	0.348	1.58	114,617	56,564	128,013	128,013
			Jul 27	1	2,065,161	18.0	0.585	0.134	2.76	216,409	61,831	1,415,933	296,790
			Jul 27	2	1,498,860	17.0	0.572	0.137	2.50	226,957	42,554	1,040,218	189,131
			Jul 28	3	1,947,681	13.0	0.319	0.113	3.13	117,479	68,014	1,687,990	74,197
			Jul 28	4	2,250,654	18.0	0.385	0.0904	5.48	123,662	49,465	1,929,132	123,662
			Jul 28	5	1,607,610	17.0	0.576	0.139	2.59	166,120	16,076	1,205,707	208,989
			Aug 28	-	632,996	22.0	0.866	0.339	1.04	383,817	78,371	72,342	58,276
2023	QUL-ZOO-7	Reference	Jun 21	-	953,849	16.0	0.808	0.325	1.48	404,582	21,435	251,859	128,609
			Jul 26	1	5,085,612	10.0	0.100	0.111	0.924	4,853,746	15,458	77,289	77,289
			Jul 26	2	7,113,674	8.00	0.0880	0.137	1.35	6,872,533	0	100,476	80,380
			Jul 26	3	7,595,957	12.0	0.357	0.130	1.28	6,048,633	60,285	160,761	80,380
			Jul 26	4	5,348,395	10.0	0.317	0.146	0.812	4,451,843	61,831	92,747	77,289
			Jul 26	5	7,274,435	10.0	0.142	0.117	1.06	6,751,962	100,476	80,380	301,427
			Aug 27	-	9,585,375	8.00	0.0738	0.135	2.09	9,344,233	40,190	180,856	0
	QUL-ZOO-1	Exposed	Jun 21	-	404,582	22.0	0.851	0.304	1.60	116,552	17,416	159,421	91,098
			Jul 26	1	4,791,914	9.00	0.112	0.125	1.41	4,529,132	30,916	77,289	154,578
			Jul 26	2	4,869,203	8.00	0.128	0.143	1.48	4,560,048	0	185,493	77,289
			Jul 26	3	4,977,408	8.00	0.114	0.141	1.34	4,776,457	15,458	61,831	92,747
			Jul 26	4	5,317,479	11.0	0.139	0.106	1.07	5,054,697	30,916	123,662	92,747
			Jul 26	5	6,651,486	6.00	0.0994	0.185	1.42	6,410,345	0	120,571	120,571
			Aug 27	-	10,348,989	10.0	0.0865	0.109	2.34	10,188,228	60,285	40,190	20,095

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.5: Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023

Year	Area	Type	Date	Replicate	Cyanobacteria (cells/L)	Dinoflagellates (cells/L)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cryptomonads (%)	Cyanobacteria (%)	Dinoflagellates (%)
2019	QUL-ZOO-7	Reference	Jun 25	-	0	0	50.8	13.9	9.57	25.7	0	0
			Jul 30	1	0	8,038	38.6	10.9	32.6	16.7	0	1.15
			Jul 30	2	96,457	2,010	34.8	14.2	26.0	12.8	12.0	0.250
			Jul 30	3	48,927	5,242	35.5	9.04	22.6	23.5	8.43	0.904
			Jul 30	4	0	18,086	39.7	5.30	33.4	18.5	0	2.98
			Jul 30	5	13,979	10,484	31.4	14.2	29.5	20.6	2.46	1.85
			Aug 29	-	128,609	2,679	32.2	6.35	41.0	9.30	10.9	0.227
	QUL-ZOO-1	Exposed	Jun 25	-	12,057	2,010	56.0	11.1	7.38	23.4	1.85	0.308
			Jul 30	1	42,200	12,057	40.4	8.47	26.8	16.7	5.93	1.69
			Jul 30	2	0	16,549	31.7	18.3	35.3	12.5	0	2.24
			Jul 30	3	42,554	26,005	27.6	6.13	41.4	15.9	5.52	3.37
			Jul 30	4	44,209	16,076	27.9	8.82	37.1	17.4	6.47	2.35
			Jul 30	5	7,092	7,092	32.4	10.8	35.1	19.8	0.901	0.901
			Aug 29	-	18,755	5,359	19.5	3.14	65.1	9.43	2.20	0.629
2020	QUL-ZOO-7	Reference	Jun 23	-	190,467	22,716	9.03	6.61	33.9	23.6	24.0	2.86
			Jul 28	1	54,375	0	16.1	13.0	23.7	40.7	6.50	0
			Jul 28	2	160,761	2,364	8.44	12.5	24.0	37.3	17.4	0.256
			Jul 28	3	164,780	8,038	10.8	8.77	16.0	42.9	20.6	1.00
			Jul 28	4	10,717	2,679	16.0	13.0	29.0	40.5	1.21	0.302
			Jul 28	5	58,740	12,366	12.1	17.0	39.0	24.8	5.88	1.24
			Aug 27	-	0	0	9.31	6.01	75.4	9.31	0	0
	QUL-ZOO-1	Exposed	Jun 23	-	64,654	15,727	14.9	7.02	41.9	23.3	10.4	2.53
			Jul 28	1	92,612	6,990	29.6	15.9	31.0	7.95	14.5	1.10
			Jul 28	2	58,740	12,366	12.1	17.0	39.0	24.8	5.88	1.24
			Jul 28	3	66,196	4,728	21.0	15.6	32.9	21.9	8.07	0.576
			Jul 28	4	531,748	15,458	14.7	9.35	27.1	15.1	32.8	0.954
			Jul 28	5	359,033	21,435	11.1	8.32	29.0	21.3	28.6	1.71
			Aug 27	-	432,818	0	14.5	9.33	38.2	7.59	30.4	0
2021	QUL-ZOO-7	Reference	Jun 23	-	345,636	1,608	12.1	8.28	24.0	9.77	45.6	0.212
			Jul 28	1	0	3,215	55.0	11.9	27.3	5.14	0	0.643
			Jul 28	2	72,342	2,010	47.4	7.47	16.7	17.8	10.3	0.287
			Jul 28	3	26,794	0	35.3	8.59	39.0	11.7	5.52	0
			Jul 28	4	229,659	0	30.7	6.26	20.9	4.17	38.0	0
			Jul 28	5	0	7,729	36.1	13.0	23.1	26.1	0	1.67
			Aug 29	-	255,878	5,359	32.5	7.66	4.68	13.6	40.6	0.851
	QUL-ZOO-1	Exposed	Jun 23	-	233,103	0	10.9	10.9	23.8	16.8	37.6	0
			Jul 28	1	0	10,484	40.6	15.4	34.6	7.55	0	1.89
			Jul 28	2	6,183	6,183	40.6	8.31	31.8	16.9	1.19	1.19
			Jul 28	3	0	12,232	35.1	10.9	37.1	14.6	0	2.32
			Jul 28	4	18,549	3,092	48.0	5.11	28.8	13.8	3.60	0.601
			Jul 28	5	347,933	8,038	13.9	6.89	21.0	6.05	50.9	1.18
			Aug 29	-	0	1,340	40.6	11.9	23.2	23.9	0	0.323

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.5: **Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023**

Year	Area	Type	Date	Replicate	Cyanobacteria (cells/L)	Dinoflagellates (cells/L)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cryptomonads (%)	Cyanobacteria (%)	Dinoflagellates (%)
2022	QUL-ZOO-7	Reference	Jun 22	-	29,856	34,449	12.3	5.83	45.0	27.8	4.21	4.85
			Jul 27	1	32,152	0	5.85	5.05	77.7	9.31	2.13	0
			Jul 27	2	3,495	10,484	12.6	3.79	63.1	19.2	0.315	0.946
			Jul 27	3	4,019	0	12.1	5.57	63.3	18.7	0.328	0
			Jul 27	4	16,076	0	15.1	7.86	55.0	20.8	1.26	0
			Jul 27	5	13,979	6,990	14.6	8.41	57.0	18.1	1.29	0.647
			Aug 28	-	25,454	2,679	52.8	9.20	9.51	22.1	5.83	0.613
	QUL-ZOO-1	Exposed	Jun 22	-	43,167	1,489	24.3	12.0	27.1	27.1	9.15	0.315
			Jul 27	1	68,014	6,183	10.5	2.99	68.6	14.4	3.29	0.299
			Jul 27	2	0	0	15.1	2.84	69.4	12.6	0	0
			Jul 28	3	0	0	6.03	3.49	86.7	3.81	0	0
			Jul 28	4	18,549	6,183	5.49	2.20	85.7	5.49	0.824	0.275
			Jul 28	5	0	10,717	10.3	1.00	75.0	13.0	0	0.667
			Aug 28	-	32,152	8,038	60.6	12.4	11.4	9.21	5.08	1.27
2023	QUL-ZOO-7	Reference	Jun 21	-	147,364	0	42.4	2.25	26.4	13.5	15.4	0
			Jul 26	1	0	61,831	95.4	0.304	1.52	1.52	0	1.22
			Jul 26	2	0	60,285	96.6	0	1.41	1.13	0	0.847
			Jul 26	3	1,205,707	40,190	79.6	0.794	2.12	1.06	15.9	0.529
			Jul 26	4	618,312	46,373	83.2	1.16	1.73	1.45	11.6	0.867
			Jul 26	5	0	40,190	92.8	1.38	1.10	4.14	0	0.552
			Aug 27	-	0	20,095	97.5	0.419	1.89	0	0	0.210
	QUL-ZOO-1	Exposed	Jun 21	-	16,076	2,679	28.8	4.30	39.4	22.5	3.97	0.662
			Jul 26	1	0	0	94.5	0.645	1.61	3.23	0	0
			Jul 26	2	15,458	30,916	93.7	0	3.81	1.59	0.317	0.635
			Jul 26	3	0	30,916	96.0	0.311	1.24	1.86	0	0.621
			Jul 26	4	0	15,458	95.1	0.581	2.33	1.74	0	0.291
			Jul 26	5	0	0	96.4	0	1.81	1.81	0	0
			Aug 27	-	0	40,190	98.5	0.583	0.388	0.194	0	0.388

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

Table C.3.6: Summary Statistics for Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (cells/L)	2019	QUL-ZOO-7	Reference	5	651,204	99,205	567,906	606,873	803,805
		QUL-ZOO-1	Exposed	5	738,035	42,440	683,234	737,609	787,256
	2020	QUL-ZOO-7	Reference	5	889,702	76,777	801,795	886,865	998,573
		QUL-ZOO-1	Exposed	5	1,066,664	384,533	637,802	998,573	1,619,976
	2021	QUL-ZOO-7	Reference	5	550,375	99,674	462,188	499,967	699,310
		QUL-ZOO-1	Exposed	5	560,459	70,394	514,744	527,715	683,234
	2022	QUL-ZOO-7	Reference	5	1,240,551	171,951	1,079,895	1,225,803	1,511,153
		QUL-ZOO-1	Exposed	5	1,873,993	314,457	1,498,860	1,947,681	2,250,654
	2023	QUL-ZOO-7	Reference	5	6,483,615	1,172,904	5,085,612	7,113,674	7,595,957
		QUL-ZOO-1	Exposed	5	5,321,498	770,116	4,791,914	4,977,408	6,651,486
Richness (# of Taxa)	2019	QUL-ZOO-7	Reference	5	21.0	2.00	19.0	20.0	24.0
		QUL-ZOO-1	Exposed	5	22.0	3.24	19.0	20.0	26.0
	2020	QUL-ZOO-7	Reference	5	22.0	2.92	18.0	23.0	25.0
		QUL-ZOO-1	Exposed	5	22.8	2.28	20.0	23.0	25.0
	2021	QUL-ZOO-7	Reference	5	21.8	2.77	19.0	22.0	25.0
		QUL-ZOO-1	Exposed	5	24.6	2.30	23.0	23.0	28.0
	2022	QUL-ZOO-7	Reference	5	22.4	2.07	20.0	22.0	25.0
		QUL-ZOO-1	Exposed	5	16.6	2.07	13.0	17.0	18.0
	2023	QUL-ZOO-7	Reference	5	10.0	1.41	8.00	10.0	12.0
		QUL-ZOO-1	Exposed	5	8.40	1.82	6.00	8.00	11.0
Simpson's Diversity	2019	QUL-ZOO-7	Reference	5	0.882	0.0233	0.854	0.876	0.910
		QUL-ZOO-1	Exposed	5	0.865	0.0124	0.853	0.863	0.882
	2020	QUL-ZOO-7	Reference	5	0.833	0.0352	0.797	0.824	0.890
		QUL-ZOO-1	Exposed	5	0.886	0.0207	0.857	0.890	0.907
	2021	QUL-ZOO-7	Reference	5	0.886	0.0242	0.846	0.894	0.907
		QUL-ZOO-1	Exposed	5	0.903	0.0263	0.857	0.910	0.922
	2022	QUL-ZOO-7	Reference	5	0.672	0.113	0.480	0.702	0.759
		QUL-ZOO-1	Exposed	5	0.487	0.126	0.319	0.572	0.585
	2023	QUL-ZOO-7	Reference	5	0.201	0.127	0.0880	0.142	0.357
		QUL-ZOO-1	Exposed	5	0.118	0.0154	0.0994	0.114	0.139
Simpson's Evenness	2019	QUL-ZOO-7	Reference	5	0.416	0.0605	0.343	0.425	0.505
		QUL-ZOO-1	Exposed	5	0.341	0.0214	0.313	0.342	0.364
	2020	QUL-ZOO-7	Reference	5	0.285	0.0667	0.237	0.246	0.395
		QUL-ZOO-1	Exposed	5	0.391	0.0356	0.334	0.395	0.430
	2021	QUL-ZOO-7	Reference	5	0.412	0.0406	0.341	0.429	0.442
		QUL-ZOO-1	Exposed	5	0.447	0.115	0.250	0.476	0.555
	2022	QUL-ZOO-7	Reference	5	0.146	0.0359	0.0962	0.138	0.188
		QUL-ZOO-1	Exposed	5	0.123	0.0208	0.0904	0.134	0.139
	2023	QUL-ZOO-7	Reference	5	0.128	0.0145	0.111	0.130	0.146
		QUL-ZOO-1	Exposed	5	0.140	0.0294	0.106	0.141	0.185
Chlorophyll-a (µg/L)	2019	QUL-ZOO-7	Reference	5	1.77	0.462	0.974	1.97	2.08
		QUL-ZOO-1	Exposed	5	2.04	0.143	1.90	1.99	2.21
	2020	QUL-ZOO-7	Reference	5	1.51	0.140	1.28	1.53	1.63
		QUL-ZOO-1	Exposed	5	1.59	0.124	1.46	1.64	1.75
	2021	QUL-ZOO-7	Reference	5	1.12	0.0986	1.04	1.11	1.29
		QUL-ZOO-1	Exposed	5	1.05	0.0720	0.969	1.06	1.14
	2022	QUL-ZOO-7	Reference	5	3.22	0.877	2.26	3.15	4.24
		QUL-ZOO-1	Exposed	5	3.29	1.25	2.50	2.76	5.48
	2023	QUL-ZOO-7	Reference	5	1.09	0.229	0.812	1.06	1.35
		QUL-ZOO-1	Exposed	5	1.34	0.161	1.07	1.41	1.48
Diatoms (cells/L)	2019	QUL-ZOO-7	Reference	5	234,833	42,511	178,235	241,142	279,322
		QUL-ZOO-1	Exposed	5	236,082	37,378	190,904	234,049	287,360
	2020	QUL-ZOO-7	Reference	5	112,351	28,726	78,016	120,571	142,006
		QUL-ZOO-1	Exposed	5	171,850	45,703	120,571	172,582	238,050
	2021	QUL-ZOO-7	Reference	5	226,124	73,531	166,944	186,023	331,570
		QUL-ZOO-1	Exposed	5	193,009	59,073	95,308	211,772	247,325
	2022	QUL-ZOO-7	Reference	5	145,419	37,708	88,419	148,704	192,913
		QUL-ZOO-1	Exposed	5	170,125	50,790	117,479	166,120	226,957
	2023	QUL-ZOO-7	Reference	5	5,795,743	1,099,001	4,451,843	6,048,633	6,872,533
		QUL-ZOO-1	Exposed	5	5,066,136	780,295	4,529,132	4,776,457	6,410,345
Chlorophyte (cells/L)	2019	QUL-ZOO-7	Reference	5	71,172	31,092	32,152	76,361	114,542
		QUL-ZOO-1	Exposed	5	77,544	34,792	47,283	60,285	134,756
	2020	QUL-ZOO-7	Reference	5	116,035	35,562	70,333	115,212	170,036
		QUL-ZOO-1	Exposed	5	131,006	29,733	101,349	127,663	170,036
	2021	QUL-ZOO-7	Reference	5	50,317	10,199	37,894	52,247	60,285
		QUL-ZOO-1	Exposed	5	51,985	21,934	26,278	47,080	85,623
	2022	QUL-ZOO-7	Reference	5	75,593	22,575	41,938	76,361	100,476
		QUL-ZOO-1	Exposed	5	47,588	20,261	16,076	49,465	68,014
	2023	QUL-ZOO-7	Reference	5	47,610	40,181	0	60,285	100,476
		QUL-ZOO-1	Exposed	5	15,458	15,458	0	15,458	30,916
Chrysophyte (cells/L)	2019	QUL-ZOO-7	Reference	5	187,566	38,220	131,055	202,961	227,075
		QUL-ZOO-1	Exposed	5	259,984	46,357	190,904	260,055	319,158
	2020	QUL-ZOO-7	Reference	5	239,236	96,298	128,609	222,228	389,536
		QUL-ZOO-1	Exposed	5	331,979	97,231	197,456	364,392	439,001
	2021	QUL-ZOO-7	Reference	5	135,043	32,181	106,659	126,312	189,043
		QUL-ZOO-1	Exposed	5	169,051	24,177	143,537	165,398	195,709
	2022	QUL-ZOO-7	Reference	5	793,321	220,034	615,086	703,329	1,173,555
		QUL-ZOO-1	Exposed	5	1,455,796	358,748	1,040,218	1,415,933	1,929,132
	2023	QUL-ZOO-7	Reference	5	102,331	33,979	77,289	92,747	160,761
		QUL-ZOO-1	Exposed	5	113,769	48,262	61,831	120,571	185,493
Cryptomonad (cells/L)	2019	QUL-ZOO-7	Reference	5	116,989	12,280	102,485	116,552	136,297
		QUL-ZOO-1	Exposed	5	121,658	22,749	92,201	118,561	156,033
	2020	QUL-ZOO-7	Reference	5	327,117	45,169	247,325	343,627	359,033
		QUL-ZOO-1	Exposed	5	197,968	88,744	50,675	244,233	267,935
	2021	QUL-ZOO-7	Reference	5	70,542	49,190	25,262	56,564	124,590
		QUL-ZOO-1	Exposed	5	63,875	21,201	41,339	71,106	88,109
	2022	QUL-ZOO-7	Reference	5	208,780	45,912	140,666	213,183	265,256
		QUL-ZOO-1	Exposed	5	178,554	85,031	74,197	189,131	296,790
	2023	QUL-ZOO-7	Reference	5	123,353	99,558	77,289	80,380	301,427
		QUL-ZOO-1	Exposed	5	107,586	30,558	77,289	92,747	154,578
Cyanobacteria (cells/L)	2019	QUL-ZOO-7	Reference	5	31,873	41,273	0	13,979	96,457
		QUL-ZOO-1	Exposed	5	27,211	21,761	0	42,200	44,209
	2020	QUL-ZOO-7	Reference	5	89,875	69,158	10,717	58,740	164,780
		QUL-ZOO-1	Exposed	5	221,666	213,536	58,740	92,612	531,748
	2021	QUL-ZOO-7	Reference	5	65,759	96,272	0	26,794	229,659
		QUL-ZOO-1	Exposed	5	74,533	153,023	0	6,183	347,933
	2022	QUL-ZOO-7	Reference	5	13,944	11,660	3,495	13,979	32,152
		QUL-ZOO-1	Exposed	5	17,313	29,459	0	0	68,014
	2023	QUL-ZOO-7	Reference	5	364,804	540,978	0	0	1,205,707
		QUL-ZOO-1	Exposed	5	3,092	6,913	0	0	15,458

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2023, see Appendix Table C.3.5.

Table C.3.6: Summary Statistics for Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Dinoflagellates (cells/L)	2019	QUL-ZOO-7	Reference	5	8,772	6,091	2,010	8,038	18,086
		QUL-ZOO-1	Exposed	5	15,556	6,970	7,092	16,076	26,005
	2020	QUL-ZOO-7	Reference	5	5,090	5,020	0	2,679	12,366
		QUL-ZOO-1	Exposed	5	12,195	6,688	4,728	12,366	21,435
	2021	QUL-ZOO-7	Reference	5	2,591	3,184	0	2,010	7,729
		QUL-ZOO-1	Exposed	5	8,006	3,587	3,092	8,038	12,232
	2022	QUL-ZOO-7	Reference	5	3,495	4,942	0	0	10,484
		QUL-ZOO-1	Exposed	5	4,617	4,603	0	6,183	10,717
	2023	QUL-ZOO-7	Reference	5	49,774	10,620	40,190	46,373	61,831
		QUL-ZOO-1	Exposed	5	15,458	15,458	0	15,458	30,916
Euglenophytes (cells/L)	2019	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2020	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2021	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2022	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2023	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
Diatoms (%)	2019	QUL-ZOO-7	Reference	5	36.0	3.31	31.4	35.5	39.7
		QUL-ZOO-1	Exposed	5	32.0	5.16	27.6	31.7	40.4
	2020	QUL-ZOO-7	Reference	5	12.7	3.35	8.44	12.1	16.1
		QUL-ZOO-1	Exposed	5	17.7	7.70	11.1	14.7	29.6
	2021	QUL-ZOO-7	Reference	5	40.9	9.98	30.7	36.1	55.0
		QUL-ZOO-1	Exposed	5	35.7	13.0	13.9	40.6	48.0
	2022	QUL-ZOO-7	Reference	5	12.1	3.69	5.85	12.6	15.1
		QUL-ZOO-1	Exposed	5	9.50	3.92	5.49	10.3	15.1
	2023	QUL-ZOO-7	Reference	5	89.5	7.64	79.6	92.8	96.6
		QUL-ZOO-1	Exposed	5	95.1	1.10	93.7	95.1	96.4
Chlorophytes (%)	2019	QUL-ZOO-7	Reference	5	10.7	3.76	5.30	10.9	14.2
		QUL-ZOO-1	Exposed	5	10.5	4.65	6.13	8.82	18.3
	2020	QUL-ZOO-7	Reference	5	12.9	2.93	8.77	13.0	17.0
		QUL-ZOO-1	Exposed	5	13.2	4.07	8.32	15.6	17.0
	2021	QUL-ZOO-7	Reference	5	9.45	2.90	6.26	8.59	13.0
		QUL-ZOO-1	Exposed	5	9.33	4.01	5.11	8.31	15.4
	2022	QUL-ZOO-7	Reference	5	6.14	1.95	3.79	5.57	8.41
		QUL-ZOO-1	Exposed	5	2.50	0.960	1.00	2.84	3.49
	2023	QUL-ZOO-7	Reference	5	0.727	0.575	0	0.794	1.38
		QUL-ZOO-1	Exposed	5	0.307	0.307	0	0.311	0.645
Chrysophytes (%)	2019	QUL-ZOO-7	Reference	5	28.8	4.55	22.6	29.5	33.4
		QUL-ZOO-1	Exposed	5	35.1	5.29	26.8	35.3	41.4
	2020	QUL-ZOO-7	Reference	5	26.4	8.45	16.0	24.0	39.0
		QUL-ZOO-1	Exposed	5	31.8	4.58	27.1	31.0	39.0
	2021	QUL-ZOO-7	Reference	5	25.4	8.51	16.7	23.1	39.0
		QUL-ZOO-1	Exposed	5	30.6	6.21	21.0	31.8	37.1
	2022	QUL-ZOO-7	Reference	5	63.2	8.87	55.0	63.1	77.7
		QUL-ZOO-1	Exposed	5	77.1	8.69	68.6	75.0	86.7
	2023	QUL-ZOO-7	Reference	5	1.58	0.377	1.10	1.52	2.12
		QUL-ZOO-1	Exposed	5	2.16	1.00	1.24	1.81	3.81
Cryptomonads (%)	2019	QUL-ZOO-7	Reference	5	18.4	4.05	12.8	18.5	23.5
		QUL-ZOO-1	Exposed	5	16.5	2.65	12.5	16.7	19.8
	2020	QUL-ZOO-7	Reference	5	37.2	7.24	24.8	40.5	42.9
		QUL-ZOO-1	Exposed	5	18.2	6.74	7.95	21.3	24.8
	2021	QUL-ZOO-7	Reference	5	13.0	9.16	4.17	11.7	26.1
		QUL-ZOO-1	Exposed	5	11.8	4.72	6.05	13.8	16.9
	2022	QUL-ZOO-7	Reference	5	17.2	4.53	9.31	18.7	20.8
		QUL-ZOO-1	Exposed	5	9.86	4.83	3.81	12.6	14.4
	2023	QUL-ZOO-7	Reference	5	1.86	1.29	1.06	1.45	4.14
		QUL-ZOO-1	Exposed	5	2.05	0.667	1.59	1.81	3.23
Cyanobacteria (%)	2019	QUL-ZOO-7	Reference	5	4.58	5.39	0	2.46	12.0
		QUL-ZOO-1	Exposed	5	3.77	3.06	0	5.52	6.47
	2020	QUL-ZOO-7	Reference	5	10.3	8.25	1.21	6.50	20.6
		QUL-ZOO-1	Exposed	5	18.0	12.1	5.88	14.5	32.8
	2021	QUL-ZOO-7	Reference	5	10.8	15.8	0	5.52	38.0
		QUL-ZOO-1	Exposed	5	11.1	22.3	0	1.19	50.9
	2022	QUL-ZOO-7	Reference	5	1.06	0.762	0.315	1.26	2.13
		QUL-ZOO-1	Exposed	5	0.824	1.43	0	0	3.29
	2023	QUL-ZOO-7	Reference	5	5.49	7.67	0	0	15.9
		QUL-ZOO-1	Exposed	5	0.0635	0.142	0	0	0.317
Dinoflagellates (%)	2019	QUL-ZOO-7	Reference	5	1.43	1.04	0.250	1.15	2.98
		QUL-ZOO-1	Exposed	5	2.11	0.910	0.901	2.24	3.37
	2020	QUL-ZOO-7	Reference	5	0.560	0.531	0	0.302	1.24
		QUL-ZOO-1	Exposed	5	1.11	0.412	0.576	1.10	1.71
	2021	QUL-ZOO-7	Reference	5	0.521	0.696	0	0.287	1.67
		QUL-ZOO-1	Exposed	5	1.43	0.672	0.601	1.19	2.32
	2022	QUL-ZOO-7	Reference	5	0.319	0.449	0	0	0.946
		QUL-ZOO-1	Exposed	5	0.248	0.275	0	0.275	0.667
	2023	QUL-ZOO-7	Reference	5	0.802	0.280	0.529	0.847	1.22
		QUL-ZOO-1	Exposed	5	0.309	0.314	0	0.291	0.635
Euglenophytes (%)	2019	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2020	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2021	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2022	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2023	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2023, see Appendix Table C.3.5.

Table C.3.7: Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023

Year	Area	Type	Date	Replicate	Density (organisms/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Wet Weight Biomass (mg/L)	Dry Weight Biomass (mg/L)	Calanoida (organisms/L)	Cladocera (organisms/L)
2019	QUL-ZOO-7	Reference	Jun 25	1	7.60	10.0	0.760	0.417	0.0767	0.0153	0.821	0.297
			Jul 30	1	3.47	10.0	0.802	0.504	0.0269	0.00532	0.274	0.205
			Jul 30	2	2.86	8.00	0.766	0.534	0.0214	0.00424	0.169	0.146
			Jul 30	3	3.65	9.00	0.743	0.432	0.0277	0.00548	0.292	0.178
			Jul 30	4	2.70	9.00	0.747	0.440	0.0195	0.00387	0.132	0.183
			Jul 30	5	3.35	10.0	0.738	0.382	0.0243	0.00481	0.224	0.187
			Aug 29	1	1.47	10.0	0.804	0.511	0.0110	0.00219	0.123	0.0844
	QUL-ZOO-1	Exposed	Jun 25	1	5.90	7.00	0.743	0.555	0.0520	0.0104	0.513	0.0799
			Jul 30	1	2.87	10.0	0.730	0.370	0.0154	0.00305	0.180	0.116
			Jul 30	2	3.08	10.0	0.717	0.353	0.0142	0.00277	0.155	0.116
			Jul 30	3	3.67	10.0	0.788	0.471	0.0253	0.00501	0.292	0.173
			Jul 30	4	4.17	11.0	0.751	0.365	0.0238	0.00470	0.292	0.164
			Jul 30	5	2.56	10.0	0.812	0.531	0.0200	0.00396	0.196	0.151
			Aug 29	1	1.26	9.00	0.811	0.589	0.00632	0.00125	0.0426	0.0700
2020	QUL-ZOO-7	Reference	Jun 23	-	8.72	8.00	0.761	0.524	0.107	0.0214	1.89	0.123
			Jul 28	1	9.87	11.0	0.730	0.337	0.0492	0.00955	0.616	0.189
			Jul 28	2	11.3	12.0	0.720	0.298	0.0268	0.00500	0.296	0.0641
			Jul 28	3	7.79	10.0	0.708	0.342	0.0301	0.00578	0.409	0.0986
			Jul 28	4	11.4	11.0	0.681	0.285	0.0368	0.00698	0.414	0.246
			Jul 28	5	25.0	9.00	0.578	0.264	0.0442	0.00784	0.419	0.279
			Aug 27	-	7.69	13.0	0.817	0.421	0.153	0.0306	1.43	2.91
	QUL-ZOO-1	Exposed	Jun 23	-	10.9	11.0	0.771	0.397	0.164	0.0327	3.48	0.0657
			Jul 28	1	13.2	11.0	0.811	0.480	0.0532	0.0104	0.634	0.176
			Jul 28	2	6.35	12.0	0.814	0.447	0.0317	0.00619	0.401	0.232
			Jul 28	3	11.8	12.0	0.758	0.344	0.0346	0.00655	0.511	0.166
			Jul 28	4	7.23	12.0	0.771	0.363	0.0313	0.00605	0.527	0.133
			Jul 28	5	16.1	11.0	0.760	0.378	0.0379	0.00705	0.468	0.242
			Aug 27	-	5.36	10.0	0.770	0.434	0.0284	0.00554	0.246	0.240
2021	QUL-ZOO-7	Reference	Jun 23	-	18.1	12.0	0.814	0.447	0.177	0.0352	4.23	0.534
			Jul 28	1	9.59	11.0	0.798	0.450	0.0324	0.00604	0.442	0.524
			Jul 28	2	8.28	13.0	0.735	0.290	0.0259	0.00479	0.370	0.518
			Jul 28	3	7.22	13.0	0.679	0.240	0.0187	0.00342	0.178	0.308
			Jul 28	4	9.36	14.0	0.704	0.241	0.0228	0.00406	0.288	0.364
			Jul 28	5	6.88	12.0	0.720	0.298	0.0133	0.00232	0.181	0.195
			Aug 29	-	3.23	16.0	0.804	0.319	0.00535	0.000975	0.109	0.198
	QUL-ZOO-1	Exposed	Jun 23	-	14.7	10.0	0.797	0.493	0.0658	0.0129	1.36	0.151
			Jul 28	1	11.2	14.0	0.726	0.261	0.0249	0.00458	0.271	0.592
			Jul 28	2	5.10	13.0	0.722	0.277	0.0117	0.00213	0.0904	0.152
			Jul 28	3	6.28	14.0	0.805	0.366	0.0145	0.00265	0.146	0.178
			Jul 28	4	10.1	11.0	0.796	0.446	0.0233	0.00421	0.263	0.435
			Jul 28	5	6.54	11.0	0.732	0.339	0.0152	0.00279	0.160	0.177
			Aug 29	-	4.43	12.0	0.781	0.381	0.00873	0.00162	0.108	0.210

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. mg/L = milligrams per litre. Zooplankton data for area QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.7: Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023

Year	Area	Type	Date	Replicate	Density (organisms/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Wet Weight Biomass (mg/L)	Dry Weight Biomass (mg/L)	Calanoida (organisms/L)	Cladocera (organisms/L)
2022	QUL-ZOO-7	Reference	Jun 22	1	5.46	9.00	0.817	0.607	0.0510	0.00992	0.772	0.0154
			Jul 27	1	5.29	11.0	0.797	0.449	0.0226	0.00418	0.154	0.0803
			Jul 27	2	11.9	11.0	0.479	0.175	0.0360	0.00503	0.0782	0.0761
			Jul 27	3	3.10	9.00	0.725	0.404	0.0135	0.00234	0.0759	0.0537
			Jul 27	4	4.03	9.00	0.817	0.608	0.0212	0.00403	0.163	0.163
			Jul 27	5	5.53	10.0	0.774	0.442	0.0203	0.00350	0.102	0.157
			Aug 28	1	2.31	11.0	0.793	0.439	0.0127	0.00246	0.0597	0.144
	QUL-ZOO-1	Exposed	Jun 22	-	2.88	10.0	0.828	0.581	0.0261	0.00508	0.384	0.0340
			Jul 27	1	6.77	9.00	0.811	0.587	0.0254	0.00458	0.133	0.136
			Jul 27	2	7.76	10.0	0.805	0.514	0.0287	0.00518	0.163	0.153
			Jul 28	3	11.7	12.0	0.774	0.368	0.0352	0.00585	0.139	0.139
			Jul 28	4	3.72	10.0	0.823	0.564	0.0196	0.00369	0.0988	0.121
			Jul 28	5	4.65	11.0	0.813	0.485	0.0191	0.00347	0.0926	0.0895
			Aug 28	-	3.65	12.0	0.799	0.415	0.0205	0.00401	0.0833	0.262
2023	QUL-ZOO-7	Reference	Jun 21	1	10.1	12.0	0.737	0.317	0.0953	0.0190	0.608	0.131
			Jul 26	1	17.3	12.0	0.793	0.403	0.0763	0.0148	0.920	0.690
			Jul 26	2	17.3	13.0	0.705	0.260	0.0408	0.00763	0.419	0.312
			Jul 26	3	5.77	15.0	0.704	0.225	0.0123	0.00230	0.149	0.0640
			Jul 26	4	17.7	12.0	0.745	0.327	0.0643	0.0124	0.881	0.565
			Jul 26	5	16.4	13.0	0.751	0.309	0.0454	0.00866	0.715	0.296
			Aug 27	1	6.32	10.0	0.820	0.555	0.0263	0.00512	0.345	0.164
	QUL-ZOO-1	Exposed	Jun 21	-	2.92	11.0	0.747	0.359	0.0253	0.00505	0.113	0.00939
			Jul 26	1	8.07	12.0	0.773	0.367	0.0342	0.00669	0.485	0.173
			Jul 26	2	15.0	14.0	0.747	0.282	0.0558	0.0108	0.701	0.383
			Jul 26	3	14.9	11.0	0.744	0.355	0.0569	0.0110	0.865	0.307
			Jul 26	4	29.7	13.0	0.736	0.292	0.0882	0.0168	1.36	0.657
			Jul 26	5	8.69	11.0	0.745	0.356	0.0339	0.00656	0.519	0.164
			Aug 27	-	14.1	11.0	0.737	0.346	0.0421	0.00800	0.633	0.394

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. mg/L = milligrams per litre. Zooplankton data for area QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.7: Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023

Year	Area	Type	Date	Replicate	Copepod Nauplii (organisms/L)	Cyclopoida (organisms/L)	Rotifera (organisms/L)	Calanoida (%)	Cladocera (%)	Copepod Nauplii (%)	Cyclopoida (%)	Rotifera (%)
2019	QUL-ZOO-7	Reference	Jun 25	1	0.662	2.56	3.26	10.8	3.90	8.71	33.6	42.9
			Jul 30	1	0.205	0.712	2.08	7.88	5.91	5.91	20.5	59.8
			Jul 30	2	0.0913	0.689	1.76	5.90	5.11	3.19	24.1	61.7
			Jul 30	3	0.0913	0.808	2.28	8.00	4.88	2.50	22.1	62.5
			Jul 30	4	0.0913	0.589	1.70	4.90	6.76	3.38	21.8	63.1
			Jul 30	5	0.0685	0.698	2.17	6.68	5.59	2.05	20.9	64.8
			Aug 29	1	0.0761	0.317	0.867	8.39	5.75	5.18	21.6	59.1
	QUL-ZOO-1	Exposed	Jun 25	1	1.25	2.02	2.03	8.70	1.35	21.3	34.2	34.4
			Jul 30	1	0.297	0.383	1.89	6.26	4.03	10.3	13.4	66.0
			Jul 30	2	0.205	0.347	2.26	5.03	3.75	6.66	11.2	73.3
			Jul 30	3	0.434	0.648	2.12	7.96	4.73	11.8	17.7	57.8
			Jul 30	4	0.297	0.584	2.83	7.01	3.94	7.12	14.0	67.9
			Jul 30	5	0.319	0.539	1.35	7.67	5.89	12.5	21.1	52.9
			Aug 29	1	0.167	0.186	0.791	3.39	5.57	13.3	14.8	63.0
2020	QUL-ZOO-7	Reference	Jun 23	-	2.03	3.12	1.56	21.7	1.41	23.2	35.8	17.9
			Jul 28	1	1.28	1.47	6.31	6.24	1.92	13.0	14.9	64.0
			Jul 28	2	1.48	0.838	8.67	2.61	0.564	13.0	7.38	76.4
			Jul 28	3	0.789	0.877	5.62	5.25	1.27	10.1	11.3	72.1
			Jul 28	4	1.28	1.30	8.13	3.64	2.17	11.3	11.4	71.5
			Jul 28	5	1.15	1.15	22.0	1.67	1.12	4.60	4.60	88.0
			Aug 27	-	0.715	0.690	1.95	18.6	37.8	9.29	8.97	25.3
	QUL-ZOO-1	Exposed	Jun 23	-	0.712	3.15	3.45	32.1	0.605	6.55	29.0	31.8
			Jul 28	1	3.37	1.75	7.31	4.79	1.33	25.4	13.2	55.2
			Jul 28	2	0.986	0.838	3.89	6.32	3.66	15.5	13.2	61.3
			Jul 28	3	1.28	0.622	9.22	4.33	1.41	10.9	5.27	78.1
			Jul 28	4	0.542	0.606	5.42	7.29	1.84	7.50	8.38	75.0
			Jul 28	5	1.87	0.818	12.7	2.91	1.50	11.6	5.08	78.9
			Aug 27	-	0.912	0.758	3.20	4.60	4.48	17.0	14.1	59.8
2021	QUL-ZOO-7	Reference	Jun 23	-	6.00	3.90	3.45	23.4	2.95	33.1	21.5	19.1
			Jul 28	1	1.44	1.27	5.91	4.61	5.46	15.0	13.3	61.7
			Jul 28	2	0.575	0.986	5.83	4.47	6.25	6.94	11.9	70.4
			Jul 28	3	0.329	0.904	5.50	2.47	4.27	4.55	12.5	76.2
			Jul 28	4	0.780	0.786	7.15	3.07	3.88	8.33	8.40	76.3
			Jul 28	5	0.575	0.387	5.54	2.64	2.83	8.35	5.62	80.6
			Aug 29	-	0.460	0.391	2.07	3.38	6.13	14.2	12.1	64.1
	QUL-ZOO-1	Exposed	Jun 23	-	7.31	1.71	4.19	9.21	1.02	49.7	11.6	28.5
			Jul 28	1	1.38	1.09	7.82	2.43	5.30	12.4	9.79	70.1
			Jul 28	2	0.493	0.587	3.78	1.77	2.98	9.66	11.5	74.1
			Jul 28	3	0.986	0.662	4.31	2.32	2.83	15.7	10.5	68.6
			Jul 28	4	1.81	0.986	6.61	2.60	4.31	17.9	9.76	65.5
			Jul 28	5	0.945	0.698	4.56	2.45	2.70	14.4	10.7	69.7
			Aug 29	-	0.986	0.682	2.44	2.44	4.73	22.3	15.4	55.2

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. mg/L = milligrams per litre. Zooplankton data for area QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.7: Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2023

Year	Area	Type	Date	Replicate	Copepod Nauplii (organisms/L)	Cyclopoida (organisms/L)	Rotifera (organisms/L)	Calanoida (%)	Cladocera (%)	Copepod Nauplii (%)	Cyclopoida (%)	Rotifera (%)
2022	QUL-ZOO-7	Reference	Jun 22	1	1.34	1.31	2.02	14.1	0.282	24.6	24.0	37.0
			Jul 27	1	1.42	0.549	3.09	2.92	1.52	26.8	10.4	58.3
			Jul 27	2	0.648	0.434	10.7	0.654	0.637	5.43	3.63	89.7
			Jul 27	3	0.574	0.289	2.11	2.45	1.73	18.5	9.31	68.0
			Jul 27	4	0.722	0.496	2.48	4.05	4.05	17.9	12.3	61.6
			Jul 27	5	0.741	0.423	4.11	1.84	2.84	13.4	7.64	74.3
			Aug 28	1	0.545	0.296	1.27	2.58	6.24	23.6	12.8	54.8
	QUL-ZOO-1	Exposed	Jun 22	-	0.815	0.676	0.973	13.3	1.18	28.3	23.4	33.8
			Jul 27	1	1.39	0.602	4.51	1.96	2.01	20.5	8.90	66.6
			Jul 27	2	2.07	0.689	4.69	2.10	1.97	26.7	8.88	60.4
			Jul 28	3	1.54	0.692	9.18	1.19	1.19	13.2	5.92	78.5
			Jul 28	4	0.633	0.509	2.36	2.65	3.24	17.0	13.7	63.4
			Jul 28	5	0.895	0.460	3.12	1.99	1.92	19.2	9.88	67.0
			Aug 28	-	0.772	0.407	2.13	2.28	7.18	21.1	11.2	58.3
2023	QUL-ZOO-7	Reference	Jun 21	1	3.48	3.80	2.04	6.05	1.31	34.6	37.8	20.3
			Jul 26	1	1.38	2.12	12.2	5.31	3.98	7.96	12.2	70.5
			Jul 26	2	0.329	1.13	15.1	2.42	1.80	1.90	6.51	87.4
			Jul 26	3	0.230	0.299	5.03	2.58	1.11	3.99	5.19	87.1
			Jul 26	4	0.394	1.58	14.3	4.98	3.20	2.23	8.92	80.7
			Jul 26	5	0.789	0.912	13.7	4.36	1.81	4.81	5.57	83.5
			Aug 27	1	0.624	0.685	4.50	5.46	2.60	9.88	10.8	71.2
	QUL-ZOO-1	Exposed	Jun 21	-	0.969	1.07	0.756	3.86	0.322	33.2	36.7	25.9
			Jul 26	1	0.723	1.01	5.68	6.00	2.14	8.95	12.5	70.4
			Jul 26	2	0.854	1.48	11.6	4.68	2.56	5.70	9.87	77.2
			Jul 26	3	1.25	1.28	11.2	5.82	2.06	8.39	8.62	75.1
			Jul 26	4	1.71	1.82	24.1	4.60	2.21	5.76	6.15	81.3
			Jul 26	5	0.559	0.749	6.70	5.97	1.89	6.42	8.62	77.1
			Aug 27	-	0.526	0.879	11.7	4.48	2.79	3.72	6.22	82.8

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. mg/L = milligrams per litre. Zooplankton data for area QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.8: Summary Statistics for Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (organisms/L)	2019	QUL-ZOO-7	Reference	5	3.21	0.408	2.70	3.35	3.65
		QUL-ZOO-1	Exposure	5	3.27	0.645	2.56	3.08	4.17
	2020	QUL-ZOO-7	Reference	5	13.1	6.83	7.79	11.3	25.0
		QUL-ZOO-1	Exposed	5	10.9	4.11	6.35	11.8	16.1
	2021	QUL-ZOO-7	Reference	5	8.27	1.22	6.88	8.28	9.59
		QUL-ZOO-1	Exposed	5	7.84	2.63	5.10	6.54	11.2
	2022	QUL-ZOO-7	Reference	5	5.98	3.48	3.10	5.29	11.9
		QUL-ZOO-1	Exposed	5	6.92	3.12	3.72	6.77	11.7
	2023	QUL-ZOO-7	Reference	5	14.9	5.12	5.77	17.3	17.7
		QUL-ZOO-1	Exposed	5	15.3	8.70	8.07	14.9	29.7
Richness (# of Taxa)	2019	QUL-ZOO-7	Reference	5	9.20	0.837	8.00	9.00	10.0
		QUL-ZOO-1	Exposure	5	10.2	0.447	10.0	10.0	11.0
	2020	QUL-ZOO-7	Reference	5	10.6	1.14	9.00	11.0	12.0
		QUL-ZOO-1	Exposed	5	11.6	0.548	11.0	12.0	12.0
	2021	QUL-ZOO-7	Reference	5	12.6	1.14	11.0	13.0	14.0
		QUL-ZOO-1	Exposed	5	12.6	1.52	11.0	13.0	14.0
	2022	QUL-ZOO-7	Reference	5	10.0	1.00	9.00	10.0	11.0
		QUL-ZOO-1	Exposed	5	10.4	1.14	9.00	10.0	12.0
	2023	QUL-ZOO-7	Reference	5	13.0	1.22	12.0	13.0	15.0
		QUL-ZOO-1	Exposed	5	12.2	1.30	11.0	12.0	14.0
Simpson's Diversity	2019	QUL-ZOO-7	Reference	5	0.759	0.0259	0.738	0.747	0.802
		QUL-ZOO-1	Exposure	5	0.759	0.0395	0.717	0.751	0.812
	2020	QUL-ZOO-7	Reference	5	0.684	0.0616	0.578	0.708	0.730
		QUL-ZOO-1	Exposed	5	0.782	0.0275	0.758	0.771	0.814
	2021	QUL-ZOO-7	Reference	5	0.727	0.0445	0.679	0.720	0.798
		QUL-ZOO-1	Exposed	5	0.756	0.0407	0.722	0.732	0.805
	2022	QUL-ZOO-7	Reference	5	0.719	0.138	0.479	0.774	0.817
		QUL-ZOO-1	Exposed	5	0.805	0.0186	0.774	0.811	0.823
	2023	QUL-ZOO-7	Reference	5	0.740	0.0372	0.704	0.745	0.793
		QUL-ZOO-1	Exposed	5	0.749	0.0139	0.736	0.745	0.773
Simpson's Evenness	2019	QUL-ZOO-7	Reference	5	0.459	0.0606	0.382	0.440	0.534
		QUL-ZOO-1	Exposure	5	0.418	0.0787	0.353	0.370	0.531
	2020	QUL-ZOO-7	Reference	5	0.305	0.0338	0.264	0.298	0.342
		QUL-ZOO-1	Exposed	5	0.403	0.0582	0.344	0.378	0.480
	2021	QUL-ZOO-7	Reference	5	0.304	0.0860	0.240	0.290	0.450
		QUL-ZOO-1	Exposed	5	0.338	0.0744	0.261	0.339	0.446
	2022	QUL-ZOO-7	Reference	5	0.416	0.156	0.175	0.442	0.608
		QUL-ZOO-1	Exposed	5	0.504	0.0857	0.368	0.514	0.587
	2023	QUL-ZOO-7	Reference	5	0.305	0.0680	0.225	0.309	0.403
		QUL-ZOO-1	Exposed	5	0.330	0.0401	0.282	0.355	0.367
Wet Weight Biomass (mg/L)	2019	QUL-ZOO-7	Exposed	5	0.0240	0.00348	0.0195	0.0243	0.0277
		QUL-ZOO-1	Exposed	5	0.0197	0.00491	0.0142	0.0200	0.0253
	2020	QUL-ZOO-7	Exposed	5	0.0374	0.00938	0.0268	0.0368	0.0492
		QUL-ZOO-1	Exposed	5	0.0377	0.00904	0.0313	0.0346	0.0532
	2021	QUL-ZOO-7	Exposed	5	0.0226	0.00720	0.0133	0.0228	0.0324
		QUL-ZOO-1	Exposed	5	0.0180	0.00583	0.0117	0.0152	0.0249
	2022	QUL-ZOO-7	Exposed	5	0.0227	0.00821	0.0135	0.0212	0.0360
		QUL-ZOO-1	Exposed	5	0.0256	0.00670	0.0191	0.0254	0.0352
	2023	QUL-ZOO-7	Exposed	5	0.0478	0.0245	0.0123	0.0454	0.0763
		QUL-ZOO-1	Exposed	5	0.0538	0.0222	0.0339	0.0558	0.0882
Dry Weight Biomass (mg/L)	2019	QUL-ZOO-7	Reference	5	0.00474	0.000690	0.00387	0.00481	0.00548
		QUL-ZOO-1	Exposure	5	0.00390	0.000983	0.00277	0.00396	0.00501
	2020	QUL-ZOO-7	Reference	5	0.00703	0.00178	0.00500	0.00698	0.00955
		QUL-ZOO-1	Exposed	5	0.00724	0.00179	0.00605	0.00655	0.0104
	2021	QUL-ZOO-7	Reference	5	0.00412	0.00140	0.00232	0.00406	0.00604
		QUL-ZOO-1	Exposed	5	0.00327	0.00106	0.00213	0.00279	0.00458
	2022	QUL-ZOO-7	Reference	5	0.00382	0.000989	0.00234	0.00403	0.00503
		QUL-ZOO-1	Exposed	5	0.00455	0.00100	0.00347	0.00458	0.00585
	2023	QUL-ZOO-7	Reference	5	0.00916	0.00480	0.00230	0.00866	0.0148
		QUL-ZOO-1	Exposed	5	0.0104	0.00420	0.00656	0.0108	0.0168
Calanoida (organisms/L)	2019	QUL-ZOO-7	Reference	5	0.218	0.0678	0.132	0.224	0.292
		QUL-ZOO-1	Exposure	5	0.223	0.0647	0.155	0.196	0.292
	2020	QUL-ZOO-7	Reference	5	0.431	0.116	0.296	0.414	0.616
		QUL-ZOO-1	Exposed	5	0.508	0.0854	0.401	0.511	0.634
	2021	QUL-ZOO-7	Reference	5	0.292	0.116	0.178	0.288	0.442
		QUL-ZOO-1	Exposed	5	0.186	0.0784	0.0904	0.160	0.271
	2022	QUL-ZOO-7	Reference	5	0.115	0.0415	0.0759	0.102	0.163
		QUL-ZOO-1	Exposed	5	0.125	0.0293	0.0926	0.133	0.163
	2023	QUL-ZOO-7	Reference	5	0.617	0.328	0.149	0.715	0.920
		QUL-ZOO-1	Exposed	5	0.787	0.357	0.485	0.701	1.36
Cladocera (organisms/L)	2019	QUL-ZOO-7	Reference	5	0.180	0.0216	0.146	0.183	0.205
		QUL-ZOO-1	Exposure	5	0.144	0.0271	0.116	0.151	0.173
	2020	QUL-ZOO-7	Reference	5	0.175	0.0926	0.0641	0.189	0.279
		QUL-ZOO-1	Exposure	5	0.190	0.0459	0.133	0.176	0.242
	2021	QUL-ZOO-7	Reference	5	0.382	0.141	0.195	0.364	0.524
		QUL-ZOO-1	Exposed	5	0.307	0.197	0.152	0.178	0.592
	2022	QUL-ZOO-7	Reference	5	0.106	0.0504	0.0537	0.0803	0.163
		QUL-ZOO-1	Exposed	5	0.128	0.0241	0.0895	0.136	0.153
	2023	QUL-ZOO-7	Reference	5	0.385	0.246	0.0640	0.312	0.690
		QUL-ZOO-1	Exposed	5	0.337	0.202	0.164	0.307	0.657
Copepod Nauplii (organisms/L)	2019	QUL-ZOO-7	Reference	5	0.110	0.0545	0.0685	0.0913	0.205
		QUL-ZOO-1	Exposed	5	0.310	0.0816	0.205	0.297	0.434
	2020	QUL-ZOO-7	Reference	5	1.20	0.256	0.789	1.28	1.48
		QUL-ZOO-1	Exposed	5	1.61	1.10	0.542	1.28	3.37
	2021	QUL-ZOO-7	Reference	5	0.739	0.422	0.329	0.575	1.44
		QUL-ZOO-1	Exposed	5	1.12	0.495	0.493	0.986	1.81
	2022	QUL-ZOO-7	Reference	5	0.821	0.341	0.574	0.722	1.42
		QUL-ZOO-1	Exposed	5	1.31	0.564	0.633	1.39	2.07
	2023	QUL-ZOO-7	Reference	5	0.624	0.473	0.230	0.394	1.38
		QUL-ZOO-1	Exposed	5	1.02	0.462	0.559	0.854	1.71

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.7.

Table C.3.8: Summary Statistics for Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2023[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Cyclopoida (organisms/L)	2019	QUL-ZOO-7	Reference	5	0.699	0.0779	0.589	0.698	0.808
		QUL-ZOO-1	Exposed	5	0.500	0.130	0.347	0.539	0.648
	2020	QUL-ZOO-7	Reference	5	1.13	0.271	0.838	1.15	1.47
		QUL-ZOO-1	Exposed	5	0.927	0.472	0.606	0.818	1.75
	2021	QUL-ZOO-7	Reference	5	0.867	0.323	0.387	0.904	1.27
		QUL-ZOO-1	Exposed	5	0.805	0.221	0.587	0.698	1.09
	2022	QUL-ZOO-7	Reference	5	0.438	0.0978	0.289	0.434	0.549
		QUL-ZOO-1	Exposed	5	0.590	0.105	0.460	0.602	0.692
	2023	QUL-ZOO-7	Reference	5	1.21	0.687	0.299	1.13	2.12
		QUL-ZOO-1	Exposed	5	1.27	0.415	0.749	1.28	1.82
Rotifera (organisms/L)	2019	QUL-ZOO-7	Reference	5	2.00	0.253	1.70	2.08	2.28
		QUL-ZOO-1	Exposed	5	2.09	0.538	1.35	2.12	2.83
	2020	QUL-ZOO-7	Reference	5	10.2	6.75	5.62	8.13	22.0
		QUL-ZOO-1	Exposed	5	7.71	3.44	3.89	7.31	12.7
	2021	QUL-ZOO-7	Reference	5	5.99	0.671	5.50	5.83	7.15
		QUL-ZOO-1	Exposed	5	5.42	1.72	3.78	4.56	7.82
	2022	QUL-ZOO-7	Reference	5	4.50	3.55	2.11	3.09	10.7
		QUL-ZOO-1	Exposed	5	4.77	2.65	2.36	4.51	9.18
	2023	QUL-ZOO-7	Reference	5	12.1	4.07	5.03	13.7	15.1
		QUL-ZOO-1	Exposed	5	11.8	7.34	5.68	11.2	24.1
Calanoida (%)	2019	QUL-ZOO-7	Reference	5	6.68	1.32	4.90	6.68	8.00
		QUL-ZOO-1	Exposed	5	6.79	1.18	5.03	7.01	7.96
	2020	QUL-ZOO-7	Reference	5	3.88	1.87	1.67	3.64	6.24
		QUL-ZOO-1	Exposed	5	5.13	1.72	2.91	4.79	7.29
	2021	QUL-ZOO-7	Reference	5	3.45	1.02	2.47	3.07	4.61
		QUL-ZOO-1	Exposed	5	2.32	0.320	1.77	2.43	2.60
	2022	QUL-ZOO-7	Reference	5	2.38	1.26	0.654	2.45	4.05
		QUL-ZOO-1	Exposed	5	1.98	0.523	1.19	1.99	2.65
	2023	QUL-ZOO-7	Reference	5	3.93	1.35	2.42	4.36	5.31
		QUL-ZOO-1	Exposed	5	5.41	0.712	4.60	5.82	6.00
Cladocera (%)	2019	QUL-ZOO-7	Reference	5	5.65	0.743	4.88	5.59	6.76
		QUL-ZOO-1	Exposed	5	4.47	0.874	3.75	4.03	5.89
	2020	QUL-ZOO-7	Reference	5	1.41	0.642	0.564	1.27	2.17
		QUL-ZOO-1	Exposed	5	1.95	0.976	1.33	1.50	3.66
	2021	QUL-ZOO-7	Reference	5	4.54	1.34	2.83	4.27	6.25
		QUL-ZOO-1	Exposed	5	3.62	1.14	2.70	2.98	5.30
	2022	QUL-ZOO-7	Reference	5	2.16	1.32	0.637	1.73	4.05
		QUL-ZOO-1	Exposed	5	2.06	0.738	1.19	1.97	3.24
	2023	QUL-ZOO-7	Reference	5	2.38	1.17	1.11	1.81	3.98
		QUL-ZOO-1	Exposed	5	2.17	0.247	1.89	2.14	2.56
Copepod Nauplii (%)	2019	QUL-ZOO-7	Reference	5	3.41	1.50	2.05	3.19	5.91
		QUL-ZOO-1	Exposed	5	9.68	2.67	6.66	10.3	12.5
	2020	QUL-ZOO-7	Reference	5	10.4	3.47	4.60	11.3	13.0
		QUL-ZOO-1	Exposed	5	14.2	6.91	7.50	11.6	25.4
	2021	QUL-ZOO-7	Reference	5	8.63	3.88	4.55	8.33	15.0
		QUL-ZOO-1	Exposed	5	14.0	3.15	9.66	14.4	17.9
	2022	QUL-ZOO-7	Reference	5	16.4	7.83	5.43	17.9	26.8
		QUL-ZOO-1	Exposed	5	19.3	4.96	13.2	19.2	26.7
	2023	QUL-ZOO-7	Reference	5	4.18	2.44	1.90	3.99	7.96
		QUL-ZOO-1	Exposed	5	7.05	1.53	5.70	6.42	8.95
Cyclopoida (%)	2019	QUL-ZOO-7	Reference	5	21.9	1.40	20.5	21.8	24.1
		QUL-ZOO-1	Exposed	5	15.5	3.88	11.2	14.0	21.1
	2020	QUL-ZOO-7	Reference	5	9.92	3.99	4.60	11.3	14.9
		QUL-ZOO-1	Exposed	5	9.03	4.03	5.08	8.38	13.2
	2021	QUL-ZOO-7	Reference	5	10.3	3.23	5.62	11.9	13.3
		QUL-ZOO-1	Exposed	5	10.4	0.725	9.76	10.5	11.5
	2022	QUL-ZOO-7	Reference	5	8.66	3.28	3.63	9.31	12.3
		QUL-ZOO-1	Exposed	5	9.45	2.79	5.92	8.90	13.7
	2023	QUL-ZOO-7	Reference	5	7.68	2.93	5.19	6.51	12.2
		QUL-ZOO-1	Exposed	5	9.15	2.31	6.15	8.62	12.5
Rotifera (%)	2019	QUL-ZOO-7	Reference	5	62.4	1.85	59.8	62.5	64.8
		QUL-ZOO-1	Exposed	5	63.6	8.15	52.9	66.0	73.3
	2020	QUL-ZOO-7	Reference	5	74.4	8.84	64.0	72.1	88.0
		QUL-ZOO-1	Exposed	5	69.7	10.8	55.2	75.0	78.9
	2021	QUL-ZOO-7	Reference	5	73.0	7.30	61.7	76.2	80.6
		QUL-ZOO-1	Exposed	5	69.6	3.10	65.5	69.7	74.1
	2022	QUL-ZOO-7	Reference	5	70.4	12.4	58.3	68.0	89.7
		QUL-ZOO-1	Exposed	5	67.2	6.88	60.4	66.6	78.5
	2023	QUL-ZOO-7	Reference	5	81.8	6.91	70.5	83.5	87.4
		QUL-ZOO-1	Exposed	5	76.2	3.95	70.4	77.1	81.3

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2023. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.7.

Grid Format Report : Bootjack Lake North Station B1 surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207972 : B1-S														
	22-May-19	12-Jun-19	23-Jul-19	29-Aug-19	16-Sep-19	23-Oct-19	4-Jun-20	19-Jun-20	14-Jul-20	19-Aug-20	9-Sep-20	30-Sep-20	27-Oct-20	26-May-21	10-Jun-21
Secchi Depth (m)	6.55	6.85	6.15	4.5	5	4	3	5.1	4.25	4.25	5.4	2.5	2.75	3	6

	E207972 : B1-S														
	15-Jul-21	24-Aug-21	28-Sep-21	19-Oct-21	1-Nov-21	24-May-22	16-Jun-22	11-Jul-22	24-Aug-22	19-Sep-22	26-Oct-22	24-May-23	8-Jun-23	12-Jul-23	23-Aug-23
Secchi Depth (m)	5.75	4.75	4.5	4	4	2.5	4.5	5	5.5	4.25	3.5	4.2	6.1	5	5

	E207972 : B1-S	
	7-Sep-23	10-Oct-23
Secchi Depth (m)	4.95	2.5

Grid Format Report : Bootjack Lake North Station B1 surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207972 : B1-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	32	32	2.50000	6.85000	4.54063	6.53250	1.18855

Grid Format Report : Bootjack Lake South Station B2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-DI								
	22-Jun-20	29-Jul-20	30-Aug-20	22-Jun-21	27-Jul-21	30-Aug-21	21-Jun-22	28-Aug-22	21-Jun-23
Secchi Depth (m)	4	6	4.75	4.25	6.2	3.8	4	4.75	5

Grid Format Report : Bootjack Lake South Station B2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	9	9	3.80000	6.20000	4.75000		0.86639

Grid Format Report : Bootjack Lake South Station B2 surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-S														
	22-May-19	12-Jun-19	25-Jun-19	23-Jul-19	31-Jul-19	29-Aug-19	4-Sep-19	16-Sep-19	23-Oct-19	4-Jun-20	18-Jun-20	14-Jul-20	19-Aug-20	9-Sep-20	29-Sep-20
Secchi Depth (m)	7.8	5.75	5	6.25	5.25	4.25	6.5	5.5	4	4	5.75	5	4.25	5.2	5

	E215897 : B2-S														
	27-Oct-20	26-May-21	10-Jun-21	15-Jul-21	24-Aug-21	28-Sep-21	19-Oct-21	1-Nov-21	24-May-22	16-Jun-22	11-Jul-22	24-Aug-22	19-Sep-22	26-Oct-22	24-May-23
Secchi Depth (m)	2.5	3.1	6.1	6	5.5	5	3.75	3.75	2.5	5	5	5.5	4.5	4.25	4.4

	E215897 : B2-S				
	8-Jun-23	12-Jul-23	23-Aug-23	7-Sep-23	10-Oct-23
Secchi Depth (m)	5.8	6.25	5.25	5.6	3

Grid Format Report : Bootjack Lake South Station B2 surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E215897 : B2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	35	35	2.50000	7.80000	4.92143	7.10450	1.16039

Grid Format Report : Polley Lake North Station P1-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207974 : P1-S														
	16-May-19	27-May-19	6-Jun-19	24-Jun-19	15-Jul-19	13-Aug-19	11-Sep-19	9-Oct-19	20-Nov-19	14-Apr-20	15-Jun-20	19-Aug-20	8-Sep-20	29-Sep-20	26-Oct-20
Secchi Depth (m)	3.95	4.75	4.5	6.5	8	6.5	7.25	7.25	3.5	7	3.5	5.5	6.1	5.5	4.75

	E207974 : P1-S														
	18-Nov-20	6-May-21	3-Jun-21	20-Jul-21	18-Aug-21	13-Sep-21	19-Oct-21	2-Nov-21	17-May-22	20-Jun-22	13-Jul-22	30-Aug-22	12-Sep-22	12-Oct-22	9-May-23
Secchi Depth (m)	4.25	4	5.25	7	6.5	9	6.25	3.5	3.1	4.25	5.5	6.95	4.75	6.5	3.7

	E207974 : P1-S				
	12-Jun-23	26-Jul-23	24-Aug-23	28-Sep-23	18-Oct-23
Secchi Depth (m)	8.8	4.5	5.75	6.5	4.5

Grid Format Report : Polley Lake North Station P1-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207974 : P1-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	35	35	3.10000	9.00000	5.57429	7.50000	1.54764

Grid Format Report : Polley Lake South Station P2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-DI								
	22-Jun-20	27-Jul-20	30-Aug-20	22-Jun-21	26-Jul-21	30-Aug-21	21-Jun-22	25-Aug-22	20-Jun-23
Secchi Depth (m)	4	6.5	6.5	6.75	4	7.5	4.5	6	4.5

Grid Format Report : Polley Lake South Station P2-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	9	9	4.00000	7.50000	5.58333		1.33463

Grid Format Report : Polley Lake South Station P2-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-S														
	16-May-19	27-May-19	6-Jun-19	24-Jun-19	15-Jul-19	29-Jul-19	13-Aug-19	28-Aug-19	11-Sep-19	9-Oct-19	20-Nov-19	15-Jun-20	14-Jul-20	19-Aug-20	8-Sep-20
Secchi Depth (m)	3.55	4.4	4.25	6.5	7.85	5.25	6.75	7.25	6.5	7	4	3	6.5	6	6.5

	E207975 : P2-S														
	29-Sep-20	26-Oct-20	18-Nov-20	6-May-21	3-Jun-21	20-Jul-21	18-Aug-21	13-Sep-21	19-Oct-21	2-Nov-21	17-May-22	20-Jun-22	13-Jul-22	30-Aug-22	12-Sep-22
Secchi Depth (m)	6.5	5	2	3.75	5.75	6.5	6	9.5	5.5	4.25	4.25	4.5	4.75	7.15	6.25

	E207975 : P2-S							
	12-Oct-22	1-Mar-23	9-May-23	12-Jun-23	26-Jul-23	24-Aug-23	28-Sep-23	18-Oct-23
Secchi Depth (m)	7	0	3.5	8.1	4	4.75	6.75	6

Grid Format Report : Polley Lake South Station P2-surface

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E207975 : P2-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	38	38	0.00000	9.50000	5.44868	7.50000	1.81151

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-0m														
	19-Jun-19	19-Aug-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22	10-May-23
Secchi Depth (m)	4	10.5	6	6.75	8	6.3	6	8	7	10.25	8	5.75	10.5	8.25	12.3

	E303022 : QUL-120a-0m		
	26-Jun-23	11-Sep-23	30-Oct-23
Secchi Depth (m)	10.25	5.2	6.5

Grid Format Report : QUL-120a-0m - Quesnel Lake Beyond

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303022 : QUL-120a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	18	18	4.00000	12.30000	7.75278	12.32000	2.23189

Grid Format Report : QUL-18-0m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-0m														
	19-Jun-19	19-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22	19-Oct-22
Secchi Depth (m)	6	6.9	8	4.5	5	6.25	6.5	6.8	9.5	11	10	7.25	4.75	5.5	7.75

	E303019 : QUL-18-0m			
	11-May-23	26-Jun-23	11-Sep-23	30-Oct-23
Secchi Depth (m)	10.1	8.5	5.6	7.95

Grid Format Report : QUL-18-0m - QUL Deep Site in Middle of

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303019 : QUL-18-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	19	19	4.50000	11.00000	7.25526	11.79000	1.91173

Grid Format Report : QUL-2a-0m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-0m														
	18-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	16-Jun-20	11-Aug-20	16-Sep-20	4-Nov-20	19-May-21	21-Jul-21	15-Sep-21	27-Oct-21	9-May-22	27-Jun-22	15-Aug-22
Secchi Depth (m)	8.1	8.65	6	10	3.5	5.5	7.5	7	5.9	5.5	7	10.5	8.25	4	9.5

	E303020 : QUL-2a-0m					
	19-Oct-22	11-May-23	19-Jun-23	26-Jun-23	11-Sep-23	30-Oct-23
Secchi Depth (m)	8	9.4	6	8	4.6	6.9

Grid Format Report : QUL-2a-0m - QUL Between Cariboo Island

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E303020 : QUL-2a-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	21	21	3.50000	10.50000	7.13333	13.10000	1.94116

Grid Format Report : QUL-57-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304874 : QUL-57-S														
	25-Apr-19	2-May-19	8-May-19	15-May-19	21-May-19	18-Jun-19	20-Aug-19	30-Oct-19	2-Jun-20	16-Jun-20	24-Jun-20	29-Jun-20	11-Aug-20	16-Sep-20	10-Nov-20
Secchi Depth (m)	9.45	9.4	7	8.05	5.5	9.05	5.5	9.9	3.5	5	4.25	5.5	5.5	5.8	10.6

	E304874 : QUL-57-S													
	19-May-21	2-Jun-21	21-Jul-21	16-Sep-21	27-Oct-21	10-May-22	27-Jun-22	16-Aug-22	19-Oct-22	10-May-23	17-May-23	27-Jun-23	14-Sep-23	31-Oct-23
Secchi Depth (m)	6	5.25	8	12.2	10	10.1	4.25	9.0	7	8.7	9.3	10	5.6	7.05

Grid Format Report : QUL-57-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304874 : QUL-57-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	29	29	3.50000	12.20000	7.46379	11.23000	2.29805

Grid Format Report : QUL-58-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304876 : QUL-58-S														
	25-Apr-19	2-May-19	8-May-19	15-May-19	21-May-19	18-Jun-19	19-Jun-19	25-Jul-19	20-Aug-19	30-Oct-19	2-Jun-20	9-Jun-20	16-Jun-20	24-Jun-20	29-Jun-20
Secchi Depth (m)	9.6	9.1	6.5	7.1	5	8.45	6.5	8.25	6.7	9.75	2.75	3	5	5	9

	E304876 : QUL-58-S														
	11-Aug-20	16-Sep-20	4-Nov-20	4-May-21	11-May-21	25-May-21	2-Jun-21	21-Jul-21	16-Sep-21	27-Oct-21	9-May-22	18-May-22	25-May-22	31-May-22	6-Jun-22
Secchi Depth (m)	5.75	7	6	7	8.5	5.5	5	7.25	13.1	16.25	9.6	0	7.1	7.5	4

	E304876 : QUL-58-S											
	27-Jun-22	16-Aug-22	19-Oct-22	10-May-23	17-May-23	25-May-23	30-May-23	6-Jun-23	19-Jun-23	27-Jun-23	14-Sep-23	31-Oct-23
Secchi Depth (m)	4.5	8.5	8.25	6.8	9.3	8.2	6.8	8.2	6.5	9.9	4.9	7.3

Grid Format Report : QUL-58-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304876 : QUL-58-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	42	42	0.00000	16.25000	7.15238	11.34000	2.71614

Grid Format Report : QUL-59-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304875 : QUL-59-S														
	25-Apr-19	2-May-19	8-May-19	15-May-19	18-Jun-19	20-Aug-19	30-Oct-19	2-Jun-20	16-Jun-20	24-Jun-20	29-Jun-20	11-Aug-20	16-Sep-20	10-Nov-20	19-May-21
Secchi Depth (m)	9.1	8.95	7	7.1	8.2	6.5	9.9	3	4	4.5	8.5	5.2	6.75	10.2	5.9

	E304875 : QUL-59-S												
	2-Jun-21	21-Jul-21	16-Sep-21	27-Oct-21	10-May-22	27-Jun-22	16-Aug-22	19-Oct-22	10-May-23	17-May-23	27-Jun-23	14-Sep-23	31-Oct-23
Secchi Depth (m)	4.75	7	12	10.75	9.6	4	8.75	7.75	7.6	8.6	9.5	5	7

Grid Format Report : QUL-59-S

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E304875 : QUL-59-S						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	28	28	3.00000	12.00000	7.39643	10.87000	2.26777

Grid Format Report : QUL-ZOO-1

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1		
	25-Jun-19	30-Jul-19	29-Aug-19
Secchi Depth (m)	9	5.5	8.5

Grid Format Report : QUL-ZOO-1

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	3	3	5.50000	9.00000	7.66667	13.33750	1.89297

Grid Format Report : QUL-ZOO-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-DI										
	23-Jun-20	28-Jul-20	27-Aug-20	23-Jun-21	28-Jul-21	29-Aug-21	22-Jun-22	28-Aug-22	21-Jun-23	26-Jul-23	27-Aug-23
Secchi Depth (m)	5	4	9	5.75	7	7.7	4	8	9	5.75	5

Grid Format Report : QUL-ZOO-1-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306455 : QUL-ZOO-1-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	11	11	4.00000	9.00000	6.38182		1.85503

Grid Format Report : QUL-ZOO-7

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7		
	25-Jun-19	30-Jul-19	29-Aug-19
Secchi Depth (m)	9	5.5	8.5

Grid Format Report : QUL-ZOO-7

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7						
	Sample (n)	**Count >MDL**	**Min**	**Max**	**Mean**	**95th Percentile**	**St Dev**
Secchi Depth (m)	3	3	5.50000	9.00000	7.66667	13.51750	1.89297

Grid Format Report : QUL-ZOO-7-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-DI									
	23-Jun-20	28-Jul-20	27-Aug-20	23-Jun-21	28-Jul-21	29-Aug-21	22-Jun-22	21-Jun-23	26-Jul-23	27-Aug-23
Secchi Depth (m)	3.5	3.5	7	4.5	5.2	8.8	2.5	6	6	5

Grid Format Report : QUL-ZOO-7-DI

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306456 : QUL-ZOO-7-DI						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	10	10	2.50000	8.80000	5.20000		1.85831

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 : 25-Jun-19
Secchi Depth (m)	9.5

Grid Format Report : QUL-ZOO-8-0m

From 1 Jan 2019 to 31 Dec 2023

Printed : 2024-02-02

Mount Polley

Mining Corporation

IMPERIAL METALS CORPORATION

	E306457 : QUL-ZOO-8-0m						
	Sample (n)	Count >MDL	Min	Max	Mean	95th Percentile	St Dev
Secchi Depth (m)	1	1	9.50000	9.50000	9.50000	12.61250	

Appendix N

Terrestrial Monitoring (DWB)

(Electronic format only)

DWB Consulting Services Ltd.

Mount Polley Mine

Terrestrial Wildlife Monitoring: Vegetation Surveys, Year 4

Engineering | Environmental | Forestry

Prepared for: Mount Polley Mining Corporation
Attn: Gabriel Holmes
PO Box 12, Likely, BC V0L 1N0

Prepared by: DWB Consulting Services Ltd.
Williams Lake Division
#301, 172 Second Avenue North, Williams Lake, BC V2G 1Z6
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Date: 17.01.2024 | DWB file: 23274-279 LB | Revision: 0

OQM | Organizational Quality Management Program

Signature Page

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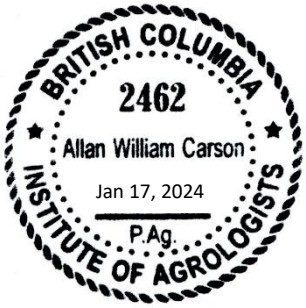
REPORT TITLE: Mount Polley Mine – Terrestrial Wildlife Monitoring: Vegetation Surveys, Year 4

PREPARED FOR: Mount Polley Mining Corporation

REVISION: 0

WRITTEN BY: Laura Kozak, RPF, RPBio



REVIEWED BY: Allan Carson, RPBio, PAg

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- That the use of guidance in the report will lead to any particular outcome or result; or, in particular,
- That by using the guidance in the report, the client will be approved by the contract holder for the applied works.

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1.0 INTRODUCTION

1.1 PROJECT SCOPE

DWB Consulting Services Ltd. (DWB) was retained by Mount Polley Mining Corporation (MPMC) to conduct vegetation surveys along the Hazeltine Creek corridor at the Mount Polley mine (hereafter, referred to as Mount Polley), July 4-6, 2023.

This report provides a summary of the vegetation survey results for 2023, which represents Year 4 of the 5-year study.

1.2 BACKGROUND

The Hazeltine Creek corridor was impacted by a breach in the Mount Polley Tailings Storage Facility (TSF) embankment that occurred in 2014, which released tailings, supernatant, and construction materials into the creek, eroding a wide channel from the Mine Site into Quesnel Lake. Since the event, extensive remediation work has been completed along the corridor, including reconstruction of the Hazeltine Creek channel. Rehabilitation of the riparian habitat was initiated by planting native trees, shrubs, and seeds and using landscape techniques to improve site growing conditions, such as mounding soil, spreading coarse woody debris (CWD), and adding mulch. Passive sediment settling ponds were constructed near the confluence of Hazeltine and Edney Creeks to improve water quality and increase wildlife forage. However, these have since been decommissioned as part of the long-term strategy for channel reconstruction. Nest boxes were installed to increase nesting sites for secondary cavity-nesting species.

An Ecological Risk Assessment conducted for MPMC in 2019 determined that the risk to terrestrial receptors, associated with uptake in metal concentrations in the soil, was low compared to the physical disruption to soil and habitat caused by the TSF breach (Golder, 2019a); therefore, the risk of metal toxicity to wildlife through bioaccumulation was expected to be low. Following the results of the risk assessment, the British Columbia (BC) Ministry of Environment and Climate Change Strategy (ENV) requested a wildlife monitoring plan be developed and implemented as a component of the Mount Polley Comprehensive Environmental Monitoring Plan (CEMP). Golder Associates Inc. addressed the request by implementing a 5-year study that consists of vegetation and bird surveys to track ecological succession, availability of habitat for terrestrial wildlife, and bird species composition along the Hazeltine Creek corridor (Golder, 2019b). The vegetation and bird surveys are considered Phase 1 of Mount Polley's wildlife monitoring program. Phase 2 will incorporate a study design into the program that monitors mammal species, which has now been initiated at Mount Polley.

1.3 STUDY OBJECTIVE

The vegetation study was designed to track ecological succession along the Hazeltine Creek corridor and determine trends in vegetation composition, structure and function over time (Golder, 2019b). In the design, vegetation was identified as the preferred ecological component for the wildlife monitoring plan as a) vegetation is immobile and can be monitored with permanent plots and b) recolonization by plants is expected to be the dominant process during the early stages of ecological succession within the Hazeltine Creek corridor (Corridor).

1.4 STUDY SCOPE

Plots for the vegetation surveys were chosen at 30 locations within the Hazeltine Creek corridor during reconnaissance surveys conducted in July 2018 (Golder, 2019b). The 30 plots were split between six areas of the corridor, and between the different surface treatment methods (e.g., recontouring and CWD placement) used to rehabilitate the areas after being impacted by the breach. Year 1 to Year 4 of the 5-year vegetation survey program was completed by DWB between 2020 and 2023, during which time information on vegetation composition and structure was collected. A long-term trend analysis will be completed in 2025 to determine patterns in vegetation establishment and succession over time. See Section 2.0 for a description of the methods used by DWB to conduct the vegetation surveys.

In February 2021, ENV provided approval for the MPMC CEMP, dated October 31st, 2019. The CEMP approval was subject to additional requirements outlined in the approval letter. In response to the approval conditions, DWB provided a summary of action items to address the gaps between the current CEMP and the conditions identified. One such approval condition was 18b, the need to outline specific objectives and endpoints for vegetation monitoring. In response to approval condition 18b, DWB proposed the following.

To track natural ecological succession, the following three objectives and associated measures, or examples, are provided:

- Objective 1: Monitor health of tree and shrub seedlings:
    - Measures: seedling survival, seedling vigour, seedling height;
- Objective 2: Monitor the natural recruitment of native plant species:
    - Measure: native species richness;
- Objective 3: Identify, if present, any factors limiting natural recruitment of native plant species or the success of planted seedlings:
    - Examples: dense grass cover, herbivory, dense woody debris cover, compacted soil surface.

The endpoint of vegetation monitoring is reached once both of the following two objectives, and defined criteria, have been met:

- Objective 1: Vegetation cover is ‘Self-sustaining’:
    - Criteria:
        - Seedling mortality is no longer occurring or is due to natural processes, not related to any anthropogenic factors (e.g., planting/handling of seedlings, adverse soil conditions), or not occurring due to excess herbivory;
        - Vegetation cover overall remains stable or is increasing;
        - Vegetation cover is resilient (evidence suggests that cover can survive periods of drought);
        - Natural recruitment of native species is continuous (occurring annually, and expected to continue to occur); recruitment is not limited by competition from existing vegetation cover, herbivory or surface conditions (e.g., soil compaction), and
        - Vegetation cover is species diverse (not a monoculture).

- Objective 2: Vegetation cover is following the natural successional trajectory that aims to satisfy the end land use objective:
    - Criteria:
        - Vegetation cover is dominated by pioneer tree and shrub species identified as early successional species of the target ecosystem (e.g., subzone/variant); vegetation cover also consists of late successional tree and shrub species of the target ecosystem;
        - Vegetation cover does not consist of any significant cover of non-target species (e.g., invasive, agronomic, nuisance weeds); any cover of non-target species present is either declining or evidence suggests cover will decline over time, and
        - Any factors that have been identified as limiting natural succession (e.g., plant competition, surface conditions, herbivory) on reclaimed areas, or portions of reclaimed areas, have been addressed or are no longer limiting.

To meet the information criteria that would be required to identify the endpoints of vegetation monitoring, the following vegetation attributes were added to the monitoring effort, beginning in Year 2:

- Collection of species-specific counts, height and vigour both for planted and naturally recruited tree and shrubs seedlings in the non-halo plots, and
- Collection of species-specific counts (estimates) of planted tree and shrubs within halo plots (where present).

1.5 Regulatory Considerations

The creation of a quantitative wildlife monitoring study under the CEMP was a condition set by ENV under the *Environmental Management Act* Permit 11678. However, apart from the aforementioned request to develop objectives and endpoints, no holistic changes to the vegetation monitoring study were required.

1.6 Project Location

Mount Polley is located approximately 57 km (geodesic distance) northeast of Williams Lake, BC, as shown in Figure 1. From Williams Lake, the mine site is accessed by driving south on Highway 97 North and turning north just before 150 Mile House onto the Horsefly Likely Road, then driving for 4.5 km before turning west onto Likely Road. After travelling Likely Road for 64.6 km, turn south onto the Morehead-Bootjack Forest Service Road (FSR) for 14 km. Mount Polley is located at the end of the Morehead-Bootjack FSR at UTM 10 U 592897 5822603.

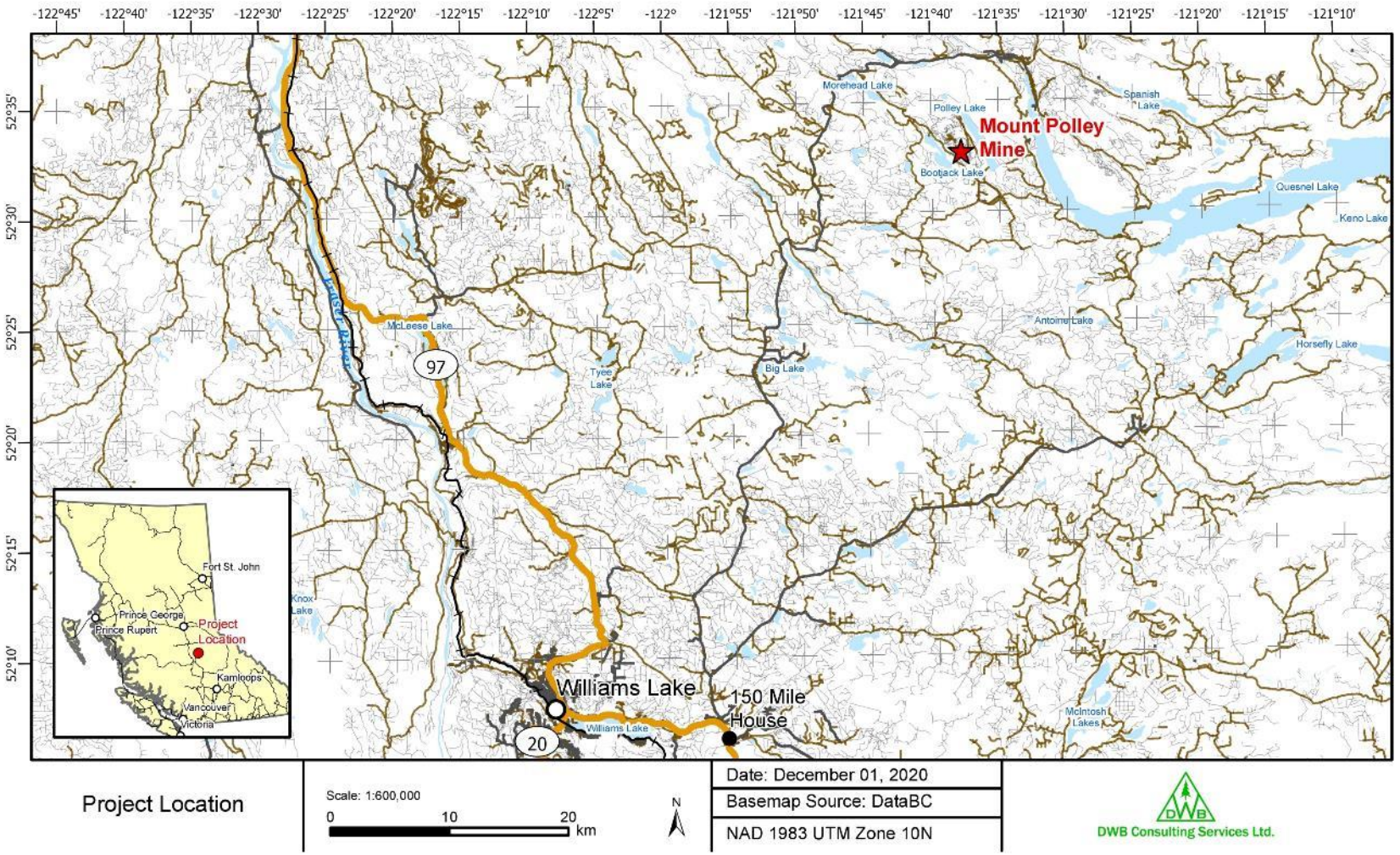

Figure 1. Location of Mount Polley mine in relation to Williams Lake, BC.

1.7 ECOSYSTEM CLASSIFICATION

Ecosystems present along the Hazeltine Creek corridor at Mount Polley include Interior Cedar Hemlock (ICH) biogeoclimatic (BEC) zone moist cool (mk3) variant and wet cool (wk2) variant. Ecosystems within mk3 variant are characterized by forest cover dominated by western redcedar (*Thuja plicata*), interior Douglas-fir (*Pseudotsuga menziesii var. glauca*) and lodgepole pine (*Pinus contorta var. latifolia*). Within the wk2 variant, forests are dominated by western redcedar and western hemlock (*Tsuga heterophylla*). Young forests within these variants are often dominated by interior Douglas-fir and/or lodgepole pine and other seral tree species that may be present including trembling aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*). Common shrubs in the forest understorey of both variants include black huckleberry (*Vaccinium membranaceum*), black gooseberry (*Ribes lacustre*), devils club (*Oplopanax horridus*), falsebox (*Pachistima myrsinites*) and oval-leaved blueberry (*Vaccinium ovalifolium*). Examples of common herbs include rose twistedstalk (*Streptopus lanceolatus*), bunchberry (*Cornus canadensis*), oak fern (*Gymnocarpium dryopteris*), three-leaved foamflower (*Tiarella trifoliata*) and twinflower (*Linnaea borealis*; Steen and Coupe, 1997).

Based on the most recent data from the Vegetation Resource Inventory (VRI; Province of BC, 2020), mature forest cover surrounding the Lower Hazeltine Creek area consists of forests dominated by hybrid white spruce (*Picea glauca x engelmannii*), paper birch, interior Douglas-fir, black cottonwood (*Populus balsamifera ssp. trichocarpa*) and western redcedar, with stand ages ranging between 31 and 261 years. Along the Upper Hazeltine Creek area, forest cover is dominated by subalpine fir (*Abies lasiocarpa*), hybrid white spruce, interior Douglas-fir, paper birch, and western redcedar with stand ages ranging between 35 to 261 years. On Polley Flats, mature forest cover along the corridor is dominated by hybrid white spruce and western redcedar with stand ages ranging between 111 to 281 years.

2.0 METHODS

2.1 SURVEY LOCATIONS

Vegetation surveys were completed at 30 plot locations within the remediated areas of the Hazeltine Creek corridor. The plot locations, and their relation to the treatment areas and surface treatment types, are outlined in Table 1. Detailed maps showing the location of each of the plots along the Hazeltine Creek corridor are provided in Appendix A.

Table 1. Plot locations, treatment areas and surface treatment types within remediated areas located along the Hazeltine Creek corridor (Golder, 2019a).

Treatment Area	Plot Name	Location (UTMs)	Surface Treatment Type
Lower Hazeltine	22-LH-2	10U 601795 m E, 5817320 m N	Recontoured with Topsoil and CWD
	22-LH-7	10U 601036 m E, 5817197 m N	Ripped with CWD
	22-LH-8	10U 601056 m E, 5817170 m N	Ripped with CWD
	22-LH-12	10U 600846 m E, 5817308 m N	Recontoured with Topsoil and CWD
	22-LH-13	10 U 600823 m E 5817340 m N	Wood Chip Mulch with CWD
	22-LH-29	10U 601597 m E, 5817397 m N	Mounded with CWD
Lower Hazeltine – Halo	22-Halo-1	10U 601783 m E, 5817532 m N	Mounded with CWD
	22-Halo-3	10U 601998 m E, 5817327 m N	No Treatment

Treatment Area	Plot Name	Location (UTMs)	Surface Treatment Type
	23-Halo-4	10U 601884 m E, 5817258 m N	Mounded with CWD
	23-Halo-5	10U 601149 m E, 5816911 m N	Ripped with CWD
	23-Halo-6	10U 601026 m E, 5817022 m N	Ripped with CWD
	23-Halo-9	10U 601230 m E, 5817278 m N	No Treatment
	23-Halo-10	10U 601183 m E, 5817289 m N	Mounded with CWD
	23-Halo-11	10U 601043 m E, 5817336 m N	No Treatment
Upper Hazeltine	23-UH-14	10U 599560 m E, 5817265 m N	Ripped with CWD
	23-UH-15	10U 598527 m E, 5817471 m N	Recontoured with Topsoil and CWD
	23-UH-16	10U 597116 m E, 5818941 m N	Recontoured with Topsoil and CWD
	23-UH-20	10U 596133 m E, 5819800 m N	Mounded with CWD
	23-UH-21	10U 596118 m E, 5819986 m N	Mounded with CWD
	23-UH-30	10U 597410 m E, 5818656 m N	Recontoured with Topsoil and CWD
Upper Hazeltine – Halo	23-Halo-17	10U 596950 m E, 5819168 m N	No Treatment
	23-Halo-18	10U 596824 m E, 5819215 m N	Mounded with CWD
	23-Halo-19	10U 596017 m E, 5819901 m N	Mounded with CWD
Polley Flats	23-PF-23	10U 595860 m E, 5820214 m N	Soil placed with CWD
	23-PF-25	10U 595897 m E, 5820424 m N	Soil Placed with CWD
	23-PF-26	10U 595677 m E, 5820432 m N	Mounded with CWD
	23-PF-27	10U 595552 m E, 5820478 m N	Soil Placed with CWD
	23-PF-28	10U 595383 m E, 5820357 m N	Soil Placed with CWD
Polley Flats - Halo	23-Halo-22	10U 595961 m E, 5820175 m N	Mounded with CWD
	23-Halo-24	10U 595966 m E, 5820403 m N	No Treatment

Note that in 2023, it became apparent that the treatment designation for Halo plot 11 was not accurate as the area within this plot has not received any surface treatment and remains relatively undisturbed by the tailings breach event. Therefore, for the Year 4 analysis, and future analyses, the Halo plot 11 surface treatment type designation has been revised to “No Treatment”.

2.2 Survey Methods

The methods used in the 2022 study were adapted from methods outlined in the following documents: *Field Manual for Describing Terrestrial Ecosystems* (BC MOF and MOE, 2010) and *Mount Polley Mine - Detailed Study Design for Terrestrial Wildlife Monitoring* (Golder, 2019a). In addition, beginning in Year 2, additional monitoring criteria, based on specific objectives and endpoints for vegetation monitoring (additional requirement 18b of the CEMP approval), were added to the data collection.

A total of 30 vegetation monitoring plots were established at the approximate locations where plots were initially established in 2018 (Golder, 2019a). The monitoring plots were established with a radius of 5 m (78.54 m^2). A wooden stake was permanently installed at the centre of each plot, and during the assessment of the plot, flagging was temporarily installed at the perimeter of the plot in each of the four cardinal directions. A photograph was taken of the plot area from approximately 7 m south of the centre (north-facing view).

Site characteristics and vegetation performance metrics were collected from each of the monitoring plots. Information collected included the following:

- Slope and aspect;
- Percent cover of surface substrates (organic matter, decaying wood, rocks, bedrock, water, mineral soil and tailings);
- Percent cover by vegetation layer (tree, shrub, herb, moss and terrestrial lichen);
- Species-specific counts, height and vigour for both planted and naturally recruited tree and shrub seedlings in the non-halo plots (added to the data collection beginning in Year 2);
- Species-specific counts (estimates) of planted tree and shrubs within halo plots (where present; added to the data collection beginning in Year 2);
- List of plant species present;
- Percent cover by plant species and for each vegetation layer in which the species was present;
- Presence/absence of invasive plant species;
- Grass cover and tree/shrub seedling vigour (including seedling mortality), and
- General notes on plot condition.

Grass cover vigour was assessed based on the density of grass cover established within the plot (i.e., dense grass cover was identified as high vigour). Tree and shrub seedling vigour was based on individual plant health and was assessed visually, primarily relying on colour (e.g., presence of brown or red needles, evidence of yellowing/chlorosis), but also integrated crown volume, and needle size and density. Photographs showing examples of the various classes of vigour for planted conifers are provided in Figure 2.

Moss and lichen, some herbaceous perennial taxa (e.g., Asteraceace, *Carex sp.*) and willows (*Salix sp.*) were not always identified to species, but instead to family or genus, due to a lack of identifiable features (e.g., germinant stage, no inflorescence developed) and/or time constraints.

Within each plot, the percent cover of vegetation types (e.g., trees, shrubs, herbs), was evaluated independently of the total sum of individual species percent cover. This approach was used as no vegetation cover was identified to species within the plot (e.g., mosses and lichens). The species list for vegetation monitoring is considered “partial” and not “complete” (BC MOF and MOE, 2010).

During the Year 2 survey, two observations were made in regards to the efficiency and accuracy of the vegetation monitoring approach. It was determined that annual monitoring of two of the selected measures were not beneficial, and were subject to observer bias. These measures, and recommendations to revise the monitoring methodology, are provided below:

- Annual monitoring of undisturbed "No Treatment" plots (e.g., 22-Halo-17) may not be necessary, as changes in vegetation composition on an annual basis are likely smaller than what can be detected with the measures selected for vegetation monitoring. Therefore, during Year 3, and for future monitoring, it was recommended that monitoring only be completed in these plots every 3 years. However, to capture any potential changes to these plots that may occur from natural disturbance events (e.g., flooding, windstorm), each of the plots will be visited annually to check whether any disturbance occurred.

- Substrates within the treated areas were not observed to be changing significantly on an annual basis. Annual assessment of % cover for substrates may not be beneficial and subject to observer bias. Therefore, during Year 3, and for future monitoring, it was recommended that assessment of % substrates only be completed every 3 years.

		
High Vigour (hybrid white spruce)	Moderate Vigour (hybrid white spruce)	Low Vigour (subalpine fir)

Figure 2. Photos illustrating high, moderate and low vigour for conifer seedlings observed within the plots.

2.3 DATA COMPILATION

Data was compiled into spreadsheets and assessed for errors prior to summarizing. A comprehensive master copy of the data spreadsheets will be submitted with the annual report each year to be used for trend analysis in 2025.

3.0 RESULTS AND DISCUSSION

The results of the Year 4 (2023) assessment of the vegetation monitoring plots within the Hazeltine Creek corridor are summarized in Figures 3 to 10 and Tables 2 to 4. For undisturbed Halo plots, Year 2 (2021) field data has been utilized as no formal assessments of these plots were completed in Year 4. Photographs illustrating the plot areas are provided in Appendix B. Detailed tables providing all the vegetation data collected during the Year 4 survey are provided in Appendix C. Note that the results presented here are preliminary, and that a more detailed analysis of the vegetation data collected from the plots, to evaluate

ecological succession along the Hazeltine Creek corridor, will be completed following five years of monitoring in 2025.

As reported in Year 2, the average percent cover of substrate materials appears to be reflective of the treatment areas and the surface treatment types where the plots were located (Figures 3 and 4). For example, the highest average percent cover of organic matter was observed within Halo plots where disturbance from the TSF breach was minimal or absent and where surface treatments were often not applied (no treatments were applied to Halo plots 3, 9, 11, 17 and 24). As another example, the average % cover for decayed wood was highest on the plot located within the "Wood Chip Mulch with CWD" treatment, and plots located within the surface treatment "Recontoured with Topsoil and CWD" had the highest average % cover of mineral soil.

It should be noted that the average percent cover of mineral soil and tailings may be less accurate due to the difficulties interpreting the difference between the two substrates where they were both found within a plot, either mixed together, or in patches.

As there was no bedrock exposed at the surface of any of the plots, no percent cover for this substrate was recorded, and therefore, has not been reported in Figures 3 and 4.

Over time, with the natural establishment of an early successional forest and riparian vegetation cover, changes in the percent cover of some substrates are expected. As future growing seasons will lead the addition of organic material to the soil surface, from plant litter and fall die-off of herbaceous perennials, the average percent cover of organic material within treatment areas is expected to increase. In addition, with no mature tree cover to replenish CWD, the percent cover of decaying wood, particularly over the longer term (>10 years), is expected to decrease as the debris decays further and contributes organic matter to the soil surface (BC MOF, 1998).

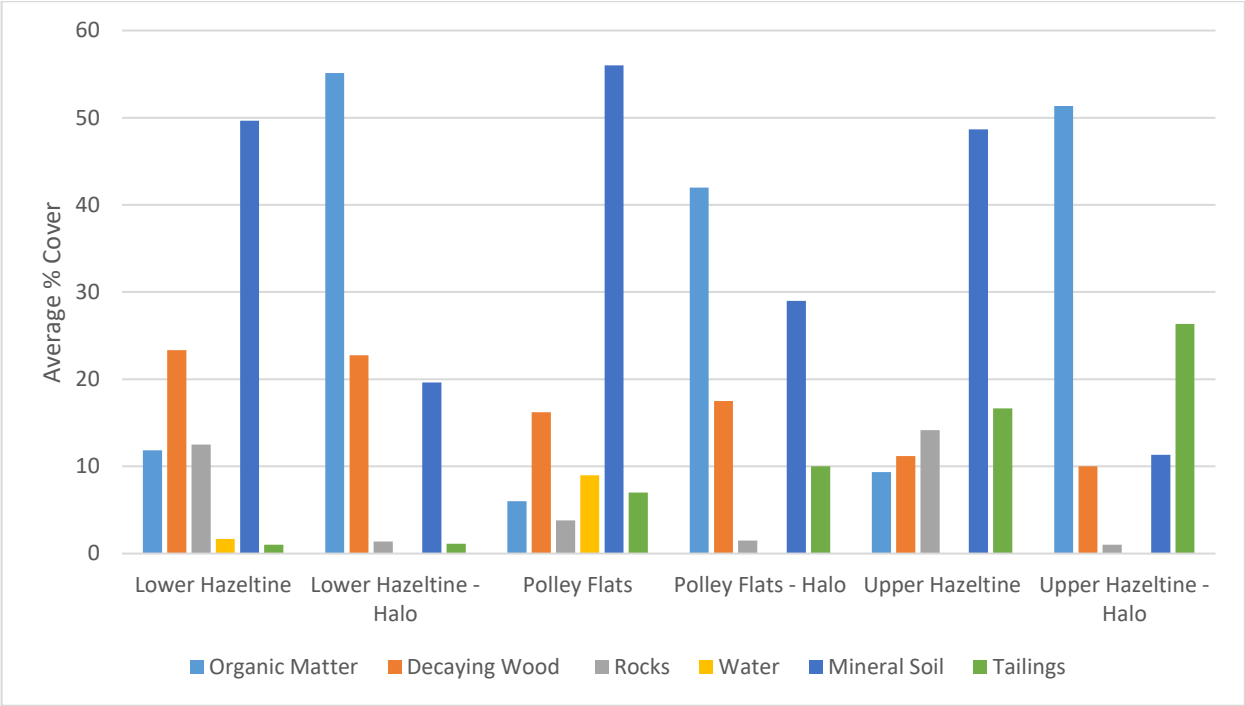

Figure 3. Average percent cover of substrate materials for each of the treatment areas.

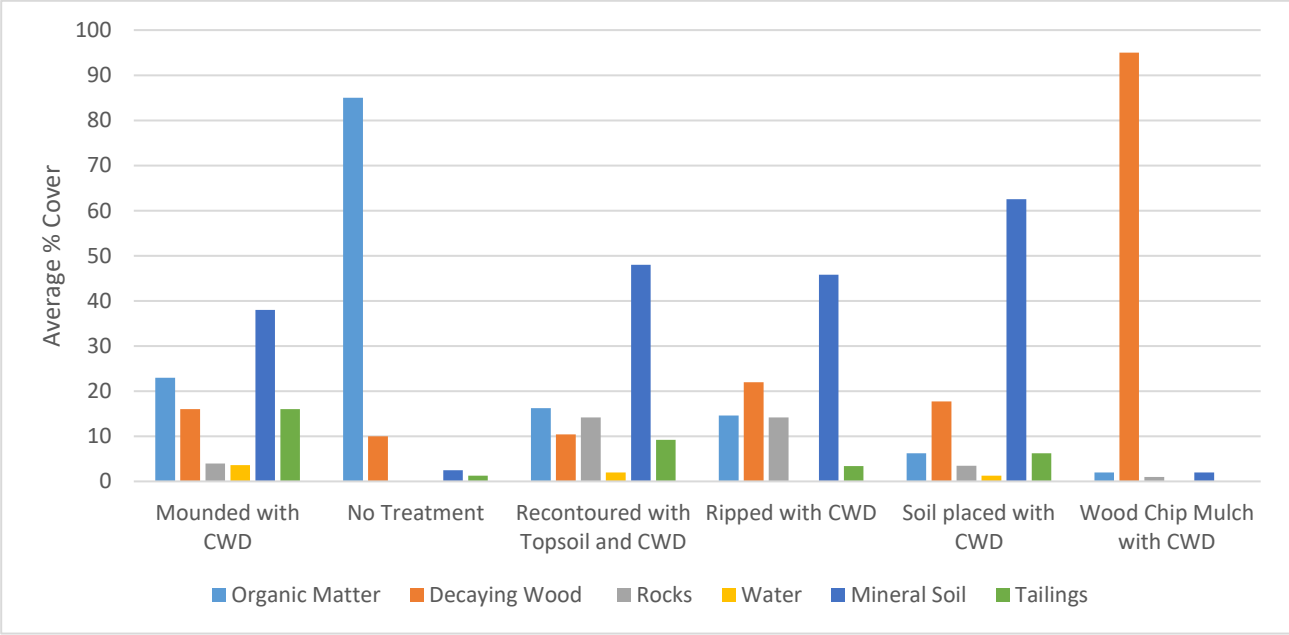

Figure 4. Average percent cover of substrate materials for each of surface treatment types.

The average percent cover for vegetation types is provided in Figures 5 and 6 and consists of data from Year 2 (no treatment plots) and Year 4 (all other plots). Average percent cover of trees was highest for halo plots (and No Treatment areas), which represents the minimally disturbed mature tree cover still present in this

zone compared to the scour areas, where little to no tree cover survived the initial breach event. Average cover for herbaceous plant cover (which includes grasses) was highest for the Polley Flats area.

The average percent cover of shrubs was high within the surface treatment "Soil Placed with CWD" in comparison to all other treatments and was lowest within no treatment areas. Soil treatments, specifically the placement of CWD, may be assisting in greater moisture retention and availability for shrubs, increasing their survival and productivity.

Very few terrestrial lichens were observed within the monitoring plots with an average percent cover of 1%. The establishment of terrestrial lichens is very slow and significant cover of this vegetation type is not expected to develop over the short term.

At present, vegetation cover within the Hazeltine Creek corridor is in the earliest stage of establishment. Pioneer herbaceous perennials and shrubs, free from competition with mature forest cover for light, and adapted to exposed conditions, are abundant (BC MOF, 1998). However, over time, the average percent cover of vegetation types is expected to change as natural succession progresses. For terrestrial and riparian areas, the average percent cover of trees, shrubs, moss and lichens is expected to increase and the average % cover of herbaceous perennials is expected to decrease (as forest cover develops from an early to mid-successional forest stage. With development of an early successional forest cover, foliage from trees and shrubs dominating the B1 layer (woody plants at 2-10 m) and B2 layer (woody plants at >2 m) will likely outcompete many of the herbaceous perennials for water and nutrients, particularly native and non-native grass species.

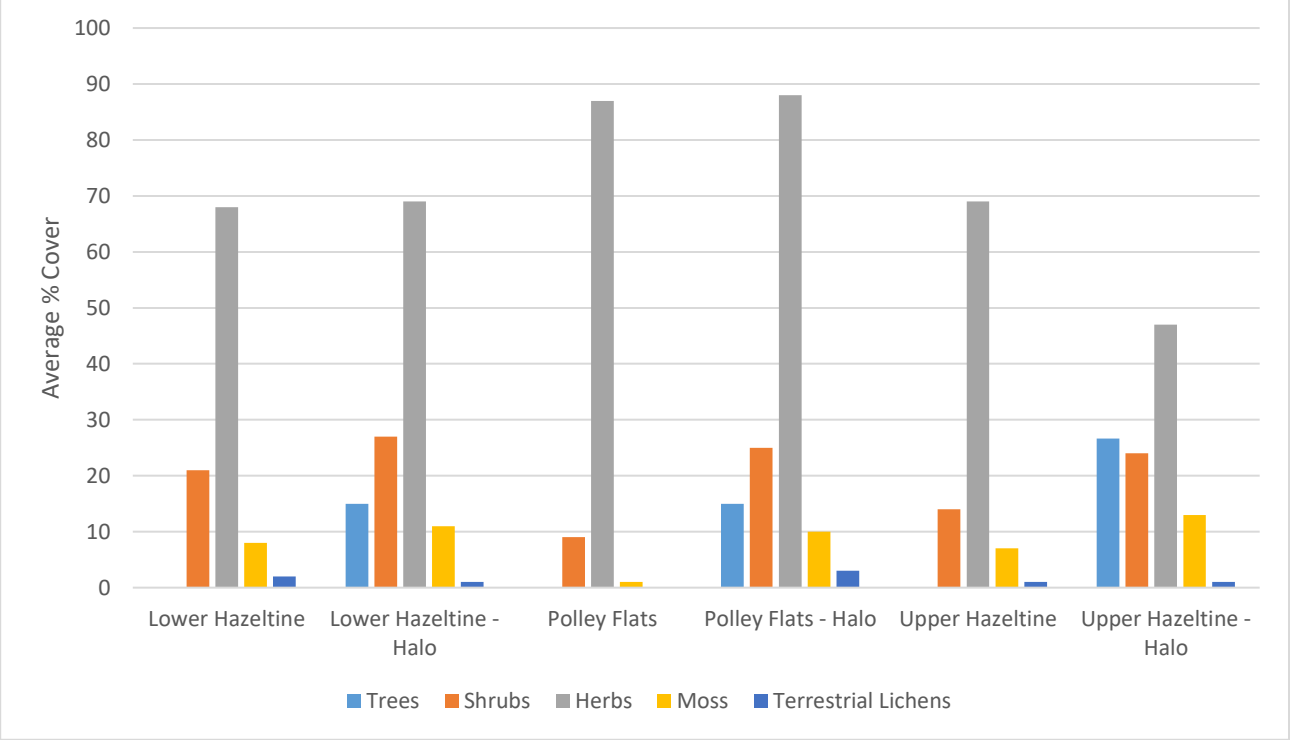

Figure 5. Average percent cover of vegetation types for each of the treatment areas.

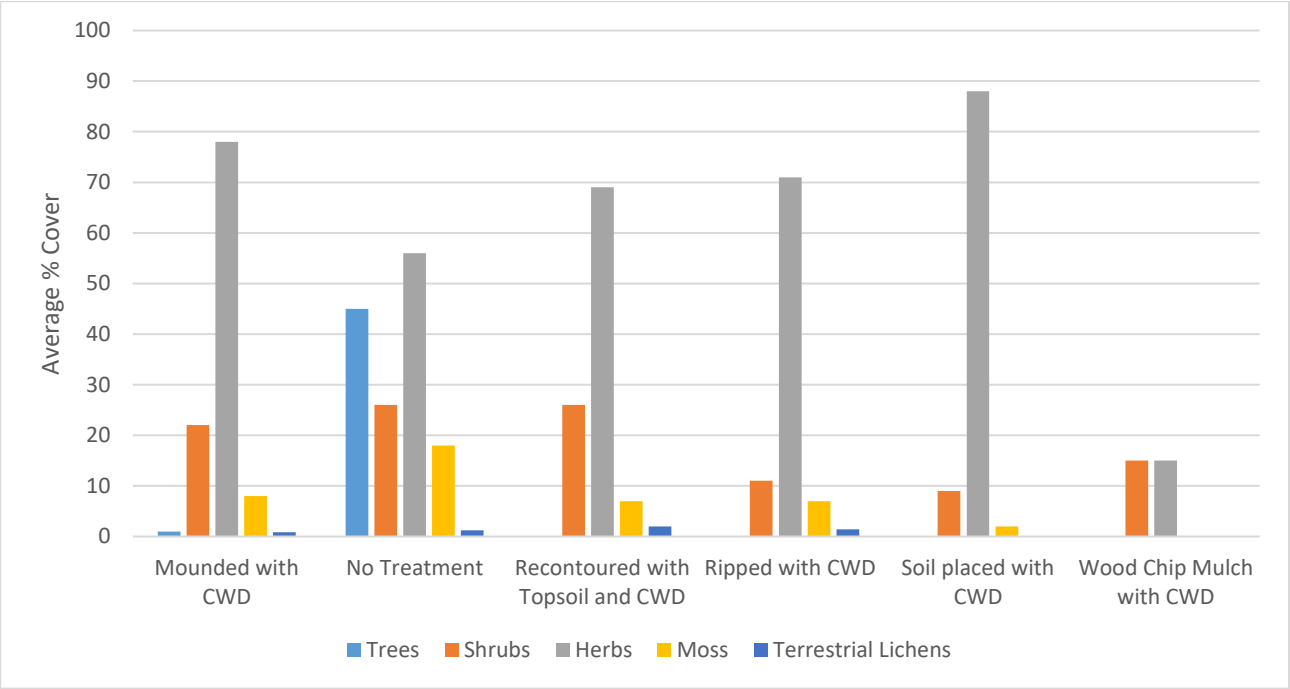

Figure 6. Average percent cover of vegetation types for each of the surface treatment types.

Species diversity, measured as the average number of species per plot is summarized in Figures 7 and 8 and consists of data from Year 2 (no treatment plots) and Year 4 (all other plots). Species diversity within the plots appeared to be higher in the Halo areas (Figure 7) and possibly the areas where no treatment was applied (Figure 8). Both of these areas appeared to have the greatest diversity of shrub and herbaceous species compared to other areas and treatments, the no treatment areas also appeared to have the greatest diversity of tree species. Species diversity was also appeared to be the lowest for all vegetation types on plots where wood chip mulch was applied (Figure 8).

Overall, plant species diversity within terrestrial areas may increase in the short term (e.g., the first few years of monitoring) but then is expected to decrease over the longer term as earlier and mid-successional forest cover establishes (BC MOF, 1998). Within riparian areas, species diversity is expected to increase over the short and long term.

The highest species diversity was observed in plot 23-Halo-17 (34 species) and the lowest species diversity was observed in plot 23-LH-7 (9 species).

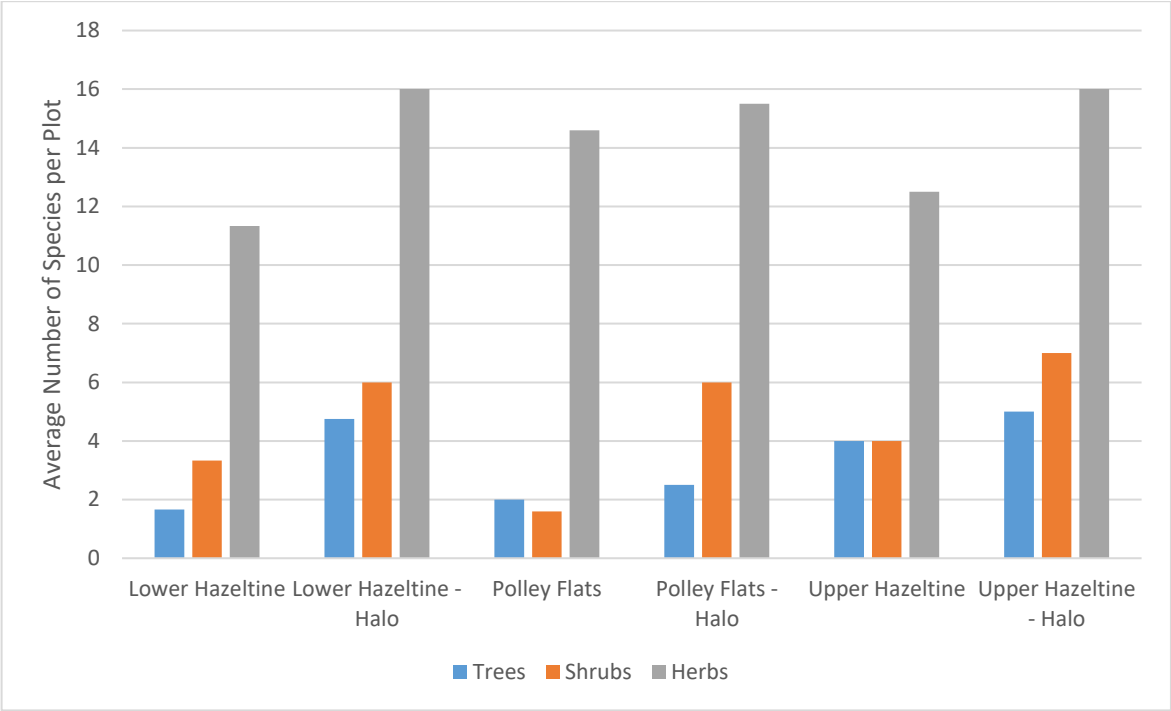

Figure 7. Average number of species per plot for each of the treatment areas.

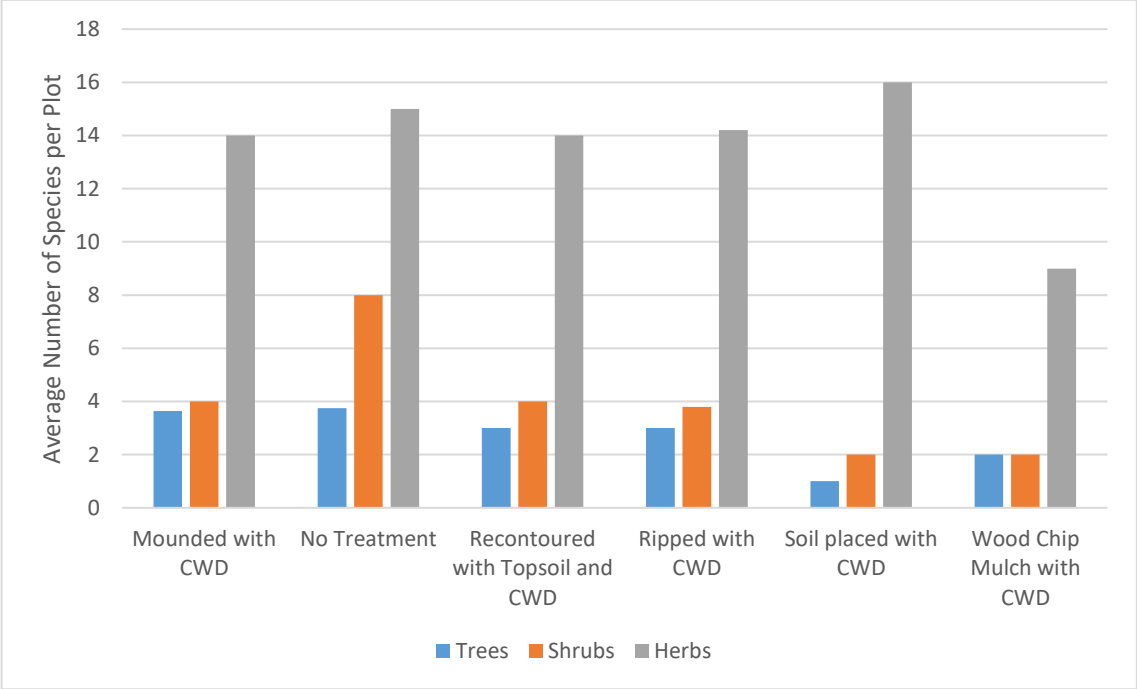

Figure 8. Average number of species per plot for each of the surface treatment types.

Tree and shrub seedling height, measured as the average height per treatment area or surface treatment type, is summarized in Figures 9 and 10. Average seedling height for deciduous trees and shrubs appeared to be the highest at Polley Flats Halo plots, coniferous tree height appeared to be highest at the Polley Flats plots. Average seedling height appeared lowest for conifers in the Lower Hazeltine area and lowest for deciduous in the Upper Hazeltine halo plots; average shrub height was lowest in the Upper Hazeltine area.

Average seedling height for deciduous trees appeared to be the highest on areas that had soil placed with CWD as well as areas that were recontoured with topsoil and CWD. Average seedling height for coniferous trees and shrubs was highest where soils where soils were placed with CWD. No deciduous trees were identified within the single plot for the wood chips mulch and CWD surface treatment. No data was collected for the No Treatment areas as planting was not completed in most areas where forest cover remained relatively undisturbed from the spill. During the Year 3 survey, it was determined that specifying between natural and planted seedlings was challenging and likely to be difficult in following years. During Year 4 surveys, all tree and shrubs were tallied together and not specified as planted versus natural. Average seedling height for deciduous and tree species was averaged across natural and planted stems during the field survey, up to a total 5 plants.

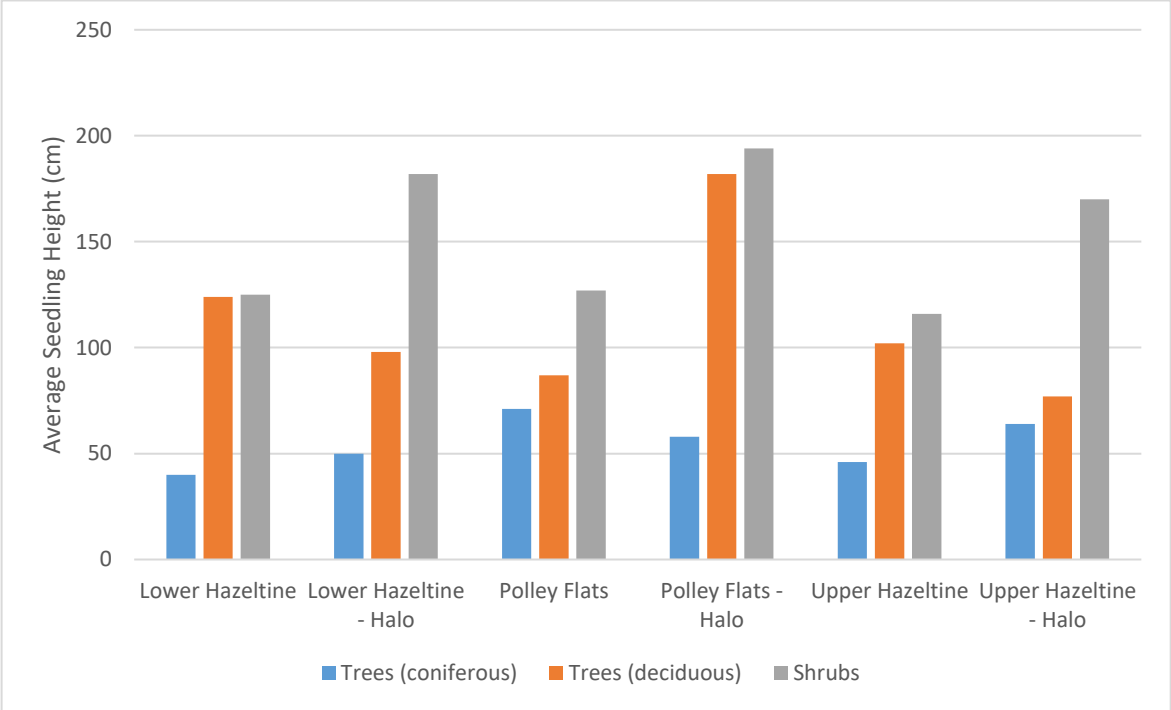

Figure 9. Average height for tree seedlings for per plot for each of the treatment areas.

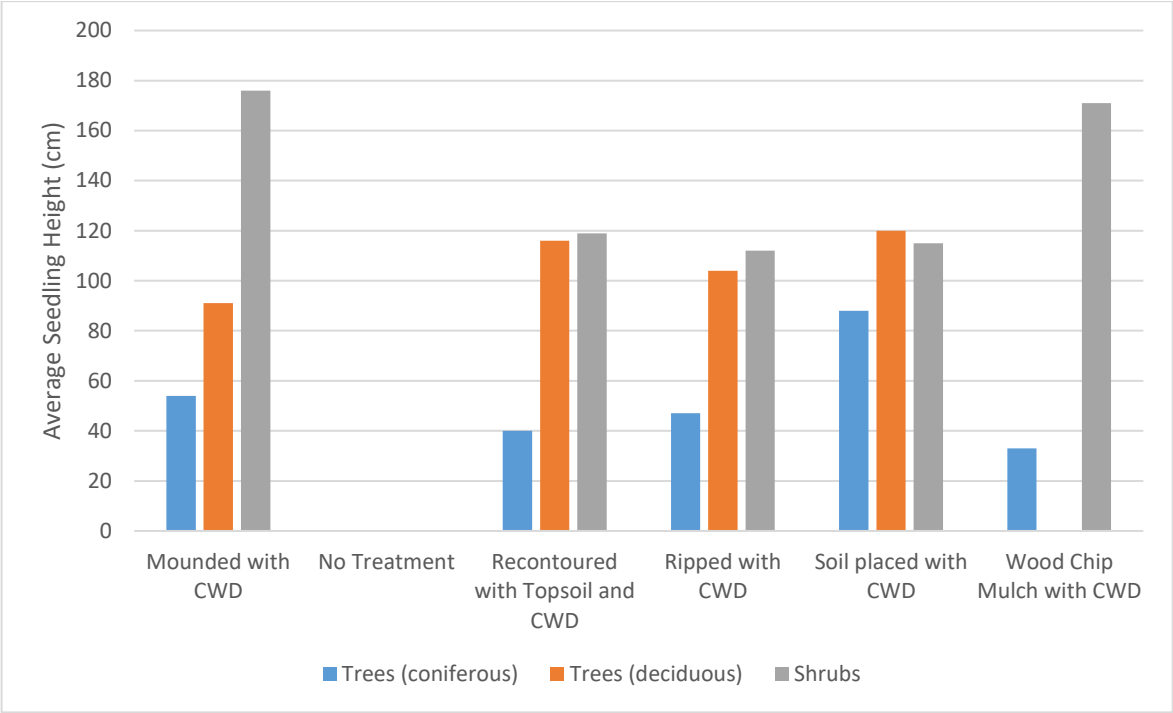

Figure 10. Average height for tree seedlings for each of the surface treatment types.

The most common tree, shrub and herb species observed within the monitoring plots have been identified as those occurring within 33% (10 out of 30) of the plots, and are listed in Table 2. Of the most common species, 14 were identified as native (6 herbs, 3 shrubs and 5 trees) and 8 species were identified as non-native. Of the most common species identified, most have naturally established (from existing seed bank or through a natural dispersal vector) on the plot, while the remainder have been established through seeding or planting. Some species, were considered as native or non-native species, as some native and non-native species present in BC belong to the same genus (e.g., *Hieracium spp.*).

Table 2. The most common plant species observed within the vegetation monitoring plots.

Vegetation Type	Common Name	Scientific Name	Percentage of Plots Observed	Native or Non-native	Seeded, Planted or Naturally Established
herb	common horsetail	*Equisetum arvense*	73	Native	Natural
	oxeye daisy	*Leucanthemum vulgare*	70	non-native	Natural
	Dandelion	*Taraxacum sp.*	60	non-native	Natural
	blue wildrye	*Elymus glaucus*	50	Native	Natural
	Fireweed	*Epilobium angustifolium*	50	Native	Natural
	creeping red fescue	*Festuca rubra*	47	non-native	Natural
	bluejoint reedgrass	*Calmagrostic canadensis*	47	Native	Natural
	black medic	*Medicago lupulina*	43	non-native	Natural
	yellow hawkweed	*Hieracium sp*	43	native or non native	Natural
	Kentucky bluegrass	*Poa pratensis*	43	non-native	Seeded
	sweet-scented	*Galium triflorum*	37	Native	Natural

	bedstraw				
	White sweet clover	*Melilotus albus*	37	non-native	Natural
	purple-leaved willowherb	*Epilobium ciliatum*	37	Native	Natural
	Timothy	*Phleum pratense*	33	non-native	Seeded
	Birdsfoot trefoil	*Lotus corniculatus*	33	non-native	Natural
shrub	Sitka alder	*Alnus viridis ssp. sinuata*	100	Native	Natural and Planted
	willow	*Salix sp.*	83	Native	Natural and Planted
	red raspberry	*Rubus idaeus*	67	Native	Natural and Planted
tree	black cottonwood	*Populus balsamifera ssp. trichocarpa*	87	Native	Natural and Planted
	hybrid white spruce	*Picea glauca x engelmannii*	83	Native	Natural and Planted
	western redcedar	*Thuja plicata*	53	Native	Natural and Planted
	Interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	43	Native	Natural and planted
	Lodgepole pine	*Pinus contorta var. latifolia*	43	Native	Natural and Planted

*Although creeping red fescue and the clover varieties were not included in the grass seed mixes applied to the site between 2015 and 2017, their prevalence at the site, and being that it is a non-native agronomic legume, suggests it may have been introduced from the soil that was applied to the reclaimed areas.

It is important to note that seed for agronomic grass and legume species were not applied to the reclaimed areas of Hazeltine Creek during remediation/reclamation efforts. It is suspected that the presence of these species within the remediated areas is the result of the application of various soils that were sourced from and/or mixed with soils once seeded with these species during forestry and mining erosion and sediment control activities (e.g., roadside seeding).

The overall vigour of seeded grass cover and planted seedlings (where installed) was assessed in each of the plots and the results are summarized in Table 3. Seeded grass vigour ranged from low to high, with a majority of plots identified as high vigour. Planted seedling vigour also ranged from low to high, with a majority of planted identified as moderate or moderate to high vigour.

Tree and shrub species appeared to have moderate to high vigour across all species; however, Sitka alder vigour ranged from low to moderate across the plots.

During Year 4, tree and shrub seedling mortality within the monitoring plots appeared to be low; however, natural ingress is contributing to the overall total stems recorded within each plot. It was difficult to discern between planted and naturally established seedlings at this point in the monitoring program, and as a result, the number of planted seedlings that have died can only be broadly estimated. Plot 23-PF-23 had obvious mortality of almost all planted stems and no natural ingress observed.

Table 3. Seeded grass cover and planted seedling vigour observed within monitoring plots.

Plot	Location	Surface Treatment	Seeded Grass Vigour	Tree Seedling Vigour		
				High	Moderate	Low
23-Halo-1	Lower Hazeltine - Halo	Mounded with CWD	High	24	1	0
23-LH-2	Lower Hazeltine	Recontoured with Topsoil and CWD	High	5	0	0
22-Halo-3	Lower Hazeltine - Halo	No Treatment	NA	NA	NA	NA
23-Halo-4	Lower Hazeltine - Halo	Mounded with CWD	High	3	0	0
23-Halo-5	Lower Hazeltine - Halo	Ripped with CWD	High	74	43	0
23-Halo-6	Lower Hazeltine - Halo	Ripped with CWD	Low	26	3	0
23-LH-7	Lower Hazeltine	Ripped with CWD	High	12	9	0
23-LH-8	Lower Hazeltine	Ripped with CWD	High	49	0	0
22-Halo-9	Lower Hazeltine - Halo	No Treatment	NA	NA	NA	NA
23-Halo-10	Lower Hazeltine - Halo	Mounded with CWD	High	37	2	0
22-Halo-11	Lower Hazeltine - Halo	Mounded with CWD	NA	NA	NA	NA
23-LH-12	Lower Hazeltine	Recontoured with Topsoil and CWD	Moderate	169	12	2
23-LH-13	Lower Hazeltine	Wood Chip Mulch with CWD	Moderate	15	1	0
22-UH-14	Upper Hazeltine	Ripped with CWD	High	60	6	0
23-UH-15	Upper Hazeltine	Recontoured with Topsoil and CWD	High	37	3	0
23-UH-16	Upper Hazeltine	Recontoured with Topsoil and CWD	High	63	0	0
22-Halo-17	Upper Hazeltine - Halo	No Treatment	Low	NA	NA	NA
23-Halo-18	Upper Hazeltine - Halo	Mounded with CWD	Moderate	33	7	6
23-Halo-19*	Upper Hazeltine - Halo	Mounded with CWD	High	58	0	0
23-UH-20	Upper Hazeltine	Mounded with CWD	High	19	15	0
23-UH-21	Upper Hazeltine	Mounded with CWD	High	141	2	0
23-Halo-22*	Polley Flats - Halo	Mounded with CWD	High	59	0	0
23-PF-23	Polley Flats	Soil placed with CWD	Moderate	0	2	0
22-Halo-24	Polley Flats - Halo	No Treatment	NA	NA	NA	NA
23-PF-25	Polley Flats	Soil placed with CWD	High	40	0	0

Plot	Location	Surface Treatment	Seeded Grass Vigour	Tree Seedling Vigour		
				High	Moderate	Low
23-PF-26	Polley Flats	Mounded with CWD	High	23	2	1
23-PF-27	Polley Flats	Soil placed with CWD	Moderate	9	0	0
23-PF-28	Polley Flats	Soil placed with CWD	High	25	0	0
23-LH-29	Lower Hazeltine	Mounded with CWD	High	16	0	0
23-UH-30	Upper Hazeltine	Recontoured with Topsoil and CWD	Low	49	7	0

* NA refers to Not Available, as some plots were not seeded or planted, or the evaluation of seedling and grass vigour was not completed.

Non-native plant species (excluding seeded grasses and legumes), invasive plants and noxious weeds, observed within the vegetation monitoring plots, are summarized in Table 4. Two noxious weeds, Oxeye daisy (*Leucanthemum vulgare*), Canada thistle (*Cirsium arvense*) and orange hawkweed (*Hieracium aurantiacum*), were observed within plots located in most or all of the treatment areas, with the Oxeye daisy having the greatest occurrence. One potential invasive species, thistle (*Cirsium spp.*) was also observed; however, at the time of the survey, these plants were not identified to species and therefore, their status as invasive could not be confirmed. During the 2018 reconnaissance surveys, bull thistle (*Cirsium vulgare*), an invasive plant species, was identified in six of the 30 monitoring plots; it is likely that the thistle plants observed this year are the same species. Non-native species identified, that were not intentionally introduced to the treatment areas, included dandelions (*Taraxacum sp.*).

Table 4. Non-native (excluding seeded grasses and legumes) and invasive plants and noxious weeds observed within the monitoring plots.

Common Name	Scientific Name	Status	Location(s)	Percentage of Plots Observed	Average % Cover per plot
oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	Lower Hazeltine, Upper Hazeltine, Polley Flats	70	6
dandelion	*Taraxacum sp.*	Non-native	Lower Hazeltine, Upper Hazeltine, Polley Flats	60	5
thistle	*Cirsium sp.*	Invasive (Potential)	Lower Hazeltine, Upper Hazeltine, Polley Flats	33	6
Canada thistle	*Cirsium arvense*	Noxious Weed	Lower Hazeltine, Upper Hazeltine, Polley Flats	27	6
orange hawkweed	*Hieracium aurantiacum*	Noxious Weed	Lower Hazeltine	10	<1

During the surveys, general observations of vegetation condition within each of the plots were made. Notable observations are provided below:

- Amphibians, signs of ungulates (tracks and browsing signs) and birding behaviour was observed at some of the plots;
- Significant changes in herbaceous cover were observed at some of the plots; this included a mortality of species that commonly occur in hydric conditions including sedges, and common horsetail.
- Most of the trees within Plot 22-Halo-3 that were present prior to the tailings release remain standing but dead. This may be due to the limited water availability that occurred when a deep cover of tailings was applied to the surface, possibly preventing percolation/infiltration;
- Young spruce and western redcedar germinants were observed within some of the areas where wood mulch was applied as a treatment to the surface;
- Plot 23-PF-23 showed significant mortality of tree stems, on trend with what was observed in 2022.
- The percent cover and diversity of native herbaceous perennials within plot 13 is low and is suspected to be due to mulch surface treatment. Natural recruitment of herbaceous perennials and shrubs, within areas where mulch has been applied, may be reduced over the short term due to low seed receptivity of the mulch surface, and mulch depth, which may limit seed germination from the buried soil's seed bank;
- The general health of vegetation within Plot 18 appears to be negatively impacted by the tailing's substrate. Natural recruitment and succession of vegetation in this area may be limited by the fine textured nature of the tailings;
- Distinguishing between planted and naturally recruited tree and shrubs within the Plots became was notably difficult in Year 3 surveys. Natural trees and shrubs were not distinguished from planted, and so heights of all tree and shrub species were averaged across the plots.

4.0 SUMMARY

Approximately 113 species of plants were detected within the Hazeltine Creek corridor during Year 4 of the surveys, including 9 species of trees, 20 species of shrubs, approximately 84 species of herbs and an unrecorded number of moss and lichens. The results of the surveys from Year 1 to 4 will be incorporated into the final trend analysis in 2025.

Year 5 of the 5-year study will be conducted during the recommended period for vegetation surveys, which has been identified as early to early-July, 2024.

A summary of the current status of vegetation monitoring objectives and endpoints is provided in Table 5 below. As monitoring progresses, the status of these objectives will continue to be re-evaluated until monitoring endpoints have been reached.

Table 5. Summary of the current status for endpoints of vegetation monitoring.

Objective	Criteria	Results	Current Status
Objective 1: Vegetation cover is 'Self-sustaining'	Seedling mortality is no longer occurring or is due to natural processes, not related to any anthropogenic factors (e.g., planting/handling of seedlings, adverse soil conditions), or not occurring due to excess herbivory.	Tree and shrub Seedling mortality observed in Year 1 to 4 monitoring was minor.	Most seedling mortality at the site does not appear to be occurring as the result of anthropogenic factors and is expected to be a result of extreme weather conditions observed over recent years.
	Vegetation cover overall remains stable or is increasing.	Vegetation established in reclaimed areas appear stable.	Vegetation cover does not appear to be reducing over time; depending on soil conditions, some areas vegetation cover is increasing and some areas, vegetation cover remains consistent.
	Vegetation cover is resilient (evidence suggests that cover can survive periods of drought).	Vegetation observations in Year 4 show indications that vegetation was significantly impacted by the hot and dry period of the previous year.	Vegetation overall throughout the reclaimed areas appears resilient to dry periods due to species diversity.
	Natural recruitment of native species is continuous (occurring annually, and expected to continue to occur); recruitment is not limited by competition from existing vegetation cover, herbivory or surface conditions (e.g., soil compaction).	Natural recruitment of native plant species is occurring throughout the reclaimed areas. However, surface soil conditions (e.g., compaction and surface cementing) at some locations are limiting or preventing recruitment.	Recruitment is occurring and will likely continue to occur for most reclaimed areas. Further recruitment in areas where soil surface conditions are limiting will likely continue to see low or no recruitment until surface conditions change.
	Vegetation cover is species diverse (not a monoculture).	Vegetation is diverse in all reclaimed areas. Some areas were found to have significant ground cover of horsetail, but still were considered to have species diversity.	In most reclaimed areas, vegetation cover is very diverse and similar to early successional forest ecosystems.

Objective 2: Vegetation cover is following the natural successional trajectory that aims to satisfy the end land use objective	Vegetation cover is dominated by pioneer tree and shrub species identified as early successional species of the target ecosystem (e.g., subzone/variant); vegetation cover also consists of late successional tree and shrub species of the target ecosystem.	Pioneer and late successional tree and shrub species are present in all reclaimed areas.	A diversity of native tree and shrub species are well established throughout most reclaimed areas.
	Vegetation cover does not consist of any significant cover of nontarget species (e.g., invasive, agronomic, nuisance weeds); any cover of non-target species present is either declining or evidence suggests cover will decline over time.	Non-target vegetation has been identified in reclaimed areas. Invasive species or noxious weeds observed have been very limited in their distribution and cover. Agronomic grass cover has dominated some areas and is limiting or preventing the natural recruitment of native plant species.	Although some invasive plants and noxious weeds have been identified, they currently do not pose a risk to limiting natural succession. Areas dominated by agronomic grass cover have become successionally stagnant and are limiting for native plant species.
	Any factors that have been identified as limiting natural succession (e.g., plant competition, surface conditions, herbivory) on reclaimed areas, or portions of reclaimed areas, have been addressed or are no longer limiting.	Limiting factors for natural succession are still present in some reclaimed areas, including compacted ground/surface cementing, tailings substrates and dense agronomic grass/legume or herbaceous plant cover.	Limiting factors will likely remain long term unless remedial actions are taken in those areas where they are present.

4.1 Proposed Modifications and Improvements to Vegetation Monitoring

To ensure the MPMC wildlife monitoring plan is comprehensive and inclusive to the overall successional trajectory within the corridor, DWB has proposed to modify the focus of the vegetation monitoring from areas where the successional trajectory has been identified as "pursuant to the end land use objective" (i.e., endpoints) to areas where the direction and outcome of ecological succession is still to be confirmed.

The approach to this work would be to complete a mapping and field verification exercise that would identify areas that have, or have not, reached the endpoint for monitoring of ecological succession. Results from mapping and field verification would identify areas for new vegetation monitoring plots where the status and direction of ecological succession has not yet been confirmed. These new plots will allow DWB and MPMC to improve the ability to identify any limitations to ecological succession present within areas of the corridor.

Using current aerial imagery, DWB has proposed to delineate areas of homogenous vegetation cover within the Hazeltine corridor with a desktop mapping exercise. Ground verification of monitoring endpoint status will then be determined in conjunction with the annual vegetation monitoring conducted as part of the Study Design of the Wildlife Monitoring in the Hazeltine Creek.

Upon identifying the endpoint status of each of the mapped homogenous vegetation polygons, the location of vegetation monitoring plots, and frequency of monitoring of each plot, would be re-evaluated. For vegetation plots located in areas where the monitoring endpoint has been reached, the frequency of monitoring for these plots is recommended to be reduced to every 3 to 5 years (depending on annual climate variations or the occurrence of ground disturbance). For polygons where the monitoring endpoint has not been reached, the establishment of new vegetation plots will be considered to improve identification of limitations to ecological succession.

Potential areas in which new vegetation plots would be considered include:

- Recently disturbed and/or newly planted areas (e.g., Lower Hazeltine);
- Areas with growth limitations to vegetation (e.g., tailings substrate, compacted soil); or
- Areas not yet represented by a plot.

Any new plots that would be established would be monitored annually using the same criteria as identified in the Study Design for Wildlife Monitoring. Monitoring of these plots would be completed for a 5-year period, or until the monitoring endpoints have been reached.

An increased cost will be associated with establishment of completing this work as part of the Wildlife Monitoring Program. However, the proposed modifications to vegetation monitoring is predicted to result in a long-term cost savings through:

- Reduction in the frequency of monitoring for existing and new vegetation plots from annually to every 3-5 years, and
- Reduction in the total area in which vegetation monitoring will be required.

In addition, the cost of completing ground verification of endpoint status will be minimal as field work can be conducted in conjunction with the annual vegetation monitoring.

5.0 CLOSURE

This report was created for the exclusive use of MPMC and was completed in accordance with generally accepted biological principles and practice. No other warranty, expressed or implied, is made.

6.0 REFERENCES

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Appendix A

Plot Location Maps

Appendix B

Plot Photos (Year 4)

Photo 1. 23-Halo-1, Lower Hazeltine – Halo, Mounded with CWD.

Photo 2. 23-LH-2, Lower Hazeltine, Recontoured with Topsoil and CWD.

Photo 3. 23-Halo-3, Lower Hazeltine – Halo, No Treatment.

Photo 4. 23-Halo-4, Lower Hazeltine – Halo, Mounded with CWD.

Photo 5. 23-Halo-5, Lower Hazeltine – Halo, Ripped with CWD.

Photo 6. 23-Halo-6, Lower Hazeltine – Halo, Ripped with CWD.

Photo 7. 23-LH-7, Lower Hazeltine, Ripped with CWD.

Photo 8. 23-LH-8, Lower Hazeltine, Ripped with CWD.

Photo 9. 23-Halo-9, Lower Hazeltine, Halo.

Photo 10. 23-Halo-10, Lower Hazeltine – Halo, Mounded with CWD.

Photo 11. 23-Halo-11, Lower Hazeltine – Halo, No Treatment.

Photo 12. 23-LH-12, Lower Hazeltine, Recontoured with Topsoil and CWD.

Photo 13. 23-LH-13, Lower Hazeltine, Wood Chip Mulch with CWD.

Photo 14. 23-UH-14, Upper Hazeltine, Ripped with CWD.

Photo 15. 23-UH-15, Upper Hazeltine, Recontoured with Topsoil and CWD.

Photo 16. 23-UH-16, Upper Hazeltine, Recontoured with Topsoil and CWD.

Photo 17. 23-Halo-17, Upper Hazeltine – Halo, No Treatment.

Photo 18. 23-Halo-18, Upper Hazeltine – Halo, Mounded with CWD.

Photo 19. 23-Halo-19, Upper Hazeltine – Halo, Mounded with CWD.

Photo 20. 23-UH-20, Upper Hazeltine, Mounded with CWD.

Photo 21. 23-UH-21, Upper Hazeltine, Mounded with CWD.

Photo 22. 23-Halo-22, Polley Flats – Halo, Mounded with CWD.

Photo 23. 23-PF-23, Polley Flats, Soil Placed with CWD.

Photo 24. 23-Halo-24, Polley Flats – Halo, No Treatment.

Photo 25. 23-PF-25, Polley Flats, Soil Place with CWD.

Photo 26. 23-PF-26, Polley Flats, Mounded with CWD.

Photo 27. 23-PF-27, Polley Flats, Soil Placed with CWD.

Photo 28. 23-PF-28, Polley Flats, Soil Placed with CWD.

Photo 29. 23-LH-29, Lower Hazeltine, Mounded with CWD.

Photo 30. 23-UH-30, Upper Hazeltine, Recontoured with Topsoil and CWD.

Appendix C
Plot Data

Table C-1: Site Description and Percent Cover of Surface Substrates (Year 2)

Plot	Location	Surface Treatment	Aspect	Slope	Organic Matter	Decaying Wood	Rocks	Bedrock	Water	Mineral Soil	Tailings
23-Halo-1	Lower Hazeltine - Halo	Mounded with CWD	1	3	10	25	2	0	0	61	2
23-LH-2	Lower Hazeltine	Recontoured with Topsoil and CWD	140	5	40	20	1	0	0	34	5
23-Halo-3	Lower Hazeltine - Halo	No Treatment	NA	0	75	20	0	0	0	5	0
23-Halo-4	Lower Hazeltine - Halo	Mounded with CWD	NA	0	30	10	2	0	0	53	5
23-Halo-5	Lower Hazeltine - Halo	Ripped with CWD	NA	0	10	65	5	0	0	18	2
23-Halo-6	Lower Hazeltine - Halo	Ripped with CWD	0	3	49	40	1	0	0	10	0
23-LH-7	Lower Hazeltine	Ripped with CWD	120	2	2	2	30	0	0	66	0
23-LH-8	Lower Hazeltine	Ripped with CWD	350	4	2	1	30	0	0	67	0
23-Halo-9	Lower Hazeltine - Halo	No Treatment	160	3	85	15	0	0	0	0	0
23-Halo-10	Lower Hazeltine - Halo	Mounded with CWD	125	5	89	5	1	0	0	5	0
23-Halo-11	Lower Hazeltine -	No Treatment	162	3	93	2	0	0	0	5	0

Plot	Location	Surface Treatment	Aspect	Slope	Organic Matter	Decaying Wood	Rocks	Bedrock	Water	Mineral Soil	Tailings
	Halo										
23-LH-12	Lower Hazeltine	Recontoured with Topsoil and CWD	160	3	20	2	5	0	10	62	1
23-LH-13	Lower Hazeltine	Wood Chip Mulch with CWD	150	15	2	95	1	0	0	2	0
23-UH-14	Upper Hazeltine	Ripped with CWD	90	4	10	2	5	0	0	68	15
23-UH-15	Upper Hazeltine	Recontoured with Topsoil and CWD	84	6	10	5	10	0	0	65	10
23-UH-16	Upper Hazeltine	Recontoured with Topsoil and CWD	200	20	10	15	35	0	0	25	15
23-Halo-17	Upper Hazeltine - Halo	No Treatment	190	4	94	5	1	0	0	0	0
23-Halo-18	Upper Hazeltine - Halo	Mounded with CWD	NA	0	5	10	1	0	0	5	79
23-Halo-19	Upper Hazeltine - Halo	Mounded with CWD	NA	0	55	15	1	0	0	29	0
23-UH-20	Upper Hazeltine	Mounded with CWD	210	8	15	15	10	0	0	55	5
23-UH-21	Upper Hazeltine	Mounded with CWD	200	1	10	20	5	0	0	25	40
23-Halo-22	Polley Flats - Halo	Mounded with CWD	NA	0	5	25	2	0	0	53	15
23-PF-23	Polley Flats	Soil placed with CWD	NA	0	2	15	5	0	0	68	0
23-Halo-24	Polley Flats - Halo	No Treatment	NA	0	79	10	1	0	0	5	5

Plot	Location	Surface Treatment	Aspect	Slope	Organic Matter	Decaying Wood	Rocks	Bedrock	Water	Mineral Soil	Tailings
23-PF-25	Polley Flats	Soil placed with CWD	NA	0	15	30	2	0	5	23	25
23-PF-26	Polley Flats	Mounded with CWD	NA	Depression	5	10	5	0	40	30	10
23-PF-27	Polley Flats	Soil placed with CWD	130	1	3	25	2	0	0	70	0
23-PF-28	Polley Flats	Soil placed with CWD	120	5	5	1	5	0	0	89	0
23-LH-29	Lower Hazeltine	Mounded with CWD	NA	0	5	20	8	0	0	67	0
23-UH-30	Upper Hazeltine	Recontoured with Topsoil and CWD	230	10	1	10	20	0	0	54	15

*Data shown in this table was collected during Year 2 of the monitoring.

Table C-2: Percent Cover of Vegetation Types and Seeded Grass and Planted Seedling Vigour (Year 4)

Plot	Location	Surface Treatment	% Cover				
			Trees	Shrubs	Herbs	Moss	Terrestrial Lichens
23-Halo-1	Lower Hazeltine - Halo	Mounded with CWD	0	20	85	5	1
23-LH-2	Lower Hazeltine	Recontoured with Topsoil and CWD	0	45	95	1	1
21-Halo-3	Lower Hazeltine - Halo	No Treatment	15	15	90	30	2
23-Halo-4	Lower Hazeltine - Halo	Mounded with CWD	5	35	75	10	1
23-Halo-5	Lower Hazeltine - Halo	Ripped with CWD	0	20	40	15	3
23-Halo-6	Lower Hazeltine - Halo	Ripped with CWD	0	15	80	5	1
23-LH-7	Lower Hazeltine	Ripped with CWD	0	5	100	5	1
23-LH-8	Lower Hazeltine	Ripped with CWD	0	8	60	5	1
21-Halo-9	Lower Hazeltine - Halo	No Treatment	60	20	70	10	1
23-Halo-10	Lower Hazeltine - Halo	Mounded with CWD	3	40	100	5	1
21-Halo-11	Lower Hazeltine - Halo	No Treatment	40	50	10	10	0
23-LH-12	Lower Hazeltine	Recontoured with Topsoil and CWD	0	35	65	25	5
23-LH-13	Lower Hazeltine	Wood Chip Mulch with CWD	0	15	15	0	0
23-UH-14	Upper Hazeltine	Ripped with CWD	0	5	75	5	1

Plot	Location	Surface Treatment	% Cover				
			Trees	Shrubs	Herbs	Moss	Terrestrial Lichens
23-UH-15	Upper Hazeltine	Recontoured with Topsoil and CWD	0	5	90	5	1
23-UH-16	Upper Hazeltine	Recontoured with Topsoil and CWD	0	40	85	5	1
21-Halo-17	Upper Hazeltine - Halo	No Treatment	80	25	20	25	2
23-Halo-18	Upper Hazeltine - Halo	Mounded with CWD	0	8	20	5	1
23-Halo-19	Upper Hazeltine - Halo	Mounded with CWD	0	40	100	10	0
23-UH-20	Upper Hazeltine	Mounded with CWD	0	10	80	10	1
23-UH-21	Upper Hazeltine	Mounded with CWD	0	20	75	15	1
23-Halo-22	Polley Flats - Halo	Mounded with CWD	0	30	85	5	5
22-PF-23	Polley Flats	Soil placed with CWD	0	70	80	5	1
21-Halo-24	Polley Flats - Halo	No Treatment	30	20	90	15	0
23-PF-25	Polley Flats	Soil placed with CWD	0	15	90	1	0
23-PF-26	Polley Flats	Mounded with CWD	0	5	85	0	0
23-PF-27	Polley Flats	Soil placed with CWD	0	10	90	0	0
23-PF-	Polley Flats	Soil placed with CWD	0	15	95	0	0

Plot	Location	Surface Treatment	% Cover				
			Trees	Shrubs	Herbs	Moss	Terrestrial Lichens
28							
23-LH-29	Lower Hazeltine	Mounded with CWD	0	15	70	10	1
23-UH-30	Upper Hazeltine	Recontoured with Topsoil and CWD	0	5	10	1	1

*Data highlighted in green represents halo plot data collected during Year 2 of the monitoring.

Table C3: Species Composition, Status and Percent Cover (Year 4)

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-Halo-1	alsike clover	*Trifolium hybridum*	Non-native	herb	15	B2
23-Halo-1	black medic	*Medicago lupulina*	Non-native	herb	3	B2
23-Halo-1	blue wildrye	*Elymus glaucus*	Native	herb	3	B2
23-Halo-1	creeping red fescue	*Festuca rurbra*	Non-native	herb	3	B2
23-Halo-1	horsetail (general)	*Equisetum sp.*	Native	herb	15	B2
23-Halo-1	lady fern	*Athyrium filix-femina*	Native	herb	1	B2
23-Halo-1	thistle (general)	*Cirsium sp.*	NA	herb	<1	B2
23-Halo-1	white sweet-clover	*Melilotus albus*	Non-native	herb	1	B2
23-Halo-1	yellow sweet-clover	*Melilotus officinalis*	Non-native	herb	3	B2
23-Halo-1	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	3	B2
23-Halo-1	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	4	B1
23-Halo-1	soopolallie	*Shepherdia canadensis*	Native	shrub	1	B2
23-Halo-1	thimbleberry	*Rubus parviflorus*	Native	shrub	5	B2
23-Halo-1	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-Halo-1	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	2	B2
23-Halo-1	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-Halo-1	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	2	B2
23-Halo-1	subalpine fir	*Abies lasiocarpa*	Native	tree	<1	B2
23-LH-2	alsike clover	*trifiolium hybridum*	Non-native	herb	7	B2
23-LH-2	aster (general)	*Asteraceae*	NA	herb	1	B2
23-LH-2	blue wildrye	*Elymus glaucus*	Native	herb	5	B2
23-LH-2	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	4	B2
23-LH-2	creeping red fescue	*Festuca rurbra*	Non-native	herb	1	B2
23-LH-2	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
23-LH-2	horsetail (general)	*Equisetum sp.*	native	herb	10	B2
23-LH-2	lady fern	*Athyrium filix-femina*	Native	herb	<1	B2
23-LH-2	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	8	B2
23-LH-2	red columbine	*Aquilegia formosa*	Native	herb	<1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-LH-2	thistle (general)	*Cirsium sp.*	NA	herb	10	B2
23-LH-2	yellow hawkweed	*Hieracium sp.*	NA	herb	<1	B2
23-LH-2	yellow rattlebox	*Rhinanthus minor*	native	herb	10	B2
23-LH-2	prickly rose	*Rosa acicularis*	Native	shrub	3	B2
23-LH-2	red raspberry	*Rubus idaeus*	Native	shrub	30	B2
23-LH-2	red-osier dogwood	*Cornus stolonifera*	Native	shrub	5	B2
23-LH-2	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B1
23-LH-2	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	1	B2
21-Halo-3	blue wildrye	*Elymus glaucus*	Native	herb	2	B2
21-Halo-3	buttercup	*Ranunculus sp.*	Native	herb	<1	B2
21-Halo-3	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	1	B2
21-Halo-3	chickweed	*Cerastium sp.*	NA	herb	1	B2
21-Halo-3	clover (general)	*Trifolium sp.*	Non-native	herb	1	B2
21-Halo-3	common horsetail	*Equisetum arvense*	Native	herb	80	B2
21-Halo-3	creeping red fescue	*Festuca rurbra*	Non-native	herb	2	B2
21-Halo-3	fireweed	*Epilobium angustifolium*	Native	herb	4	B2
21-Halo-3	lady fern	*Athyrium filix-femina*	Native	herb	<1	B2
21-Halo-3	liverwort	NA	NA	herb	30	B2
21-Halo-3	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	4	B2
21-Halo-3	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	2	B2
21-Halo-3	stinging nettle	*Urtica dioica*	Native	herb	<1	B2
21-Halo-3	sweet-scented bedstraw	*Galium triflorum*	Native	herb	4	B2
21-Halo-3	thistle (general)	*Cirsium sp.*	NA	herb	1	B2
21-Halo-3	yellow hawkweed	*Hieracium sp.*	NA	herb	<1	B2
21-Halo-3	black twinberry	*Lonicera involucrata*	Native	shrub	2	B2
21-Halo-3	red raspberry	*Rubus idaeus*	Native	shrub	4	B2
21-Halo-3	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	4	B2
21-Halo-3	thimbleberry	*Rubus parviflorus*	Native	shrub	4	B2
21-Halo-3	willow	*Salix sp.*	Native	shrub	4	B1
21-Halo-3	paper birch	*Betula papyrifera*	Native	tree	3	B1
23-Halo-4	alsike clover	*Trifolium hybridum*	Non-native	herb	10	B2
23-Halo-4	aven (yellow) (general)	*Geum sp.*	Native	herb	2	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-Halo-4	blue wildrye	*Elymus glaucus*	Native	herb	1	B2
23-Halo-4	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	4	B2
23-Halo-4	creeping red fescue	*Festuca rurbra*	Non-native	herb	3	B2
23-Halo-4	fireweed	*Epilobium angustifolium*	Native	herb	2	B2
23-Halo-4	horsetail (general)	*Equisetum sp.*	Native	herb	70	B2
23-Halo-4	narrow-leaved hawkweed	*Hieracium umbellatum*	Native	herb	3	B2
23-Halo-4	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	3	B2
23-Halo-4	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	3	B2
23-Halo-4	stinging nettle	*Urtica dioica*	Native	herb	<1	B2
23-Halo-4	thistle (general)	*Cirsium sp.*	NA	herb	1	B2
23-Halo-4	black twinberry	*Lonicera involucrata*	Native	shrub	5	B2
23-Halo-4	red raspberry	*Rubus idaeus*	Native	shrub	5	B2
23-Halo-4	saskatoon	*Amelanchier alnifolia*	Native	shrub	2	B2
23-Halo-4	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	10	B2
23-Halo-4	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	10	B1
23-Halo-4	thimbleberry	*Rubus parviflorus*	Native	shrub	3	B2
23-Halo-4	willow	*Salix sp.*	Native	shrub	1	B2
23-Halo-4	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-Halo-4	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-Halo-4	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	native	tree	1	B2
23-Halo-4	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	2	B2
23-Halo-4	paper birch	*Betula papyrifera*	Native	tree	1	B2
23-Halo-4	western redcedar	*Thuja plicata*	Native	tree	3	B1
23-Halo-5	alsike clover	*Trifolium hybridum*	Non-native	herb	7	B2
23-Halo-5	black medic	*Medicago lupulina*	Non-native	herb	1	B2
23-Halo-5	blue wildrye	*Elymus glaucus*	Native	herb	1	B2
23-Halo-5	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	3	B2
23-Halo-5	buttercup	*Ranunculus sp.*	Native	herb	5	B2
23-Halo-5	common horsetail	*Equisetum arvense*	Native	herb	40	B2
23-Halo-5	Crawford's sedge	*Carex crawfordii*	Native	herb	1	B2
23-Halo-5	dandelion	*Taraxacum sp.*	Non-	herb	4	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
			native			
23-Halo-5	fern (general)	*Polypodiales*	Native	herb	1	B2
23-Halo-5	field mint	*Mentha arvensis*	Native	herb	2	B2
23-Halo-5	fireweed	*Epilobium angustifolium*	Native	herb	<1	B2
23-Halo-5	grass (general)	Gramineae	NA	herb	5	B2
23-Halo-5	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	1	B2
23-Halo-5	narrow-leaved hawkweed	*Hieracium umbellatum*	Native	herb	4	B2
23-Halo-5	one-leaved foamflower	*Tiarella trifoliata var. unifoliata*	Native	herb	<1	B2
23-Halo-5	orange hawkweed	*Hieracium aurantiacum*	Non-native	herb	1	B2
23-Halo-5	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	5	B2
23-Halo-5	pearly everlasting	*Anaphalis margaritacea*	Native	herb	1	B2
23-Halo-5	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	2	B2
23-Halo-5	sweet-scented bedstraw	*Galium triflorum*	Native	herb	1	B2
23-Halo-5	thistle (general)	*Cirsium sp.*	NA	herb	2	B2
23-Halo-5	red raspberry	*Rubus idaeus*	Native	shrub	1	B2
23-Halo-5	red-osier dogwood	*Cornus stolonifera*	Native	shrub	4	B2
23-Halo-5	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	4	B2
23-Halo-5	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	Shrub	1	B1
23-Halo-5	soopolallie	*Shepherdia canadensis*	Native	shrub	2	B2
23-Halo-5	willow	*Salix sp.*	Native	shrub	10	B2
23-Halo-5	willow	*Salix sp.*	Native	shrub	4	B1
23-Halo-5	wood strawberry	*Fragaria vescaberry*	Native	shrub	2	B2
23-Halo-5	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	5	B2
23-Halo-5	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	1	B1
23-Halo-5	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	4	B2
23-Halo-5	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	1	B2
23-Halo-5	western redcedar	*Thuja plicata*	Native	tree	2	B2
23-Halo-6	alsike clover	*Trifolium hybridum*	Non-native	herb	1	B2
23-Halo-6	black medic	*Medicago lupulina*	Non-native	herb	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-Halo-6	blue wildrye	*Elymus glaucus*	Native	herb	2	B2
23-Halo-6	common horsetail	*Equisetum arvense*	Native	herb	40	B2
23-Halo-6	cow parsnip	*Heracleum maximum*	Native	herb	2	B2
23-Halo-6	dandelion	*Taraxacum sp.*	Non-native	herb	3	B2
23-Halo-6	fern (general)	*Polypodiales*	Native	herb	1	B2
23-Halo-6	field mint	*Mentha arvensis*	Native	herb	2	B2
23-Halo-6	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
23-Halo-6	narrow-leaved hawkweed	*Hieracium umbellatum*	Native	herb	1	B2
23-Halo-6	orange hawkweed	*Hieracium aurantiacum*	Non-native	herb	<1	B2
23-Halo-6	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	2	B2
23-Halo-6	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	1	B2
23-Halo-6	Sitka columbine	*Aquilegia formosa*	Native	herb	1	B2
23-Halo-6	sweet mountain cicely	*Osmorhiza berteroi*	Native	herb	1	B2
23-Halo-6	sweet-scented bedstraw	*Galium triflorum*	Native	herb	2	B2
23-Halo-6	thistle (general)	*Cirsium sp.*	NA	herb	2	B2
23-Halo-6	unknown	unknown	NA	herb	<1	B2
23-Halo-6	white sweet-clover	*Melilotus albus*	Non-native	herb	2	B2
23-Halo-6	black gooseberry	*Ribes lacustre*	Native	shrub	1	B2
23-Halo-6	black twinberry	*Lonicera involucrata*	Native	shrub	5	B2
23-Halo-6	prickly rose	*Rosa acicularis*	Native	shrub	3	B2
23-Halo-6	red elderberry	*Sambucus racemosa*	Native	shrub	1	B2
23-Halo-6	red osier dogwood	*cornus sericea*	Native	shrub	3	B2
23-Halo-6	red raspberry	*Rubus idaeus*	Native	shrub	5	B2
23-Halo-6	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	7	B2
23-Halo-6	trailing raspberry	*Rubus pubescens*	Native	shrub	3	B2
23-Halo-6	wood strawberry	*Fragaria vesca*	Native	shrub	2	B2
23-Halo-6	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-Halo-6	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-Halo-6	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	1	B2
23-Halo-6	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	2	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-LH-7	alsike clover	*Trifolium hybridum*	Non-native	herb	1	B2
23-LH-7	creeping red fescue	*festuca rubra*	Non-native	herb	<1	B2
23-LH-7	grass (general)	Gramineae	Native	herb	5	B2
23-LH-7	white sweet-clover	*Melilotus albus*	Non-native	herb	90	B2
23-LH-7	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	10	B2
23-LH-7	willow	*Salix sp.*	Native	shrub	1	B2
23-LH-7	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	2	B2
23-LH-7	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-LH-7	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	1	B2
23-LH-8	alsike clover	*Trifolium hybridum*	Non-native	herb	1	B2
23-LH-8	black medic	*Medicago lupulina*	Non-native	herb	15	B2
23-LH-8	creeping red fescue	*festuca rubra*	Non-native	herb	2	B2
23-LH-8	grass (general)	*Gramineae*	Native	herb	3	B2
23-LH-8	narrow-leaved hawkweed	*Hieracium umbellatum*	Native	herb	<1	B2
23-LH-8	rocky mountain fescue	*festuca saximontana*	Native	herb	2	B2
23-LH-8	rush #2	*Cyperaceae*	Native	herb	<1	B2
23-LH-8	Smooth scouring rush	*Equisetum laevigatum*	Native	herb	1	B2
23-LH-8	white sweet-clover	*Melilotus albus*	Non-native	herb	40	B2
23-LH-8	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	5	B2
23-LH-8	willow	*Salix sp.*	Native	shrub	3	B2
23-LH-8	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	4	B2
23-LH-8	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
21-Halo-9	bunchberry	*Cornus canadensis*	Native	herb	5	B2
21-Halo-9	buttercup	*Ranunculus sp.*	Native	herb	<1	B2
21-Halo-9	common horsetail	*Equisetum arvense*	Native	herb	60	B2
21-Halo-9	dandelion	*Taraxacum sp.*	Non-native	herb	<1	B2
21-Halo-9	enchanters nightshade	circaea alpina	Native	herb	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
21-Halo-9	false solomon's seal	*Maianthemum racemosum*	Native	herb	1	B2
21-Halo-9	grass (general)	Gramineae	NA	herb	1	B2
21-Halo-9	lady fern	*Athyrium filix-femina*	Native	herb	2	B2
21-Halo-9	mitrewort	*Mitella sp.*	Native	herb	10	B2
21-Halo-9	mountain sweet-cicely	*Osmorhiza berteroi*	Native	herb	1	B2
21-Halo-9	oak fern	*Gymnocarpium dryopteris*	Native	herb	15	B2
21-Halo-9	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	<1	B2
21-Halo-9	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	1	B2
21-Halo-9	rose twistedstalk	*Streptopus lanceolatus*	Native	herb	5	B2
21-Halo-9	sweet coltsfoot	*Petasites frigidus*	Native	herb	5	B2
21-Halo-9	sweet-scented bedstraw	*Galium triflorum*	Native	herb	12	B2
21-Halo-9	three-leaved foamflower	*Tiarella trifoliata var. trifoliata*	Native	herb	1	B2
21-Halo-9	twinflower	*Linnaea borealis*	Native	herb	5	B2
21-Halo-9	black gooseberry	*Ribes lacustre*	Native	shrub	1	B2
21-Halo-9	devil's club	*Oplopanax horridus*	Native	shrub	8	B2
21-Halo-9	red raspberry	*Rubus idaeus*	Native	shrub	5	B2
21-Halo-9	red-osier dogwood	*Cornus stolonifera*	Native	shrub	2	B2
21-Halo-9	trailing raspberry	*Rubus pubescens*	Native	shrub	15	B2
21-Halo-9	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	5	B1
21-Halo-9	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	5	B1
21-Halo-9	paper birch	*Betula papyrifera*	Native	tree	3	B2
21-Halo-9	subalpine fir	*Abies lasiocarpa*	Native	tree	2	A1
21-Halo-9	subalpine fir	*Abies lasiocarpa*	Native	tree	2	B1
21-Halo-9	western redcedar	*Thuja plicata*	Native	tree	60	A1
21-Halo-9	western redcedar	*Thuja plicata*	Native	tree	15	B1
21-Halo-9	western redcedar	*Thuja plicata*	Native	tree	10	B2
23-Halo-10	american brooklime	*Veronica beccabunga*	Native	herb	3	B2
23-Halo-10	blue wildrye	*Elymus glaucus*	Native	herb	2	B2
23-Halo-10	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	2	B2
23-Halo-10	bunchberry	*Cornus canadensis*	Native	herb	3	B2
23-Halo-10	buttercup	*Ranunculus sp.*	Native	herb	2	B2
23-Halo-10	Canada thistle	*Cirsium arvense*	Noxious	herb	<1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
			Weed			
23-Halo-10	common horsetail	*Equisetum arvense*	Native	herb	80	B2
23-Halo-10	cow parsnip	*Heracleum maximum*	Native	herb	3	B2
23-Halo-10	Crawford's sedge	*Carex crawfordii*	Native	herb	1	B2
23-Halo-10	enchanters nightshade	*Circaea alpina*	Native	herb	<1	B2
23-Halo-10	fern (general)	*Polypodiales*	Native	herb	2	B2
23-Halo-10	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
23-Halo-10	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	3	B2
23-Halo-10	mitrewort	*Mitella sp.*	Native	herb	1	B2
23-Halo-10	oak fern	*Gymnocarpium dryopteris*	Native	herb	1	B2
23-Halo-10	one-leaved foamflower	*Tiarella trifoliata var. unifoliata*	Native	herb	4	B2
23-Halo-10	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	2	B2
23-Halo-10	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	5	B2
23-Halo-10	Rush #2	*Cyperaceae*	Native	herb	<1	B2
23-Halo-10	sweet-scented bedstraw	*Galium triflorum*	Native	herb	1	B2
23-Halo-10	black gooseberry	*Ribes lacustre*	Native	shrub	2	B2
23-Halo-10	black twinberry	*Lonicera involucrata*	Native	shrub	7	B2
23-Halo-10	prickly rose	*Rosa acicularis*	Native	shrub	3	B2
23-Halo-10	red raspberry	*Rubus idaeus*	Native	shrub	7	B2
23-Halo-10	red-osier dogwood	*Cornus stolonifera*	Native	shrub	4	B2
23-Halo-10	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	5	B2
23-Halo-10	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	3	B1
23-Halo-10	trailing raspberry	*Rubus pubescens*	Native	shrub	3	B2
23-Halo-10	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	7	B2
23-Halo-10	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	<1	B2
23-Halo-10	paper birch	*Betula papyrifera*	Native	tree	1	B2
23-Halo-10	western redcedar	*Thuja plicata*	Native	tree	1	A1
23-Halo-10	western redcedar	*Thuja plicata*	Native	tree	3	A3
23-Halo-10	western redcedar	*Thuja plicata*	Native	tree	3	B1
23-Halo-10	western redcedar	*Thuja plicata*	Native	tree	2	B2
21-Halo-11	aster (general)	Asteraceae	NA	herb	<1	B2
21-Halo-11	common horsetail	*Equisetum arvense*	Native	herb	3	B2
21-Halo-11	dandelion	*Taraxacum sp.*	Non-	herb	<1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
			native			
21-Halo-11	false solomon's seal	*Maianthemum racemosum*	Native	herb	<1	B2
21-Halo-11	lady fern	*Athyrium filix-femina*	Native	herb	1	B2
21-Halo-11	mitrewort	*Mitella sp.*	Native	herb	2	B2
21-Halo-11	oak fern	*Gymnocarpium dryopteris*	Native	herb	2	B2
21-Halo-11	rose twistedstalk	*Streptopus lanceolatus*	Native	herb	<1	B2
21-Halo-11	sweet coltsfoot	*Petasites frigidus*	Native	herb	<1	B2
21-Halo-11	sweet-scented bedstraw	*Galium triflorum*	Native	herb	1	B2
21-Halo-11	wild sasparilla	*Aralia nudicaulis*	Native	herb	2	B2
21-Halo-11	black gooseberry	*Ribes lacustre*	Native	shrub	1	B2
21-Halo-11	black twinberry	*Lonicera involucrata*	Native	shrub	10	B2
21-Halo-11	prickly rose	*Rosa acicularis*	Native	shrub	8	B2
21-Halo-11	red-osier dogwood	*Cornus stolonifera*	Native	shrub	5	B2
21-Halo-11	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	3	B2
21-Halo-11	snowberry	*Symphoricarpos sp.*	Native	shrub	25	B2
21-Halo-11	spirea (general)	*Spiraea sp.*	Native	shrub	2	B2
21-Halo-11	trailing raspberry	*Rubus pubescens*	Native	shrub	3	B2
21-Halo-11	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	2	B2
21-Halo-11	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	15	A1
21-Halo-11	paper birch	*Betula papyrifera*	Native	tree	15	A1
21-Halo-11	western redcedar	*Thuja plicata*	Native	tree	3	A3
23-LH-12	alsike clover	*trifolium hybridum*	Non-native	herb	5	B2
23-LH-12	black medic	*Medicago lupulina*	Non-native	herb	1	B2
23-LH-12	Crawford's sedge	*Carex crawfordii*	Native	herb	1	B2
23-LH-12	creeping red fescue	*festuca rubra*	Non-native	herb	2	B2
23-LH-12	Eyebright	*Euphrasia spp.*	Native	herb	7	B2
23-LH-12	horsetail (general)	*Equisetum sp.*	Native	herb	2	B2
23-LH-12	jointed rush	*Juncus articulatus*	Native	herb	2	B2
23-LH-12	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	1	B2
23-LH-12	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	3	B2
23-LH-12	rocky mountain fescue	*festuca saximontana*	Native	herb	1	B2
23-LH-12	rush #1	*Cyperaceae*	Native	herb	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-LH-12	rush #2	*Cyperaceae*	Native	herb	2	B2
23-LH-12	Self heal	*Prunella vulgaris*	Native	herb	1	B2
23-LH-12	Smooth scouring rush	*Equisetum laevigatum*	Native	herb	4	B2
23-LH-12	white sweet-clover	*Melilotus albus*	Non-native	herb	5	B2
23-LH-12	wood strawberry	*Fragaria vescaberry*	Native	herb	1	B2
23-LH-12	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-LH-12	yellow rattlebox	*Rhinanthus minor*	Native	herb	4	B2
23-LH-12	yellow sweet-clover	*Melilotus officinalis*	Non-native	herb	1	B2
23-LH-12	prickly rose	*Rosa acicularis*	Native	shrub	1	B2
23-LH-12	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	3	B2
23-LH-12	soopolallie	*Shepherdia canadensis*	Native	Shrub	1	B2
23-LH-12	willow	*Salix sp.*	Native	shrub	7	B2
23-LH-12	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-LH-12	Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	1	B2
23-LH-12	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-LH-12	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	2	B2
23-LH-13	alsike clover	*trifolium hybridum*	Non-native	herb	5	B2
23-LH-13	arctic lupine	*Lupinus arcticus*	Native	herb	4	B2
23-LH-13	black medic	*Medicago lupulina*	Non-native	herb	3	B2
23-LH-13	blue wildrye	*Elymus glaucus*	Native	herb	<1	B2
23-LH-13	creeping red fescue	*festuca rubra*	Non-native	herb	1	B2
23-LH-13	grass (general)	*Gramineae*	Native	herb	1	B2
23-LH-13	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	<1	B2
23-LH-13	red clover	*Trifolium pratense*	Non-native	herb	1	B2
23-LH-13	white sweet-clover	*Melilotus albus*	Non-native	herb	7	B2
23-LH-13	red raspberry	*Rubus idaeus*	Native	shrub	2	B2
23-LH-13	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	15	B2
23-LH-13	Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	2	B2
23-LH-13	hybrid white	*Picea glauca x*	Native	tree	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
	spruce	*engelmannii*				
23-UH-14	alsike clover	*trifolium hybridum*	Non-native	herb	30	B2
23-UH-14	arrow leaved coltsfoot	*Petasites frigidus var sagittatus*	Native	Herb	<1	B2
23-UH-14	black medic	*Medicago lupulina*	Non-native	herb	10	B2
23-UH-14	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	3	B2
23-UH-14	Crawford's sedge	*Carex crawfordii*	Native	herb	<1	B2
23-UH-14	creeping red fescue	*festuca rubra*	Non-native	herb	5	B2
23-UH-14	dandelion	*Taraxacum sp.*	Non-native	herb	1	B2
23-UH-14	jointed rush	*Juncus articulatus*	Native	herb	<1	B2
23-UH-14	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	1	B2
23-UH-14	narrow-leaved hawkweed	*Hieracium umbellatum*	Native	herb	1	B2
23-UH-14	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	3	B2
23-UH-14	rush #2	*Cyperaceae*	Native	herb	2	B2
23-UH-14	self heal	*Prunella vulgaris*	Native	herb	1	B2
23-UH-14	timothy	*Phleum pratense*	Non-native	herb	1	B2
23-UH-14	water sedge	*Carex aquatilis*	Native	herb	<1	B2
23-UH-14	white sweet-clover	*Melilotus albus*	Non-native	herb	10	B2
23-UH-14	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	1	B2
23-UH-14	willow	*Salix sp.*	Native	shrub	2	B2
23-UH-14	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-UH-14	hybrid white spruce	Picea glauca x engelmannii	Native	tree	1	B2
23-UH-14	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	1	B2
23-UH-15	alsike clover	*trifolium hybridum*	Non-native	herb	70	B2
23-UH-15	arctic lupine	*Lupinus arcticus*	Native	herb	1	B2
23-UH-15	blue wildrye	*Elymus glaucus*	Native	herb	<1	B2
23-UH-15	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	<1	B2
23-UH-15	creeping red fescue	*festuca rubra*	Non-native	herb	2	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-UH-15	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	<1	B2
23-UH-15	purple peavine	*Lathyrus nevadensis*	Native	herb	<1	B2
23-UH-15	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	<1	B2
23-UH-15	rush #2	*Cyperaceae*	Native	herb	<1	B2
23-UH-15	Timothy	*Phleum pratense*	Non-native	herb	1	B2
23-UH-15	yellow hawkweed	*Hieracium sp.*	NA	herb	<1	B2
23-UH-15	prickly rose	*Rosa acicularis*	Native	shrub	1	B2
23-UH-15	red raspberry	*Rubus idaeus*	Native	shrub	<1	B2
23-UH-15	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	1	B2
23-UH-15	willow	*Salix sp.*	Native	shrub	3	B2
23-UH-15	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	1	B2
23-UH-15	Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	1	B2
23-UH-15	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-UH-16	alsike clover	*trifolium hybridum*	Non-native	herb	6	B2
23-UH-16	arctic lupine	*Lupinus arcticus*	Native	herb	<1	B2
23-UH-16	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	2	B2
23-UH-16	black medic	*Medicago lupulina*	Non-native	herb	15	B2
23-UH-16	common horsetail	*Equisetum arvense*	Native	herb	20	B2
23-UH-16	creeping red fescue	festuca rubra	Non-native	herb	4	B2
23-UH-16	dandelion	*Taraxacum sp.*	Non-native	herb	5	B2
23-UH-16	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
23-UH-16	grass (general)	*Gramineae*	Native	herb	5	B2
23-UH-16	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	2	B2
23-UH-16	purple peavine	*Lathyrus nevadensis*	Native	herb	1	B2
23-UH-16	spirea	*Spiraea betulifolia*	Native	herb	1	B2
23-UH-16	sweet-scented bedstraw	*Galium triflorum*	Native	herb	2	B2
23-UH-16	thistle (general)	*Cirsium sp.*	NA	herb	1	B2
23-UH-16	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-UH-16	red raspberry	*Rubus idaeus*	Native	shrub	5	B2
23-UH-16	thimbleberry	*Rubus parviflorus*	Native	shrub	2	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-UH-16	willow	*Salix sp.*	Native	shrub	15	B1
23-UH-16	willow	*Salix sp.*	Native	shrub	10	B2
23-UH-16	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	10	B1
23-UH-16	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	5	B2
23-UH-16	Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	5	B2
23-UH-16	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-UH-16	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	1	B2
21-Halo-17	bunchberry	*Cornus canadensis*	Native	herb	5	B2
21-Halo-17	buttercup	*Ranunculus sp.*	Native	herb	<1	B2
21-Halo-17	dandelion	*Taraxacum sp.*	Non-native	herb	<1	B2
21-Halo-17	false solomon's seal	*Maianthemum racemosum*	Native	herb	1	B2
21-Halo-17	green wintergreen	*Pyrola chlorantha*	Native	herb	1	B2
21-Halo-17	meadow horsetail	*Equisetum pratense*	Native	herb	5	B2
21-Halo-17	milkvetch	*Astragalus sp.*	Native	herb	1	B2
21-Halo-17	mountain sweet-cicely	*Osmorhiza berteroi*	Native	herb	<1	B2
21-Halo-17	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	<1	B2
21-Halo-17	rose twistedstalk	*Streptopus lanceolatus*	Native	herb	8	B2
21-Halo-17	showy aster	*Eurybia spectabilis*	Native	herb	<1	B2
21-Halo-17	sweet coltsfoot	*Petasites frigidus*	Native	herb	5	B2
21-Halo-17	sweet-scented bedstraw	*Galium triflorum*	Native	herb	2	B2
21-Halo-17	three-leaved foamflower	*Tiarella trifoliata var. unifoliata*	Native	herb	1	B2
21-Halo-17	twinflower	*Linnaea borealis*	Native	herb	3	B2
21-Halo-17	wintergreen	*Pyrola sp.*	Native	herb	1	B2
21-Halo-17	black gooseberry	*Ribes lacustre*	Native	shrub	1	B2
21-Halo-17	black twinberry	*Lonicera involucrata*	Native	shrub	5	B2
21-Halo-17	highbush cranberry	*Viburnum edule*	Native	shrub	1	B2
21-Halo-17	prickly rose	*Rosa acicularis*	Native	shrub	1	B2
21-Halo-17	red-osier dogwood	*Cornus stolonifera*	Native	shrub	1	B2
21-Halo-17	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	7	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
21-Halo-17	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	3	B1
21-Halo-17	skunk currant	*Ribes glandulosum*	Native	shrub	1	B2
21-Halo-17	snowberry	*Symphoricarpos sp.*	Native	shrub	8	B2
21-Halo-17	spirea (general)	*Spiraea sp.*	Native	shrub	1	B2
21-Halo-17	thimbleberry	*Rubus parviflorus*	Native	shrub	1	B2
21-Halo-17	trailing raspberry	*Rubus pubescens*	Native	shrub	3	B2
21-Halo-17	willow	*Salix sp.*	Native	shrub	2	B2
21-Halo-17	wood strawberry	*Fragaria vescaberry*	Native	shrub	<1	B2
21-Halo-17	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	60	A2
21-Halo-17	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	<1	B2
21-Halo-17	subalpine fir	*Abies lasiocarpa*	Native	tree	5	A2
21-Halo-17	western redcedar	*Thuja plicata*	Native	tree	1	B2
23-Halo-18	alsike clover	*Trifolium hybridum*	Non-native	herb	5	B2
23-Halo-18	aven (yellow) (general)	*Geum sp.*	Native	herb	1	B2
23-Halo-18	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	2	B2
23-Halo-18	common horsetail	*Equisetum arvense*	Native	herb	15	B2
23-Halo-18	creeping red fescue	*festuca rubra*	Non-native	herb	2	B2
23-Halo-18	dandelion	*Taraxacum sp.*	Non-native	herb	5	B2
23-Halo-18	field mint	*Mentha arvensis*	Native	herb	1	B2
23-Halo-18	fireweed	*Epilobium angustifolium*	Native	herb	3	B2
23-Halo-18	grass (general)	*Gramineae*	Native	herb	3	B2
23-Halo-18	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	1	B2
23-Halo-18	purple peavine	*Lathyrus nevadensis*	Native	herb	1	B2
23-Halo-18	thistle (general)	*Cirsium sp.*	NA	herb	<1	B2
23-Halo-18	yellow hawkweed	*Hieracium sp.*	NA	herb	3	B2
23-Halo-18	red raspberry	*Rubus idaeus*	Native	shrub	1	B2
23-Halo-18	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	3	B2
23-Halo-18	willow	*Salix sp.*	Native	shrub	7	B2
23-Halo-18	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-Halo-18	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-Halo-18	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	3	B2
23-Halo-18	subalpine fir	*Abies lasiocarpa*	Native	tree	3	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-Halo-18	trembling aspen	*Populus tremuloides*	Native	tree	2	B2
23-Halo-19	alsike clover	*Trifolium hybridum*	Non-native	herb	4	B2
23-Halo-19	blue wildrye	*Elymus glaucus*	Native	herb	<1	B2
23-Halo-19	buttercup	*Ranunculus sp.*	Native	herb	<1	B2
23-Halo-19	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	4	B2
23-Halo-19	common horsetail	*Equisetum arvense*	Native	herb	70	B2
23-Halo-19	cow parsnip	*Heracleum maximum*	Native	herb	3	B2
23-Halo-19	dandelion	*Taraxacum sp.*	Non-native	herb	2	B2
23-Halo-19	fireweed	*Epilobium angustifolium*	Native	herb	5	B2
23-Halo-19	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	1	B2
23-Halo-19	liverwort	NA	NA	herb	10	B2
23-Halo-19	oak fern	*Gymnocarpium dryopteris*	Native	herb	1	B2
23-Halo-19	one-leaved foamflower	*Tiarella trifoliata var. unifoliata*	Native	herb	1	B2
23-Halo-19	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	2	B2
23-Halo-19	pearly everlasting	*Anaphalis margaritacea*	Native	herb	<1	B2
23-Halo-19	senecio	*Senecio sp.*	Native	herb	3	B2
23-Halo-19	sweet-scented bedstraw	*Galium triflorum*	Native	herb	3	B2
23-Halo-19	twinflower	*Linnaea borealis*	Native	herb	10	B2
23-Halo-19	yellow hawkweed	*Hieracium sp.*	NA	herb	2	B2
23-Halo-19	black gooseberry	*Ribes lacustre*	Native	shrub	5	B2
23-Halo-19	black twinberry	*Lonicera involucrata*	Native	shrub	4	B2
23-Halo-19	red raspberry	*Rubus idaeus*	Native	shrub	5	B2
23-Halo-19	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	10	B2
23-Halo-19	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	20	B1
23-Halo-19	willow	*Salix sp.*	Native	shrub	5	B1
23-Halo-19	willow	*Salix sp.*	Native	shrub	8	B2
23-Halo-19	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-Halo-19	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	5	B2
23-Halo-19	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	1	B2
23-Halo-19	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	3	B2
23-Halo-19	paper birch	*Betula papyrifera*	Native	tree	1	B2
23-Halo-19	western redcedar	*Thuja plicata*	Native	tree	3	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-UH-20	alsike clover	*Trifolium hybridum*	Non-native	herb	25	B2
23-UH-20	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	8	B2
23-UH-20	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	3	B2
23-UH-20	black medic	*Medicago lupulina*	Non-native	herb	5	B2
23-UH-20	blue wildrye	*Elymus glaucus*	Native	herb	5	B2
23-UH-20	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	1	B2
23-UH-20	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	3	B2
23-UH-20	common horsetail	*Equisetum arvense*	Native	herb	10	B2
23-UH-20	dandelion	*Taraxacum sp.*	Non-native	herb	3	B2
23-UH-20	fireweed	*Epilobium angustifolium*	Native	herb	2	B2
23-UH-20	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	2	B2
23-UH-20	timothy	*Phleum pratense*	Non-native	herb	<1	B2
23-UH-20	white sweet-clover	*Melilotus albus*	Non-native	herb	1	B2
23-UH-20	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-UH-20	yellow sweet clover	*Melilotus officinalis*	Non-native	herb	5	B2
23-UH-20	birch leaved spirea	*Spiraea betulifolia*	Native	shrub	1	B2
23-UH-20	prickly rose	*Rosa acicularis*	Native	shrub	1	B2
23-UH-20	red raspberry	*Rubus idaeus*	Native	shrub	7	B2
23-UH-20	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	10	B2
23-UH-20	thimbleberry	*Rubus parviflorus*	Native	shrub	3	B2
23-UH-20	Willow	*Salix sp.*	Native	shrub	2	B2
23-UH-20	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-UH-20	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	1	B2
23-UH-20	western redcedar	*Thuja plicata*	Native	tree	1	B2
23-UH-21	alsike clover	*Trifolium hybridum*	Non-native	herb	15	B2
23-UH-21	common horsetail	*Equisetum arvense*	Native	herb	10	B2
23-UH-21	dandelion	*Taraxacum sp.*	Non-native	herb	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-UH-21	jointed rush	*Juncus articulatus*	Native	herb	1	B2
23-UH-21	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	2	B2
23-UH-21	Oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	1	B2
23-UH-21	pearly everlasting	*Anaphalis margaritacea*	Native	herb	1	B2
23-UH-21	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	1	B2
23-UH-21	red raspberry	*Rubus idaeus*	Native	shrub	2	B2
23-UH-21	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	10	B2
23-UH-21	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	5	B1
23-UH-21	thimbleberry	*Rubus parviflorus*	Native	shrub	1	B2
23-UH-21	willow	*Salix sp.*	Native	shrub	10	B2
23-UH-21	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	10	B2
23-UH-21	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-UH-21	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	5	B2
23-UH-21	western redcedar	*Thuja plicata*	Native	tree	2	B2
23-Halo-22	alsike clover	*Trifolium hybridum*	Non-native	herb	5	B2
23-Halo-22	american brooklime	*Veronica beccabunga*	Native	herb	<1	B2
23-Halo-22	beaked sedge	*Carex utriculata*	Native	herb	1	B2
23-Halo-22	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	3	B2
23-Halo-22	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	3	B2
23-Halo-22	bunchberry	*Cornus canadensis*	Native	herb	2	B2
23-Halo-22	buttercup	*Ranunculus sp.*	Native	herb	1	B2
23-Halo-22	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	1	B2
23-Halo-22	common horsetail	*Equisetum arvense*	Native	herb	65	B2
23-Halo-22	Crawford's sedge	*Carex crawfordii*	Native	herb	<1	B2
23-Halo-22	dandelion	*Taraxacum sp.*	Non-native	herb	3	B2
23-Halo-22	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
23-Halo-22	jointed rush	*Juncus articulatus*	Native	herb	<1	B2
23-Halo-22	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	2	B2
23-Halo-22	oak fern	*Gymnocarpium dryopteris*	Native	herb	<1	B2
23-Halo-22	purple-leaved	*Epilobium ciliatum*	Native	herb	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
	willowherb					
23-Halo-22	sedge (general)	*Carex sp.*	Native	herb	5	B2
23-Halo-22	Sweet scented bedstraw	*Galium triflorum*	Native	herb	<1	B2
23-Halo-22	timothy	*Phleum pratense*	Non-native	herb	2	B2
23-Halo-22	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-Halo-22	black gooseberry	*Ribes lacustre*	Native	shrub	1	B2
23-Halo-22	red raspberry	*Rubus idaeus*	Native	shrub	1	B2
23-Halo-22	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	15	B2
23-Halo-22	willow	*Salix sp.*	Native	shrub	10	B1
23-Halo-22	willow	*Salix sp.*	Native	shrub	10	B2
23-Halo-22	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	5	B2
23-Halo-22	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-Halo-22	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	1	B2
23-PF-23	alsike clover	*Trifolium hybridum*	Non-native	herb	15	B2
23-PF-23	arctic lupine	*Lupinus arcticus*	Native	herb	<1	B2
23-PF-23	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	2	B2
23-PF-23	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	10	B2
23-PF-23	dandelion	*Taraxacum sp.*	Non-native	herb	2	B2
23-PF-23	Kentucky bluegrass	*Poa pratensis*	Non-native	herb	1	B2
23-PF-23	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	10	B2
23-PF-23	red clover	*Trifolium pratense*	Non-native	herb	5	B2
23-PF-23	thistle (general)	*Cirsium sp.*	NA	herb	1	B2
23-PF-23	Timothy	*Phleum pratense*	Non-native	herb	5	B2
23-PF-23	white sweet-clover	*Melilotus albus*	Non-native	herb	3	B2
23-PF-23	yellow sweet-clover	*Melilotus officinalis*	Non-native	herb	5	B2
23-PF-23	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	2	B2
21-Halo-24	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	5	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
21-Halo-24	bunchberry	*Cornus canadensis*	Native	herb	2	B2
21-Halo-24	buttercup	*Ranunculus sp.*	Native	herb	3	B2
21-Halo-24	common horsetail	*Equisetum arvense*	Native	herb	90	B2
21-Halo-24	Crawford's sedge	*Carex crawfordii*	Native	herb	2	B2
21-Halo-24	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
21-Halo-24	lily of the valley	*Maianthemum canadense*	Native	herb	1	B2
21-Halo-24	mountain sweet-cicely	*Osmorhiza berteroi*	Native	herb	2	B2
21-Halo-24	purple-leaved willowherb	*Epilobium ciliatum*	Native	herb	5	B2
21-Halo-24	red clover	*Trifolium pratense*	Non-native	herb	4	B2
21-Halo-24	sweet-scented bedstraw	*Galium triflorum*	Native	herb	5	B2
21-Halo-24	timothy	*Phleum pratense*	Non-native	herb	2	B2
21-Halo-24	black gooseberry	*Ribes lacustre*	Native	shrub	4	B2
21-Halo-24	black twinberry	*Lonicera involucrata*	Native	shrub	8	B2
21-Halo-24	highbush cranberry	*Viburnum edule*	Native	shrub	2	B2
21-Halo-24	prickly rose	*Rosa acicularis*	Native	shrub	10	B2
21-Halo-24	red raspberry	*Rubus idaeus*	Native	shrub	4	B2
21-Halo-24	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	5	B2
21-Halo-24	thimbleberry	*Rubus parviflorus*	Native	shrub	3	B2
21-Halo-24	willow	*Salix sp.*	Native	shrub	2	B2
21-Halo-24	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	30	B2
21-Halo-24	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	4	B2
23-PF-25	alsike clover	*Trifolium hybridum*	Non-native	herb	5	B2
23-PF-25	american brooklime	*Veronica beccabunga*	Native	herb	1	B2
23-PF-25	aven (yellow) (general)	*Geum sp.*	Native	herb	1	B2
23-PF-25	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	5	B2
23-PF-25	black medic	*Medicago lupulina*	Non-native	herb	5	B2
23-PF-25	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	10	B2
23-PF-25	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-PF-25	Crawford's sedge	*Carex crawfordii*	Native	herb	1	B2
23-PF-25	dandelion	*Taraxacum sp.*	Non-native	herb	1	B2
23-PF-25	fireweed	*Epilobium angustifolium*	Native	herb	<1	B2
23-PF-25	jointed rush	*Juncus articulatus*	Native	herb	1	B2
23-PF-25	kentucky bluegrass	*Poa pratensis*	Non-native	herb	3	B2
23-PF-25	Monkey flower	*Erythranthe guttata*	Native	herb	<1	B2
23-PF-25	orange hawkweed	*Hieracium aurantiacum*	Non-native	herb	<1	B2
23-PF-25	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	5	B2
23-PF-25	red clover	*Trifolium pratense*	Non-native	herb	1	B2
23-PF-25	rush #1	*Cyperaceae*	Native	herb	1	B2
23-PF-25	rush #2	*Cyperaceae*	Native	herb	5	B2
23-PF-25	Timothy	*Phleum pratense*	Non-native	herb	2	B2
23-PF-25	white sweet-clover	*Melilotus albus*	Non-native	herb	1	B2
23-PF-25	yellow hawkweed	*Hieracium sp.*	NA	herb	<1	B2
23-PF-25	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	15	B2
23-PF-25	willow	*Salix sp.*	Native	shrub	3	B2
23-PF-25	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	5	B2
23-PF-25	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	5	B2
23-PF-26	alfalfa	*Medicago sativa*	Non-native	herb	<1	B2
23-PF-26	beaked sedge	*Carex utriculata*	Native	herb	5	B2
23-PF-26	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	<1	B2
23-PF-26	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	3	B2
23-PF-26	common cattail	*Typha latifolia*	Native	herb	40	B2
23-PF-26	common horsetail	*Equisetum arvense*	Native	herb	5	B2
23-PF-26	jointed rush	*Juncus articulatus*	Native	herb	5	B2
23-PF-26	little buttercup	*Raunculus abortivus*	Native	herb	<1	B2
23-PF-26	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	1	B2
23-PF-26	rush #1	*Cyperaceae*	Native	herb	4	B2
23-PF-26	rush #2	*Cyperaceae*	Native	herb	2	B2
23-PF-26	water plantain	*Alisma sp.*	Native	herb	<1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-PF-26	white sweet-clover	*Melilotus albus*	Non-native	herb	3	B2
23-PF-26	yellow sweet-clover	*Melilotus officinalis*	Non-native	herb	1	B2
23-PF-26	Sitka Alder	*Alnus viridis ssp. sinuata*	Native	shrub	1	B2
23-PF-26	willow	*Salix sp.*	Native	shrub	2	B1
23-PF-26	willow	*Salix sp.*	Native	shrub	1	B2
23-PF-26	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	3	B2
23-PF-26	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-PF-26	trembling aspen	*Populus tremuloides*	Native	tree	1	B2
23-PF-26	western redcedar	*Thuja plicata*	Native	tree	1	B2
23-PF-27	alsike clover	*Trifolium hybridum*	Non-native	herb	20	B2
23-PF-27	arctic lupine	*Lupinus arcticus*	Native	herb	1	B2
23-PF-27	aven (yellow) (general)	*Geum sp.*	Native	herb	1	B2
23-PF-27	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	1	B2
23-PF-27	black medic	*Medicago lupulina*	Non-native	herb	5	B2
23-PF-27	blue wildrye	*Elymus glaucus*	Native	herb	5	B2
23-PF-27	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	3	B2
23-PF-27	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	2	B2
23-PF-27	common horsetail	*Equisetum arvense*	Native	herb	15	B2
23-PF-27	dandelion	*Taraxacum sp.*	Non-native	herb	3	B2
23-PF-27	fireweed	*Epilobium angustifolium*	Native	herb	1	B2
23-PF-27	kentucky bluegrass	*Poa pratensis*	Non-native	herb	5	B2
23-PF-27	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	5	B2
23-PF-27	red clover	*Trifolium pratense*	Non-native	herb	1	B2
23-PF-27	Timothy	*Phleum pratense*	Non-native	herb	2	B2
23-PF-27	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-PF-27	yellow sweet-clover	*Melilotus officinalis*	Non-native	herb	10	B2
23-PF-27	black gooseberry	*Ribes lacustre*	Native	shrub	<1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-PF-27	red raspberry	*Rubus idaeus*	Native	shrub	5	B2
23-PF-27	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	2	B2
23-PF-27	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	1	B2
23-PF-27	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	2	B2
23-PF-28	alsike clover	*Trifolium hybridum*	Non-native	herb	10	B2
23-PF-28	aven (yellow) (general)	*Geum sp.*	Native	herb	1	B2
23-PF-28	birdsfoot trefoil	*Lotus corniculatus*	Non-native	herb	20	B2
23-PF-28	bluejoint reedgrass	*Calmagrostis canadensis*	Native	herb	1	B2
23-PF-28	Canada thistle	*Cirsium arvense*	Noxious Weed	herb	1	B2
23-PF-28	common horsetail	*Equisetum arvense*	Native	herb	5	B2
23-PF-28	dandelion	*Taraxacum sp.*	Non-native	herb	10	B2
23-PF-28	kentucky bluegrass	*Poa pratensis*	Non-native	herb	5	B2
23-PF-28	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	10	B2
23-PF-28	sedge (general)	*Carex sp.*	Native	herb	3	B2
23-PF-28	self heal	*Prunella vulgaris*	Native	herb	1	B2
23-PF-28	Timothy	*Phleum pratense*	Non-native	herb	10	B2
23-PF-28	Yellow sweet clover	*Melilotus officinalis*	Non-native	herb	1	B2
23-PF-28	red raspberry	*Rubus idaeus*	Native	shrub	<1	B2
23-PF-28	willow	*Salix sp.*	Native	shrub	5	B2
23-PF-28	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Native	tree	5	B2
23-LH-29	alsike clover	*Trifolium hybridum*	Non-native	herb	15	B2
23-LH-29	black medic	*Medicago lupulina*	Non-native	herb	5	B2
23-LH-29	blue wildrye	*Elymus glaucus*	Native	herb	5	B2
23-LH-29	common horsetail	*Equisetum arvense*	Native	herb	3	B2
23-LH-29	creeping red fescue	*Festuca rubra*	Non-native	herb	5	B2
23-LH-29	dandelion	*Taraxacum sp.*	Non-native	herb	2	B2
23-LH-29	fireweed	*Epilobium angustifolium*	Native	herb	<1	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
23-LH-29	great mullen	*Verbascum Thapsus*	Native	herb	1	B2
23-LH-29	oxeye daisy	*Leucanthemum vulgare*	Noxious Weed	herb	2	B2
23-LH-29	pearly everlasting	*Anaphalis margaritacea*	Native	herb	1	B2
23-LH-29	white sweet-clover	*Melilotus albus*	Non-native	herb	5	B2
23-LH-29	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-LH-29	Yellow sweet clover	*Melilotus officinalis*	Non-native	herb	5	B2
23-LH-29	red raspberry	*Rubus idaeus*	Native	shrub	1	B2
23-LH-29	red-osier dogwood	*Cornus stolonifera*	Native	shrub	1	B2
23-LH-29	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	5	B2
23-LH-29	trailing raspberry	*Rubus pubescens*	Native	shrub	1	B2
23-LH-29	Douglas-fir	*Pseudotsuga menziesii var. glauca*	Native	tree	2	B2
23-LH-29	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-UH-30	alsike clover	*Trifolium hybridum*	Non-native	herb	3	B2
23-UH-30	black medic	*Medicago lupulina*	Non-native	herb	3	B2
23-UH-30	blue wildrye	*Elymus glaucus*	Native	herb	<1	B2
23-UH-30	blue wildrye	*Elymus glaucus*	Native	herb	<1	B2
23-UH-30	common horsetail	*Equisetum arvense*	Native	herb	1	B2
23-UH-30	creamy peavine	*Lathyrus ochroleucus*	Native	herb	<1	B2
23-UH-30	creeping red fescue	*Festuca rubra*	Non-native	herb	1	B2
23-UH-30	dandelion	*Taraxacum sp.*	Non-native	herb	3	B2
23-UH-30	grass (general)	*Gramineae*	native	herb	2	B2
23-UH-30	kentucky bluegrass	*Poa pratensis*	Non-native	herb	<1	B2
23-UH-30	red clover	*Trifolium pratense*	Non-native	herb	1	B2
23-UH-30	Timothy	*Phleum pratense*	Non-native	herb	1	B2
23-UH-30	yellow hawkweed	*Hieracium sp.*	NA	herb	1	B2
23-UH-30	red-osier dogwood	*Cornus stolonifera*	Native	shrub	<1	B2
23-UH-30	Sitka alder	*Alnus viridis ssp. sinuata*	Native	shrub	5	B2
23-UH-30	willow	*Salix sp.*	Native	shrub	2	B2
23-UH-30	black cottonwood	*Populus balsamifera ssp.*	Native	tree	3	B2

Plot	Common Name	Scientific Name	Status	Vegetation Type	% Cover	Layer
		trichocarpa				
23-UH-30	hybrid white spruce	*Picea glauca x engelmannii*	Native	tree	2	B2
23-UH-30	lodgepole pine	*Pinus contorta var. latifolia*	Native	tree	2	B2
23-UH-30	subalpine fir	*Abies lasiocarpa*	Native	tree	<1	B2
23-UH-30	western redcedar	*Thuja plicata*	Native	tree	2	B2

*Data highlighted in green represents halo plot data collected during Year 2 of the monitoring.

Table C4: Tree and Shrub Seedling Average Height and Vigour (Year 4)

Plot	Common Name	*Scientific Name*	Vegetation Type	Total Stems	Seedling Height (cm)	Seedling Vigour
23-Halo-1	subalpine fir	*Abies lasiocarpa*	Coniferous Tree	1	13	moderate
23-Halo-1	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	4	52	high
23-Halo-1	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	1	56	High
23-Halo-1	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	8	35	high
23-Halo-1	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	11	155	high
23-LH-2	red-osier dogwood	*Cornus stolonifera*	Shrub	2	189	high
23-LH-2	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	5	208	high
23-Halo-4	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	1	30	high
23-Halo-4	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	6	53	high
23-Halo-4	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	1	54	high
23-Halo-4	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	5	86	High
23-Halo-4	paper birch	*Betula papyrifera*	Deciduous Tree	1	97	moderate
23-Halo-4	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	6	233	High
23-Halo-5	western redcedar	*Thuja plicata*	Coniferous Tree	40	7	moderate
23-Halo-5	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	27	16	high
23-Halo-5	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	3	23	moderate
23-Halo-5	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	38	57	high
23-Halo-5	willow	*Salix sp.*	Shrub	2	131	high
23-Halo-5	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	7	154	high
23-Halo-6	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	1	68	moderate
23-Halo-6	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	3	70	high
23-Halo-6	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	2	100	high
23-Halo-6	black	*Populus balsamifera ssp.*	Deciduous	19	116	high

Plot	Common Name	*Scientific Name*	Vegetation Type	Total Stems	Seedling Height (cm)	Seedling Vigour
	cottonwood	*trichocarpa*	Tree			
23-Halo-6	red-osier dogwood	*Cornus stolonifera*	Shrub	8	84	high
23-Halo-6	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	4	185	Low
23-LH-7	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	1	63	high
23-LH-7	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	1	77	high
23-LH-7	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	8	187	moderate
23-LH-7	willow	*Salix sp.*	Shrub	2	100	High
23-LH-7	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	9	147	moderate
23-LH-8	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	1	34	high
23-LH-8	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	19	74	high
23-LH-8	willow	*Salix sp.*	Shrub	15	93	high
23-LH-8	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	14	101	high
23-Halo-10	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	2	29	moderate
23-Halo-10	western redcedar	*Thuja plicata*	Coniferous Tree	4	128	high
23-Halo-10	paper birch	*Betula papyrifera*	Deciduous Tree	1	113	high
23-Halo-10	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	19	179	high
23-Halo-10	Sitka alder	*Alnus viridis ssp. sinuata*	shrub	13	333	high
23-LH-12	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	2	19	moderate
23-LH-12	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	2	27	low
23-LH-12	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	4	44	moderate
23-LH-12	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	95	26	high
23-LH-12	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	8	87	moderate
23-LH-12	willow	*Salix sp.*	Shrub	74	123	high
23-LH-13	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	1	24	moderate
23-LH-13	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	3	41	high
23-LH-13	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	12	171	high

Plot	Common Name	*Scientific Name*	Vegetation Type	Total Stems	Seedling Height (cm)	Seedling Vigour
23-UH-14	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	4	15	moderate
23-UH-14	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	2	48	moderate
23-UH-14	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	19	86	high
23-UH-14	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	1	53	high
23-UH-14	willow	*Salix sp.*	Shrub	40	76	high
23-UH-15	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	2	24	high
23-UH-15	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	3	25	moderate
23-UH-15	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	9	71	high
23-UH-15	willow	*Salix sp.*	Shrub	25	41	high
23-UH-15	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	1	90	high
23-UH-16	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	4	40	high
23-UH-16	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	2	92	high
23-UH-16	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	5	151	high
23-UH-16	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	27	253	high
23-UH-16	willow	*Salix sp.*	Shrub	25	267	high
23-Halo-18	subalpine fir	*Abies lasiocarpa*	Coniferous Tree	2	21	low
23-Halo-18	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	3	30	moderate
23-Halo-18	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	7	59	moderate
23-Halo-18	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	5	20	high
23-Halo-18	trembling aspen	*populus tremuloides*	Deciduous Tree	9	59	high
23-Halo-18	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	4	47	low
23-Halo-18	willow	*Salix sp.*	Shrub	25	102	high
23-Halo-19	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	1	68	high
23-Halo-19	western redcedar	*Thuja plicata*	Coniferous Tree	6	69	high

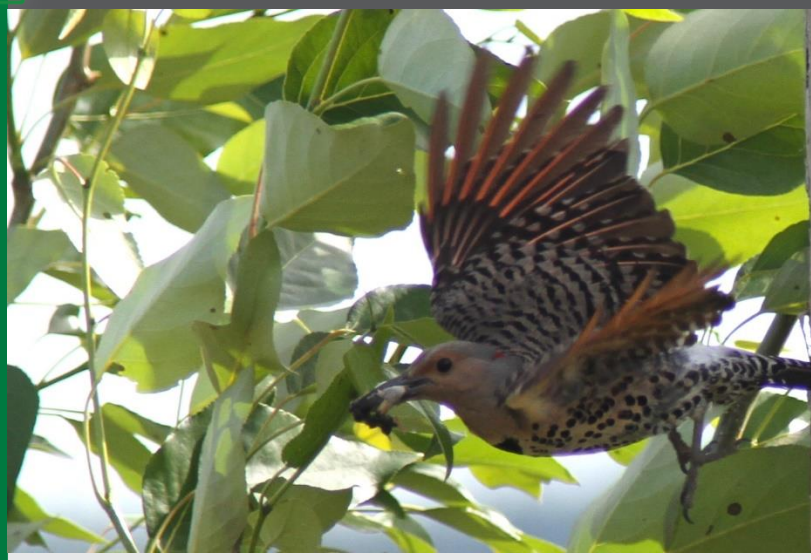
Plot	Common Name	*Scientific Name*	Vegetation Type	Total Stems	Seedling Height (cm)	Seedling Vigour
23-Halo-19	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	11	74	high
23-Halo-19	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	3	124	high
23-Halo-19	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	15	71	high
23-Halo-19	paper birch	*Betula papyrifera*	Deciduous Tree	1	159	high
23-Halo-19	willow	*Salix sp.*	Shrub	10	227	high
23-Halo-19	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	11	303	high
23-UH-20	western redcedar	*Thuja plicata*	Coniferous Tree	1	44	high
23-UH-20	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	5	65	high
23-UH-20	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	1	80	high
23-UH-20	willow	*Salix sp.*	Shrub	5	77	high
23-UH-20	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	15	176	moderate
23-UH-21	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	5	32	high
23-UH-21	western redcedar	*Thuja plicata*	Coniferous Tree	1	48	moderate
23-UH-21	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	2	50	moderate
23-UH-21	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	107	79	high
23-UH-21	willow	*Salix sp.*	Shrub	24	163	high
23-UH-21	Sitka alder	*Alnus viridis ssp. sinuata*	shrub	9	174	high
23-Halo-22	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	1	50	high
23-Halo-22	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	2	66	high
23-Halo-22	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	27	182	high
23-Halo-22	Sitka alder	*Alnus viridis ssp. sinuata*	shrub	11	146	high
23-Halo-22	willow	*Salix sp.*	Shrub	18	242	high
23-PF-23	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	2	71	moderate
23-PF-25	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	4	66	high

Plot	Common Name	*Scientific Name*	Vegetation Type	Total Stems	Seedling Height (cm)	Seedling Vigour
23-PF-25	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	12	66	high
23-PF-25	willow	*Salix sp.*	Shrub	15	98	high
23-PF-25	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	9	143	high
23-PF-26	western redcedar	*Thuja plicata*	Coniferous Tree	1	38	high
23-PF-26	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	2	56	moderate
23-PF-26	trembling aspen	*populus tremuloides*	Deciduous Tree	2	36	high
23-PF-26	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	4	71	high
23-PF-26	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	2	128	low
23-PF-26	willow	*Salix sp.*	Shrub	15	187	high
23-PF-27	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	3	82	high
23-PF-27	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	4	115	high
23-PF-27	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	2	105	high
23-PF-28	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	5	174	high
23-PF-28	willow	*Salix sp.*	Shrub	20	157	high
23-LH-29	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	4	31	high
23-LH-29	interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	Coniferous Tree	7	35	high
23-LH-29	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	5	117	moderate
23-UH-30	hybrid white spruce	*Picea glauca x engelmannii*	Coniferous Tree	6	8	moderate
23-UH-30	western redcedar	*Thuja plicata*	Coniferous Tree	3	8	high
23-UH-30	subalpine fir	*Abies lasiocarpa*	Coniferous Tree	1	15	high
23-UH-30	lodgepole pine	*Pinus contorta var. latifolia*	Coniferous Tree	3	32	moderate
23-UH-30	black cottonwood	*Populus balsamifera ssp. trichocarpa*	Deciduous Tree	15	22	high
23-UH-30	willow	*Salix sp.*	Shrub	22	20	high
23-UH-30	Sitka alder	*Alnus viridis ssp. sinuata*	Shrub	6	134	high

DWB Consulting Services Ltd.

Mount Polley Mine

Terrestrial Wildlife Monitoring: Bird Surveys, Year 4, 2023



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OQM | Organizational Quality Management Program

Executive Summary

DWB Consulting Services Ltd. conducted avian point count surveys from June 20 – 25, 2023, at Mount Polley Mine. The surveys were conducted as part of Year 4 of the mine's 10-year terrestrial wildlife monitoring program. The objective of the program is to monitor rehabilitation and reclamation initiatives that were completed for the Hazeltine Creek corridor to assess whether ecological succession is on track to support local wildlife populations after a tailings breach impacted the reach in 2014.

Point count surveys were conducted by four experienced surveyors in groups of two across 15 plots for five key study areas along the Hazeltine Creek corridor and 12 plots across Reference areas representative of Young and Mature Forest unimpacted by the 2014 tailings breach. Within the Hazeltine Creek corridor, four of the study areas (Lower Hazeltine – Quesnel Lake, Lower Hazeltine – CWD, Upper Hazeltine, Polley Flats) represent areas where rehabilitation treatments were previously applied, while the fifth study area (Lower Hazeltine – Halo Zone) represents an area where mature trees and native vegetation survived the breach.

A total of 61 avian species were detected within the Hazeltine Creek corridor, 29 species in Young Forest, and 36 species in Mature Forest when including detections between 0 – 100 m of plot center and flyovers. When analyzing the number of species detected within 0 – 50 m of plot center across all study areas in the Hazeltine Creek corridor, species richness was significantly higher in Lower Hazeltine – CWD and significantly lower in the Upper Hazeltine and Polley Flats study areas. A higher percentage of exposed ground in the Upper Hazeltine and Polley Flats plots may be a proxy indicator of underdeveloped vegetation cover or soil substrate capable of supporting invertebrate communities that would provide food to birds. However, future surveys and analysis are required to determine if this hypothesis has merit.

The relative mean abundance was estimated for 16 species within the Hazeltine Creek corridor, five species within Young Forest areas, and seven species within Mature Forest areas. Of these species, song sparrow had the highest abundance estimate in the Hazeltine Creek corridor and was influenced by study area, having a notably higher estimate in Polley Flats and a lower estimate in Upper Hazeltine. Orange-crowned warbler and Swainson's thrush demonstrated the highest mean abundance values in Young Forest plots, while varied thrush and Hammond's flycatcher had the highest mean abundance in Mature Forest areas; however, variability for the Reference area results was high.

Species resource preferences and habitat characteristics of survey plots were summarized to help interpret survey results and to use in future years for multi-year analyses, including comparison of species assemblages between study areas. Incidental observations, particularly evidence of avian breeding behaviour and presence of species at-risk, were also documented. Overall, results in Year 4 suggest that the reclaimed sites are attracting bird species we would expect to see on landscapes dominated by early pioneering vegetation species and are providing at least some support for actively breeding birds. Future survey years will incorporate invertebrate sampling and multi-year analyses (Years 5 and 10) to provide supplementary information on habitat and resource availability in the reclaimed areas and assess whether the objectives and benchmarks of the Mount Polley Mine wildlife monitoring program are being met.

Signature Page

DWB Consulting Services Ltd. is pleased to submit this report for your review. This report has been prepared using sound technical and professional judgement, based on our knowledge and experience, applicable regulatory framework, industry best management practices, and current understanding of project conditions, design, and project setting.

REPORT TITLE: Mount Polley Mine – Terrestrial Wildlife Monitoring: Bird Surveys, Year 4, 2023

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We do not represent, warrant, undertake or guarantee:

- That all project environmental-related information has been received.
- That regulations and standards of practices shall remain constant through the duration of the project.
- That the use of guidance in the report will lead to any particular outcome or result; or, in particular,
- That by using the guidance in the report, the client will be approved by the contract holder for the applied works.

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1.0 INTRODUCTION

1.1 PROJECT SCOPE

DWB Consulting Services Ltd. (DWB) was retained by Mount Polley Mining Corporation (MPMC) to conduct bird surveys in 2023 along the Hazeltine Creek corridor at Mount Polley Mine (hereafter, referred to as Mount Polley) and Reference areas by conducting standardized point count surveys at established plot locations. Avian point count surveys are part of a terrestrial wildlife monitoring program to assess the progress of ecological succession in response to reclamation initiatives completed along the Hazeltine Creek corridor after a tailings breach in 2014 (DWB 2021; Section 1.2). The first year of bird surveys occurred in 2020 using the methods outlined in the *Mount Polley Mine - Detailed Study Design for Terrestrial Wildlife Monitoring* (Golder 2019a). Updates to the overarching terrestrial monitoring program were proposed in the *Updated Scope for the Terrestrial Wildlife Monitoring Plan for the Hazeltine Creek Corridor* (DWB 2021; hereafter, referred to as the Wildlife Monitoring Plan). Updates included increasing the program lifespan to 10 years, incorporating additional terrestrial ecosystem performance indicators, and outlining various benchmark indicators to assess the effectiveness of reclamation (DWB 2021; see Section 1.3).

The changes to the original monitoring plan were in response to recommendations from two oversight committees: the Mount Polley Government to Government Technical Working Group, (representing the local Xatśūll [Soda Creek] and T'exelc [Williams Lake] First Nations, the BC Ministry of Environment and Climate Change Strategy [BC ENV]), and the Habitat Remediation Working Group (representing Xatśūll, T'exelc, BC ENV, as well as MPMC technical experts, BC Ministry of Forest Lands and Natural Resource Operations and Rural Development [BC FLNRORD], and the Department of Fisheries and Oceans Canada [DFO]). The recommendations from these committees were stipulated by BC ENV as conditions for the approval of the 2019 Comprehensive Environmental Management Plan (CEMP). The CEMP is a permit requirement under *Environmental Management Act* Authorization 11678.

This report presents Year 4 of the bird survey results. The Wildlife Monitoring Plan is a long-term project which will develop a multi-year dataset (DWB 2021). Multi-year analyses are planned for Years 5 and 10 of the study, which will compare the results to the benchmark indicators for breeding birds outlined in the Wildlife Monitoring Plan.

1.2 BACKGROUND

The Hazeltine Creek corridor was impacted by a breach in the Mount Polley tailings storage facility embankment in 2014, which released tailings, supernatant, and construction materials into Hazeltine Creek and the downstream Edney Creek and Quesnel Lake. Since the event, extensive remediation work has been completed along the corridor, including reconstruction of Hazeltine and Edney Creeks, and the shoreline of Quesnel Lake. Rehabilitation of riparian habitat was initiated by planting native trees, shrubs, and graminoids, and using landscape techniques to improve site growing conditions, such as mounding soil, spreading coarse woody debris (CWD), and adding mulch. Riparian vegetation planting and installation of habitat features favourable to birds, such as vertical CWD tree perches and nest boxes, were completed at several of the sites.

An Ecological Risk Assessment was conducted for MPMC in 2019 (Golder 2019b). The results determined that the risk of metal uptake by terrestrial receptors from contaminated soil and sediment was low compared to the ecological risk posed by the physical disruption to soil, vegetation, and riparian habitat (Golder 2019b). Therefore, The Wildlife Monitoring Plan was developed with a focus on rehabilitation of

physical habitat attributes, since the risk of metal toxicity to terrestrial wildlife through bioaccumulation and biomagnification was designated as low.

1.3 Study Objective

Breeding migratory birds are informative indicators of habitat availability, since different species and groups rely on different habitats to support breeding, nutrition, and territory acquisition (Mac Nally 1997, Hanson et al. 2009, O'Brien and Dawson 2016). Birds are also an efficient wildlife group to survey and can indicate when ecological succession is progressing to a more mature state (Block 1987, Schieck and Song 2006, Hawkes 2021). The MPMC Terrestrial Wildlife Monitoring Program was initially designed to facilitate trend analysis over a 5-year period (Golder 2019a). However, the scope of the program was updated in October 2021 to increase the monitoring period to 10-years and include other study elements, such as reference sites, mammals, population metrics, and benchmarks (DWB 2021). Reference sites representative of young and mature forest stages was established in 2022 outside the boundaries of the mine site and were surveyed for the first year in 2023.

In accordance with the current Wildlife Monitoring Plan, ecological succession along the Hazeltine Creek corridor will be considered on a trajectory that is successfully supporting breeding birds if the relative abundance of bird species, species richness, and/or species diversity on the reclaimed sites are:

- Similar to the reference sites, **and/or**
- Higher on the reclaimed sites where improvements to facilitate vegetation regrowth and habitat complexity have been applied for a longer duration of time, indicating that these reclaimed sites will have a higher likelihood of success, **and/or**
- Higher in year 10 when compared to previous years, indicating that habitat availability for breeding bird populations has improved, particularly for species that occupy habitats in early- to mid-successional stages.

Alternatively, avian community composition may demonstrate a transition from an early-successional to mid-successional assemblage of avian species, a mid-successional to a mature-successional assemblage of avian species, or a transition in community composition that is similar to the reference sites.

To address the recommendations provided by the Government to Government Technical Working Group, Reference sites representative of young and mature forest stages were selected outside the boundaries of the mine and field-verified in late summer of 2022. Therefore, Year 4 of the program (2023) represents the first year of surveys completed at the Reference sites. The Reference sites will be considered representative of early- to mid-successional and mature-successional avian communities.

1.4 Applicable Regulations

No permit was required to complete the bird point count surveys; however, a number of overarching regulations apply to birds in Canada and British Columbia (BC). Most bird species are protected under the Canada *Migratory Birds Convention Act* (MBCA; S.C. 1994, c. 22), which prohibits harm and disturbance to most bird species and nests that are occupied by birds and/or viable eggs. Bird species that are not regulated under the MBCA (e.g., raptors) still have similar protection under the BC *Wildlife Act* (R.S.B.C. 1996, c. 488, s. 34). In addition, nests belonging to certain species are protected year-round regardless of occupancy. Under Schedule 1 of the Canada *Migratory Birds Regulations* (SOR/2022-105), nests belonging to 18 species, including pileated woodpecker and great blue heron, are protected indefinitely on the landscape unless determined to be unoccupied for a certain period of time (36 months for pileated woodpecker and 24 months for great blue heron).

Under the BC *Wildlife Act*, nests belonging to eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls are protected year-round regardless of occupancy. Nests protected year-round under statute must not be removed without federal or provincial authorization.

Some avian species have additional protection under the Canada *Species at Risk Act* (SARA; S.C. 2002, c. 29), particularly if designated as *Threatened* or *Endangered*. Additional prohibitions under SARA also apply to the 'residence' of the *Threatened* or *Endangered* species, which is sometimes species dependent. Federal prohibitions under the MBCA and SARA are applicable on all lands in Canada for birds, including private and provincial crown land.

1.5 PROJECT LOCATION

Mount Polley is located approximately 57 km (geodesic distance) northeast of Williams Lake, and 8 km south of Likely, BC, at the end of the Morehead-Bootjack Forest Service Road (FSR) at UTM 10 U 592897 m E, 5822603 m N (Figure 1). The project area is within the Interior Cedar Hemlock, Quesnel wet cool variant (ICHwk2) biogeoclimatic zone, which encompasses an elevation range of 725-1250 m and is characterized by cool wet winters, warm moist to dry summers, and a mean annual precipitation of 842 mm (Steen and Coupé 1997).

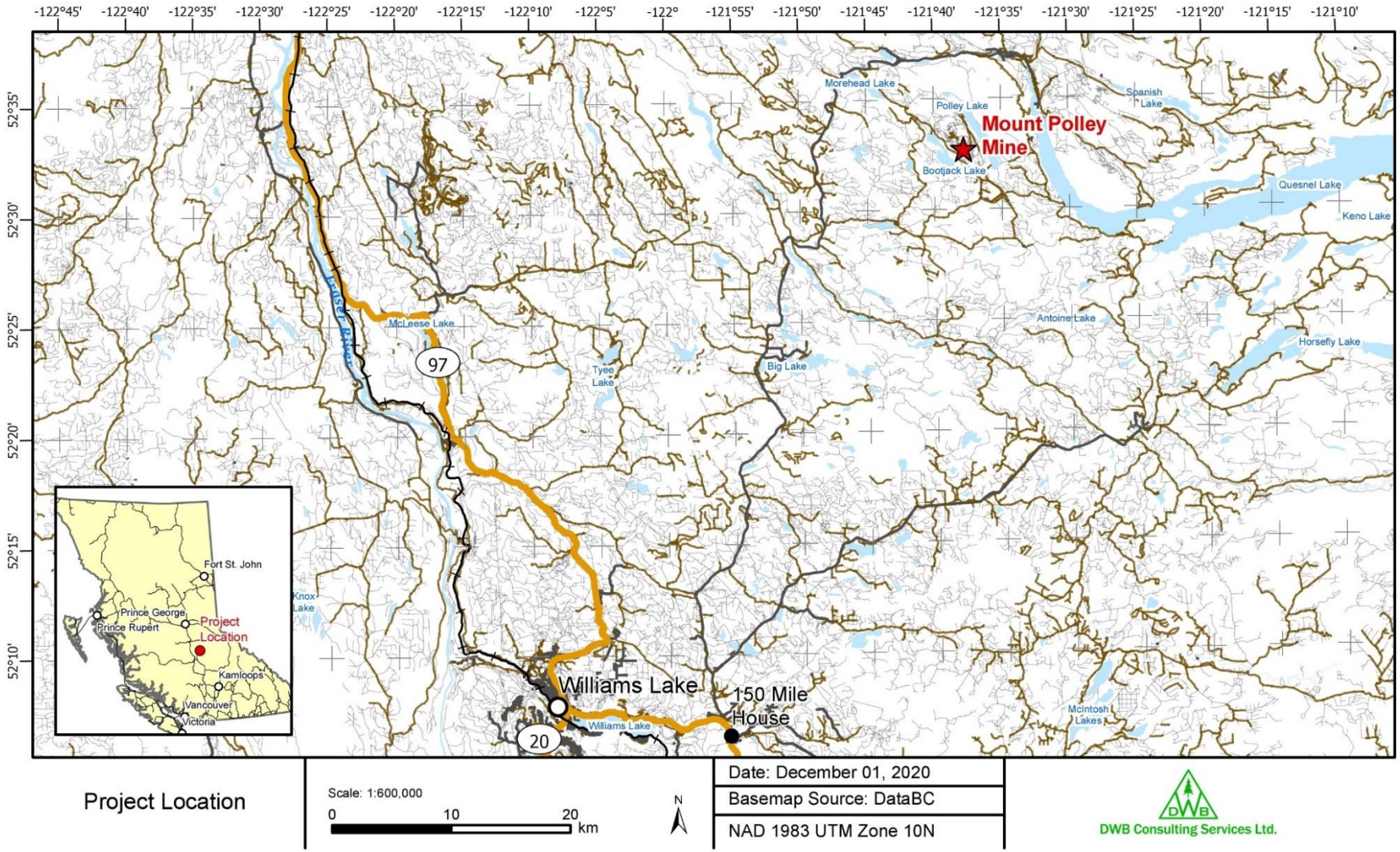

Figure 1. Location of Mount Polley Mine in British Columbia, Canada

2.0 METHODS

Survey methods were based on the initial study design summarized in the *Mount Polley Mine - Detailed Study Design for Terrestrial Wildlife Monitoring* (Golder 2019a) and updated in the Wildlife Monitoring Plan (DWB 2021). Point count surveys were conducted to meet provincial standards described in *Inventory Methods for Forest and Grassland Songbirds* (RIC 1999).

2.1 POINT COUNT SURVEYS

2.1.1 Plot Locations

Avian point count stations were established at 15 plots within the Hazeltine Creek corridor. Each plot was 100 m radius in size and spaced a minimum of 200 m from other plots to meet the assumption of independence (RIC 1999). Plots were established in five study areas along the Hazeltine Creek corridor that had been functionally impacted by the breach, including Lower Hazeltine, Upper Hazeltine, and Polley Flats (Table 1; Appendix A). Lower Hazeltine was further separated into three zones to account for differences in vegetation. *Lower Hazeltine – Quesnel Lake* represented the nearshore area adjacent to Quesnel Lake where some mature trees remained intact post-breach and where CWD treatments had been applied, *Lower Hazeltine – Halo Zone* represented an area where the majority of mature trees present prior to the breach were still intact and no treatments had been applied, and *Lower Hazeltine – CWD* represented an area primarily absent of mature trees and where CWD treatments had been applied. Each of the five study areas contained three plots for conducting point count surveys.

Table 1. Locations of avian point count survey plots according to study areas located within the Hazeltine Creek corridor

Study Area	Plot Name	UTM Locations	Rehabilitation Treatment Type
Lower Hazeltine – Quesnel Lake	BBS01	10U 601729 m E, 5817535 m N	Mounded with CWD
	BBS02	10U 601586 m E, 5817399 m N	Mounded with CWD
	BBS12	10U 601789 m E, 5817363 m N	Recontoured with topsoil and CWD
Lower Hazeltine – Halo Zone	BBS03	10U 602060 m E, 5817382 m N	**No treatments applied** – mature trees that were present prior to the breach remained intact
	BBS04	10U 601790 m E, 5817157 m N	
	BBS13	10U 601987 m E, 5817223 m N	
Lower Hazeltine - CWD	BBS05	10U 601239 m E, 5817098 m N	Recontoured with topsoil and CWD
	BBS06	10U 601011 m E, 5817000 m N	Ripped with CWD
	BBS14	10U 601092 m E, 5817321 m N	Added wood chip mulch with CWD; mounded with CWD
Upper Hazeltine	BBS07	10U 599371 m E, 5817367 m N	Mounded with CWD
	BBS08	10U 598204 m E, 5817648 m N	Recontoured with topsoil and CWD
	BBS15	10U 596877 m E, 5819176 m N	Mounded with CWD
Polley Flats	BBS09	10U 595938 m E, 5820037 m N	Ripped with CWD
	BBS10	10U 595743 m E, 5820153 m N	Mounded with CWD
	BBS11	10U 595856 m E, 5820385 m N	Soil placed with CWD

In 2022 (Year 3), a total of 18 plots were established in Reference areas adjacent to nearby watercourses that were representative of early-successional and mature forest. Being well outside the boundaries of the mine site, the locations of the Reference areas had not been directly impacted by the tailings breach in 2014; however, most of the Reference area locations had been affected by historical silviculture practices, as is common to the region. Reference areas were categorized into two groups: Young Forest and Mature Forest. Young Forest areas were characterized by forest stands approximately 15-years old that had been replanted as part of silviculture practices. Plots were established in stands that contained diverse shrub layers and native plant communities, where possible, so that reasonable comparisons between Young Forest and the Hazeltine Creek Corridor could be made over time. The Mature Forest habitat was characterized by forest stands approximately 127 – 135 years old. Age class was determined using BC Vegetation Resource Inventory (VRI) data (Province of BC 2023).

Table 2. Plot locations for avian point count surveys in study areas located within reference areas outside the boundaries of the Hazeltine Creek Corridor and Mount Polley Mine site

Study Area	Plot Name	Location (UTMs)	Adjacent Riparian Feature
Mature Forest	BBS16	10U 580145.97 m E, 5820274.04 m N	Miles Creek
	BBS17	10U 579878.99 m E, 5820118.04 m N	Miles Creek
	BBS18	10U 579802.02 m E, 5820447.99 m N	Miles Creek
	BBS19	10U 583414.98 m E, 5822481.05 m N	Jacobie Creek
	BBS20	10U 583235.01 m E, 5822314.99 m N	Jacobie Creek
	BBS21	10U 582941.03 m E, 5822431.04 m N	Jacobie Creek
	BBS22	10U 589345.97 m E, 5824429.03 m N	Morehead Creek
	BBS23	10U 589624.01 m E, 5824430.00 m N	Morehead Creek
	BBS24	10U 589771.00 m E, 5824608.05 m N	Morehead Creek
Young Forest	BBS25	10U 580852.01 m E, 5826802.00 m N	Warren Creek
	BBS26	10U 581062.02 m E, 5826850.98 m N	Warren Creek
	BBS27	10U 581015.01 m E, 5826657.95 m N	Warren Creek
	BBS28	10U 581557.97 m E, 5821448.98 m N	Miles Creek
	BBS29	10U 581389.01 m E, 5821186.05 m N	Miles Creek
	BBS30	10U 581087.02m E, 5821284.95 m N	Miles Creek
	BBS31	10U 580763.97 m E, 5822726.96 m N	Jacobie Creek
	BBS32	10U 581144.03 m E, 5822802.00 m N	Jacobie Creek
	BBS33	10U 581370.01 m E, 5822912.00 m N	Jacobie Creek

Refer to Appendix A for a map of all survey plot locations across the different study areas. At a regional level, bird species can be influenced by elevation, vegetation characteristics, and forest age. Therefore, Table 3 summarizes these features between survey plots.

Table 3. Comparison of regional habitat characteristics between all study area and plot locations

Study Area	Plot Name	BEC Zone[a]	Elevation (m)	Forest Age Class[b] (Years)	Description
Lower Hazeltine Creek – Quesnel Lake	BBS01	ICHwk2	731	34	Reclaimed after tailings breach.
	BBS02	ICHwk2	731	124	
	BBS12	ICHwk2	733	34	
	BBS03	ICHwk2	732	34	

Study Area	Plot Name	BEC Zone[(a)]	Elevation (m)	Forest Age Class[(b)] (Years)	Description
Lower Hazeltine Creek – Halo Zone	BBS04	ICHwk2	737	34	Impacted by tailings breach but mature trees still present: reclamation not applied.
	BBS13	ICHwk2	741	34	
Lower Hazeltine Creek – CWD	BBS05	ICHwk2	741	112	Reclaimed after tailings breach.
	BBS06	ICHwk2	745	112	
	BBS14	ICHwk2	746	94	
Upper Hazeltine Creek	BBS07	ICHmk3	837	144	Reclaimed after tailings breach.
	BBS08	ICHmk3	875	264	
	BBS15	ICHmk3	910	56	
Hazeltine Creek – Polley Flats	BBS09	ICHmk3	924	124	Reclaimed after tailings breach.
	BSS10	ICHmk3	922	124	
	BBS11	ICHmk3	926	284	
Reference Area – Mature Forest	BBS16	SBSdw1	974	154	Not impacted by tailings breach. Evidence of historical silviculture practices.
	BBS17	SBSdw1	964	174	
	BBS18	SBSdw1	971	134	
	BBS19	ICHmk3	1129	54	
	BBS20	ICHmk3	1137	54	
	BBS21	ICHmk3	1106	137	
	BBS22	ICHmk3	984	49	
	BSS23	ICHmk3	982	129	
	BBS24	ICHmk3	981	129	
Reference Area – Young Forest	BBS25	SBSdw1	1042	15	Not impacted by tailings breach. Recently replanted as part of silviculture practices.
	BBS26	SBSdw1	1072	15	
	BBS27	SBSdw1	1051	15	
	BBS28	SBSdw1	1093	17	
	BBS29	SBSdw1	1060	17	
	BBS30	SBSdw1	1055	16	
	BBS31	SBSdw1	1062	17	
	BBS32	SBSdw1	1067	17	
	BBS33	SBSdw1	1071	17	

(a) Biogeoclimatic Ecosystem Classification, including Interior Cedar Hemlock Quesnel Wet Cool (ICHwk2), Interior Cedar Hemlock Horsefly Moist Cool (ICHMK3), and Sub-boreal Spruce Horsefly Dry Warm (SBSdw1).

(b) Age class was determined using 2023 BC Vegetation Resource Inventory (VRI) data

Five plots in each References area type were surveyed in 2023, including BBS19 – 24 (Mature Forest) and BBS25 – 30 (Young Forest). Within 50 m of each point count plot center, physical and biotic habitat characteristics were documented to support the analyses of successional status and verify that plots accurately represented the characteristics of the study areas. Vegetation characteristics are described in greater detail in Section 2.3. Photographs showing vegetation characteristics from each cardinal direction of the plot center are in Appendix B.

For a formal, quantitative assessment of the progress of planting and vegetation succession along the Hazeltine Creek corridor, refer to the *Mount Polley Mine - Terrestrial Wildlife Monitoring: Vegetation Surveys, Year 4* (DWB 2023a).

2.1.2 Bird Counts

Auditory and visual counts of birds were conducted from June 20 – 25, 2023, which is within the recommended window for peak detection of songbird activity (May 1 – July 10; RIC 1999). Surveys were conducted within the first four hours after sunrise when singing rates are highest (RIC 1999) by four experienced observers working in teams of two. Plots were surveyed for a total of five minutes each day by one of the two survey teams using the unreconciled double-observer method (Riddle et al. 2010). The unreconciled double-observer method provides estimates of detection probability and abundance without requiring surveyors to match their individual observations; this differs from the independent double-observer method where matching observations between observers is required (Riddle et al. 2010). During the five-minute survey period, the total number of individual birds detected was recorded according to whether they could be heard or visually observed within the following horizontal distance categories:

- 0 – 50 m from plot center,
- 50 – 100 m from plot center,
- >100 m from plot center (outside of plot),
- Flying over plot

A total of three surveys were completed for each plot over six consecutive days to capture variation in survey conditions and associated bird activity, as well as chance observations. Poor weather conditions, such as cold temperatures (<3°C), persistent precipitation in the form of snow or rain, and high winds (Beaufort Scale >2 or >12 km/hr) reduces bird activity and can compromise the ability of the surveyor to detect species (RIC 1999); however, weather conditions remained favourable during the survey period. To reduce potential surveyor bias that could impact the probability of species detection, surveyor crews alternated plots daily.

Bird species were recorded as incidental observations if they were identified outside of the 5-minute point count survey sessions. Although incidental observations were not used in final analyses, these observations were informative for confirming presence of avian species and breeding behaviours that were present in study areas, but not always detectable through point count surveys (e.g., waterfowl, raptors), as well as identifying the presence of species at risk (Section 4.0). Evidence of breeding could include persistent territorial alarm-calling, adults carrying food in beak indicative of nestling provisioning, adults on nests or entering tree cavities, or observations of juveniles that had recently fledged (Section 3.4).

2.2 Data Analyses

The results of point count surveys were used to determine the following metrics:

- **Species Richness** – the total number of bird species detected within each study area,
- **Species Relative Abundance** – an estimate of the mean number of individuals per species utilizing each study area,
- **Community Composition** – the presence of a particular assemblage of species that share similar preferences for habitat and resources within each study area.

Species richness, relative abundance and community composition are quantifiable means of measuring changes in avian populations and communities, which will improve interpretability when comparing survey results to the benchmarks of the Wildlife Monitoring Plan (DWB 2021). Only data collected from 0

– 50 m of plot center were used in analyses because this area was considered the most representative of the reclaimed site features.

2.2.1 Species Richness

A generalized linear model with a Poisson distribution was analyzed in R v 4.2.3 (R Core Team 2023) using the 'lme4' package (Bates et al. 2015) to determine if there was a statistically significant difference in species richness between study areas. Linear models attempt to describe a relationship between a variable of interest (e.g., species richness) and predictor/explanatory variable(s) (e.g., study area/time) by fitting a straight line to the observed data (Agresti 2015). The model was assessed for overdispersion and collinearity using the 'Performance' package (Lüdecke et al. 2021) to ensure Poisson model assumptions were met. Parameter estimates were calculated using Maximum Likelihood Estimation and results were considered significant when the p-value was less than 0.05. Sampling variation and precision was represented by ± 1 standard error (SE) with a 95% confidence interval.

2.2.2 Species Relative Abundance

Species abundance across all plots and study areas were estimated by analyzing point count data in the program PRESENCE v 2.13.47 (Hines 2023) using the Royle Biometrics option, which also calculates the probability that a species will be detected by surveyors (Royle 2004). Although some studies have found that zero-inflated Poisson and negative binomial distributions are a better fit for modelling species where overdispersion is present in the dataset, a simple Poisson N-mixture model was chosen to better accommodate small sample sizes. Only species that were detected a minimum of fives times across all plots were included in the analyses. The number of times a bird was detected by surveyors was assumed to have included repeat counts of the same individuals over the survey period, since many songbirds establish territories during breeding.

Abundance and the probability of detection can be influenced by a number of environmental and survey factors. For example, a greater number of individuals and species are more likely to be detected in the first few hours after sunrise compared to late morning or afternoon (Ralph et al. 1993, RIC 1999). Species detection may also be affected by surveyor experience and physical ability (e.g., some surveyors have difficulty detecting the higher frequency of golden-crowned kinglets). To account for this type of variation, a number of independent variables (hereafter, referred to as explanatory variables) anticipated to influence species detection were assessed in the models. Study area was included in the models for the Hazeltine Creek corridor as the primary predictor of interest of avian abundance (Table 4). A predictor variable was not included in the model for the Reference areas.

Table 4. Model variables anticipated to influence estimates of abundance and detection probability of avian species during point count surveys from June 20 – 25, 2023

Parameter Tested	Variable Category[(a)]	Variable Type[(b)]	Description
Study Area	Predictor	Qualitative	The five study areas associated with the Hazeltine Creek corridor (see Table 1). A predictor was not included in the models for the Reference areas.
Time	Explanatory	Quantitative	The start time of each point count survey conducted for each plot located in the Hazeltine Creek corridor and Reference areas.

Parameter Tested	Variable Category[(a)]	Variable Type[(b)]	Description
Observer	Explanatory	Qualitative	A unique identifier associated with each surveyor who performed the point count survey for plots in the Hazeltine Creek corridor and Reference areas.
Temperature	Explanatory	Quantitative	The ambient air temperature at the start of each day for plots in the Hazeltine Creek corridor and Reference areas.
Edges	Explanatory	Quantitative	Distance between plot center and nearest edge of adjacent forest habitat for plots in the Hazeltine Creek corridor. For Mature Forest Reference areas, this value represents the nearest distance from plot center to the edge of the forest before the habitat transitions to early-successional habitat or main roads that fragment the forest stand. Values were measured from satellite imagery.

(a) For this analysis, the Predictor variable is defined as the variable of primary interest (Study Area) in regards to its direct influence on species mean relative abundance. The Explanatory variable is defined as a variable anticipated to have an influence on the detection probability for each species and, therefore, an indirect influence on mean relative abundance that is unrelated to Study Area.

(b) Qualitative variables were analyzed as categories, while quantitative variables were analyzed as either discrete or continuous numerical data.

Survey number (i.e., Survey Visit), which was included as an explanatory variable in 2022 (Year 3), was removed for the 2023 (Year 4) analysis (DWB 2023b). Air temperature at the start of each day was used in the analysis for 2023 instead of the air temperature at the start of each point count survey used in the analysis for 2022 (DWB 2023b); this was due to the daily air temperature results having fewer missing data points.

A total of 10 models were considered for each species detected in plots within the Hazeltine Creek corridor and a total of 5 models were considered for each species detected in Reference area plots. Only species that had cumulative counts of five or greater across all plots during the survey period were analyzed for mean abundance. Overall, a total of 47 species were included in the analysis for mean abundance; however, final results were only presented for 16 species within the Hazeltine Creek corridor and 11 species within the Reference areas after excluding species with highly variable results (i.e., the standard error was greater than the mean estimate).

The model that best represented the dataset for each species was chosen using Akaike's Information Criterion corrected for small sample sizes (AICc). AICc ranks the relative performance of multiple models of the same data set by using the maximum likelihood estimation as a measure of fit, and penalizes more complex models with a higher number of parameters (Burnham and Anderson 1998). In AICc, the lowest score is assigned to the best performing model; however, models with low scores of two AICc units of difference or less are considered equally superior (Burnham and Anderson 1998). Precision of the results were represented by ± 1 standard error (SE) with a 95% confidence interval.

2.2.3 Community Composition

One of the long-term goals of the program is to assess whether changes in community composition (i.e., species assemblages) occur in the reclaimed areas of the Hazeltine Creek corridor over time. Therefore, species included in the analysis of abundance were categorized according to specific habitat types and resources. The habitat and resource categories are summarized in Table 5.

Table 5. Categories assigned to avian species based on habitat and resource preferences

Category	Sub-Category	Description
Vegetation Structural Stage	Herb (SS2)	Habitat that consists of an early successional stage or herb community (SS2) that could be dominated by forbs, graminoids, aquatic plants, or dwarf shrubs.
	Shrub (SS3)	Habitat that consists of an early successional stage or shrub community, including low shrubs (<2 m tall) and tall shrubs (2 - 10 m tall).
	Pole/Sapling (SS4)	Habitat characterized by (typically) young trees (usually > 15-20 years old) greater than 10 m tall, and which are often densely stocked and have overtopped shrub and herb layers.
	Young Forest (SS5)	Habitat characterized by young forest where thinning is starting to occur and which is potentially 30 - 80 years of age, depending on the species.
	Mature Forest (SS6) Old Forest (SS7)	Habitat characterized by mature trees (80 - 140/250 years, depending on disturbance type) where the shrub and herb understories have become well developed (SS6). Old forest contains stands of old trees with complex structure (SS7).
Habitat Type	Riparian	Areas characterized by watercourses.
	Shrub	Areas characterized by shrub communities.
	Grassland	Areas characterized by early- to late-successional grassland species.
	Conifer	Forest stands dominated by conifer tree species.
	Deciduous	Forest stands dominated by deciduous tree species.
	Mixed Forest	Forest stands comprised of mixed conifer and deciduous tree species.
	Open	Areas dominated by herbs, low shrubs, or exposed ground.
Nest Site	Tree	Builds nests in the branches, or against the trunk, of trees.
	Shrub	Builds nests in early- to late-successional shrubs.
	Ground	Builds nests on the ground.
	Burrows	Builds nests in excavated burrows of embankments or wherever small crevices can be found.
	Cavities	Builds nests in excavated cavities of trees or nest boxes.
Foraging Area	Aerial	Primarily forages for food in the air.
	Foliage	Primarily forages for food in the leaves, needles, and branches of trees.
	Riparian	Primarily forages over watercourses.
	Ground	Primarily forages on the ground.

Category	Sub-Category	Description
	Low Vegetation	Primarily forages in low-growing shrubs.
	Canopy	Primarily forages in the crowns of trees.
Food Types	Invertebrates	Has a generalist diet comprised of a broad group of terrestrial and/or aquatic invertebrates.
	Arthropods	Primarily subsists on arthropods, such as insects and spiders.
	Adult Aquatic Insects	Primarily targets flying insects that have an aquatic larval stage.
	Floral Nectar, Fruit	Has a more specialized diet consisting of nectar from flowering plants (floral nectar) or fruit.
	Seeds	Subsist on seeds as a large portion of their diet.

The categories for structural stages were based on the definitions provided in the *Field Manual for Describing Terrestrial Ecosystems 2nd Edition* (Province of BC 2010). Food categories were simplified to represent broad food groups, from the most diverse options (invertebrates) to narrower food groups (seeds, fruits, adult aquatic insects). Food type categories were assigned to a species based on the primary diet relied upon during the breeding season.

2.3 PLOT HABITAT CHARACTERISTICS

Functional habitat characteristics were documented within 0 – 50 m of each point count survey plot to track plot vegetation over time and assess whether it may be influencing avian species richness, abundance, and community composition. However, these attributes will not be included in analyses until future years. Observations were collected from plot center once during the survey period (June 20 – 23, 2023) and included the following information:

- **Habitat Type** – percent of open versus forested landscape.
- **Vegetation Composition** – grasses, forbs, and shrubs documented to genus and species, where possible.
- **Forest Composition** – trees documented to genus and species, where possible.
- **Forest Cover** – percent of total forest cover overlapping plots when compared to open herb and shrub habitat, including trees that provide canopy coverage; however, this category excludes saplings in the reclaimed plots and is not representative of percent canopy cover.
- **Vegetation Cover** – percent of total vegetation cover that includes moss, herbs, and shrubs less than 2 meters high.
- **Exposed Ground** – percent of plot area that is absent of vegetation growth, including exposed soil, mineral, or mulch.
- **Coarse Woody Debris (CWD)** – percent of plot area on top of the ground that is comprised of CWD material.
- **Adjacent Watercourse** – watercourses close enough to be observed from plot center.

Percent forest cover was added as its own separate assessment category for the 2023 surveys. For the purpose of these assessments, vegetation cover includes the B2 Vegetation Layer (under 2 meters; Province of BC 2010) as well as moss and herbs. Undisturbed, adjacent forest habitat overlapped with some of the plots within the Hazeltine Creek corridor, particularly in the Upper Hazeltine area where the

reclaimed corridor is narrow. The Lower Hazeltine – Halo Zone area is also characterized by mature trees that survived the breach and, therefore, had higher forest coverage compared to the other study areas at the start of the monitoring program. No reclamation treatments have been applied to the Lower Hazeltine – Halo Zone area; instead, the existing understory vegetation has regenerated naturally.

3.0 RESULTS

3.1 SPECIES RICHNESS

When considering all avian species detected within 0 – 100 m of plot center and flyovers during surveys, a total of 61 species were detected within the Hazeltine Creek corridor, 36 species were detected within mature forest reference plots, and 29 species were detected within young forest reference plots. Within the Hazeltine Creek corridor, these detection numbers include a greater number of species found outside of the reclaimed sites since the reclaimed sites are primarily represented by 0 – 50 m of plot center.

When focusing the detection numbers to 0 – 50 m of plot center, the highest number of detections within the Hazeltine Creek corridor occurred in the Hazeltine Creek – CWD study area (21 species) compared to 20 species in the Young Forest study area and 27 species in the Mature Forest study area (Figure 2).

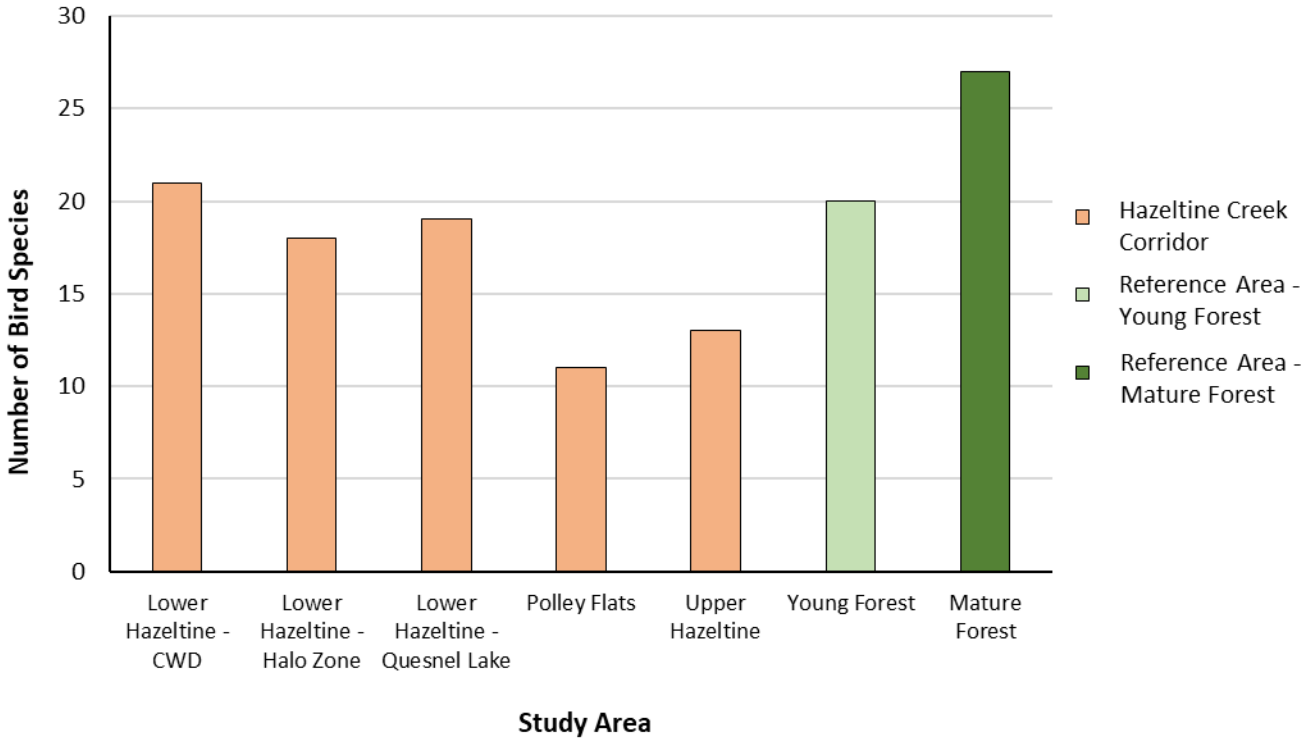

Figure 2. The total number of bird species detected during avian point surveys from June 20 – 25, 2023, within 0 – 50 m of plot center across different study areas that included the Hazeltine Creek corridor and Reference areas

The number of bird species detected was significantly higher for Lower Hazeltine – CWD (χ^2 = 26.3, P < 0.001, Estimate = 1.66 ± 0.148), and significantly lower for Polley Flats (χ^2 = 26.3, P = 0.005, Estimate = -0.662 ± 0.236) and Upper Hazeltine (χ^2 = 26.3, P = 0.001, Estimate = -0.816 ± 0.248) when compared to the other Hazeltine Creek corridor study areas and Reference areas. Differences in the number of species detected was not statistically significant between the Lower Hazeltine – Halo Zone (χ^2 = 26.3, P = 0.553, Estimate = 0.114 ± 0.192), Lower Hazeltine – Quesnel Lake (χ^2 = 26.3, P=0.548, Estimate = -0.122 ± 0.204),

Young Forest (χ^2 = 26.3, P = 0.253, Estimate = -0.201 ± 0.176), or Mature Forest (χ^2 = 26.3, P = 0.280, Estimate = -0.189 ± 0.175).

One of the survey crews in Year 4 trended towards having higher detection rates compared to the other crew in Year 4 and this difference approached significance (χ2 = 26.3, P = 0.063, Estimate = 0.196 ± 0.105).

3.2 Species Relative Abundance

3.2.1 Hazeltine Creek Corridor

Mean abundance was estimated for a total of 16 species identified within the Hazeltine Creek corridor during surveys (Table 6).

Table 6. Estimates of mean abundance (λ) for bird species detected during point count surveys within the Hazeltine Creek corridor from June 20 – 25, 2023, within 0 – 50 m from plot center

Species	Parameter Assumptions (Variables)[a]	Study Area Differences[b]	Total Cumulative Count[c]	Mean Abundance (λ)	Standard Error (±)
Alder Flycatcher (*Empidonax alnorum*)	λ(.), r(.)	n/a n/a	14	0.274	0.137
American Redstart (*Setophaga ruticilla*)	λ(.), r(temp)	n/a	17	0.424	0.175
	λ(.), r(.)	n/a		0.437	0.182
	λ(.), r(edges)	n/a		0.449	0.191
American Robin (*Turdus migratorius*)	λ(.), r(.)	n/a	44	2.44	1.07
	λ(.), r(edges)	n/a		1.87	0.576
Cedar Waxwing (*Bombycilla cedrorum*)	λ(.), r(.)	n/a	19	0.898	0.330
	λ(.), r(edges)	n/a		1.03	0.400
Hammond's Flycatcher (*Empidonax hammondii*)	λ(.), r(time)	n/a n/a	21	0.726	0.262
Lincoln's Sparrow (*Melospiza lincolnii*)	λ(.), r(observer)	n/a n/a	52	2.25	0.698
MacGillivray's Warbler (*Geothlypis tolmiei*)	λ(.), r(time)	n/a	18	1.04	0.483
	λ(.), r(.)	n/a		1.29	0.773
Northern Flicker (*Colaptes auratus*)	λ(.), r(.)	n/a n/a	6	0.137	0.097
Orange-crowned Warbler (*Leiothlypis celata*)	λ(.), r(edges)	n/a n/a	20	1.38	0.652
Ruby-crowned Kinglet (*Corthylio calendula*)	λ(.), r(.)	n/a	14	0.353	0.159
	λ(.), r(time)	n/a		0.346	0.155
Red-winged Blackbird (Agelaius phoeniceus)	λ(.), r(.)	n/a	6	0.457	0.327
	λ(.), r(time)	n/a		0.657	0.440
Savannah Sparrow (*Passerculus sandwichensis*)	λ(.), r(edges)	n/a n/a	15	0.280	0.141

Species	Parameter Assumptions (Variables)[a]	Study Area Differences[b]	Total Cumulative Count[c]	Mean Abundance (λ)	Standard Error (±)
Song Sparrow	λ(area), r(temp)	lh-ql	42	5.09	3.86
(*Melospiza melodia*)		lh-hz		0.00	n/a
		lh-cwd		3.26	2.54
		uh		0.597	0.684
		pf		5.43	3.93
Warbling Vireo	λ(.), r(time)	n/a	11	0.357	0.162
(*Vireo gilvus*)	λ(.), r(.)	n/a		0.405	0.196
Willow Flycatcher	λ(.), r(.)	n/a	9	0.310	0.163
(*Empidonax traillii*)		n/a			
Yellow Warbler	λ(.), r(edges)	n/a	8	1.20	0.829
(*Setophaga petechia*)	λ(.), r(.)	n/a		0.211	0.123

(a) The effect of a variable (in brackets) on mean abundance (λ) and the probability of detection (r) for that species. For example, survey start time may influence the probability of detection for some species, as represented by r(time). In some cases, no variables were found to influence mean abundance or the probability of detection, as represented by λ(.) or r(.). See Section 2.2.2 for definitions of the variables. Some species had more than one set of models that best explained the mean abundance results (e.g., American redstart) based on the principles of Akaike's Information Criterion (AIC).

(b) Results according to study area within the Hazeltine Creek corridor if study area had an influence on mean relative abundance (λ); otherwise, this column is not applicable (n/a).

(c) The total number of detections across all survey plots for that species during the survey period (June 20 – June 25) that were analyzed in the model to determine mean abundance (λ).

Only species that had a minimum of five detections across the survey period, and that had abundance estimates with reasonable variability (i.e., in this case, standard error < abundance estimate) were included in the final results (Table 6). Different study areas within the Hazeltine Creek corridor had an influence on mean abundance for song sparrow, with the highest abundance estimate for this species observed in Polley Flats (λ = 5.43, ± 3.93). Mean abundance for song sparrow was lower in Upper Hazeltine (λ = 0.597, ± 0.684) and undetectable in the Lower Hazeltine – Halo Zone (detections = 0).

Ambient temperature at the beginning of the day, survey start time, and distance between plot center and forest edge had an influence on the probability of detection for some species in the Hazeltine Creek corridor (Table 6). Higher temperatures at the start of the day were associated with a higher probability of detection for American redstart and a lower probability of detection for song sparrow. Point count surveys that occurred later in the morning were associated with a lower probability of detection for Hammond's flycatcher, but a higher probability of detection for MacGillivray's warbler, ruby-crowned kinglet, red-winged blackbird, and warbling vireo.

Increased distances between the edge of mature forest and survey plot center were associated with an increase in the probability of detection for American redstart, American robin, and yellow warbler, but a decrease in the probability of detection for cedar waxwing, orange-crowned warbler, and savannah sparrow. Detection probability of Lincoln's sparrow was higher for two individual surveyors, each of whom was on at least one of the two crews (Table 6).

Figure 3 summarizes the mean relative abundance of bird species consistently detected over a three-year period within the Hazeltine Creek corridor between 2021 and 2023.

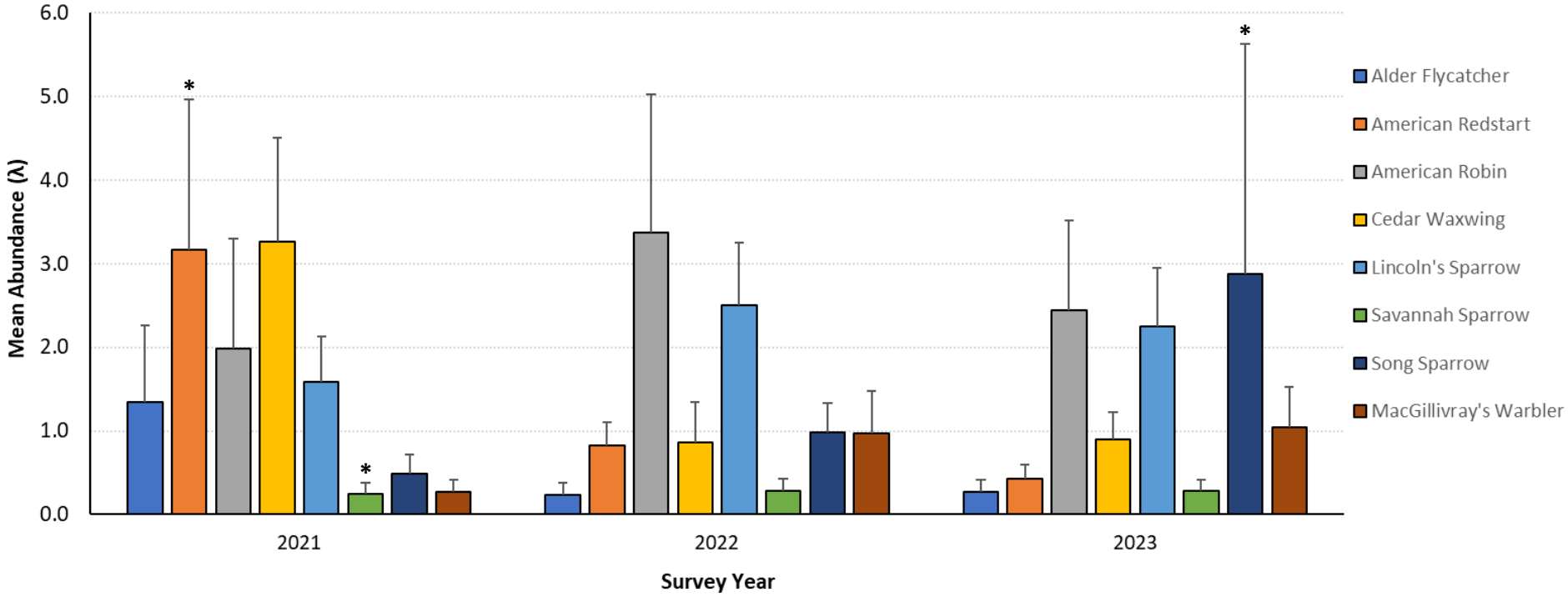

Figure 3. Mean abundance of bird species consistently detected within 0 – 50 m of plot center during point count surveys from 2021 – 2023 within the Hazeltine Creek corridor across all study areas; the error bars represent standard error (±) of the results. For years where a species had notable differences in abundance between the five Hazeltine Creek study areas (*), the mean abundance across all study areas was used. Abundance was not estimated in 2020, but will be included in the multi-year analysis of abundance for Year 5 of surveys

3.2.2 Reference Areas

Mean abundance was calculated for 11 species within the Reference areas, including 5 species in Young Forest and 7 species in Mature Forest (Table 7). Several explanatory variables influenced the probability of detection in both reference study areas. In Mature Forest plots, higher temperatures at the start of the day were associated with a higher probability of detection for Hammond's flycatcher and a lower probability of detection for warbling vireo. In Young Forest plots, higher temperatures at the start of the day were associated with a lower probability of detection for orange-crowned warbler and Swainson's thrush.

Survey start time also influenced detection probability for some species. Surveys that occurred later in the morning in Mature Forest plots were associated with a lower probability of detection for golden-crowned kinglets and pacific wren, and a higher probability of detection for northern waterthrush. In Young Forest plots, surveys that started later in the morning were associated with a higher probability of detection for orange-crowned warbler and a lower probability of detection for Swainson's thrush and warbling vireo.

Distance to forest edge influenced detection probability as well, but for fewer species, and only in Young Forest Reference areas. For example, an increase in distance between mature forest edge and plot center was associated with a lower probability of detection for chipping sparrow and a higher probability of detection for orange-crowned warbler in Young Forest Reference areas.

Table 7. Estimates of mean abundance (λ) for bird species detected during point count surveys in the Reference areas from June 20 – 25, 2023, within 0 – 50 m from plot center

Species	Young Forest				Mature Forest			
	Parameter Assumptions (Variables)[a]	Sample Size[b]	Mean Abundance (λ)	Standard Error (±)	Parameter Assumptions (Variables)[a]	Sample Size[b]	Mean Abundance (λ)	Standard Error (±)
Chipping Sparrow (*Spizella passerina*)	λ(.), r(edges)	16	1.50	0.647		Not Detected		
Golden-crowned Kinglet (*Regulus satrapa*)		Not Detected			L(.),(time)	9	0.796	0.404
Hammond's Flycatcher (*Empidonax hammondii*)		Not Detected			L(.),r(temp) L(.),r(.)	15	1.19 0.9	0.576 0.411
Magnolia Warbler (*Setophaga magnolia*)		Not Detected			L(.),r(.)	5	0.389	0.292
Northern Waterthrush (*Parkesia noveboracensis*)		Not Detected			L(.),r(time)	10	0.516	0.299
Orange-crowned Warbler (*Leiothlypis celata*)	L(.),r(temp) L(.),r(.) L(.),r(time) L(.),r(edges)	35	4.78 3.60 3.72 3.13	4.07 1.85 2.10 1.18		Not Detected		
Pacific Wren (*Troglodytes pacificus*)		Not Detected			L(.),r(.) L(.),r(time)	9	0.852 0.858	0.490 0.490
Swainson's Thrush (*Catharus ustulatus*)	L(.),r(.) L(.),r(time) L(.),r(temp)	21	2.87 2.97 2.56	1.59 1.83 1.10		Not Detected		
Varied Thrush (*Ixoreus naevius*)		Not Detected			L(.),r(.)	12	2.69	2.23
Warbling Vireo (*Vireo gilvus*)	L(.),r(time) L(.),r(.)	14	2.80 2.70	2.34 2.15	L(.),r(temp)	7	1.03	0.599
White-throated Sparrow (*Zonotrichia albicollis*)	L(.),r(.)	6	0.363	0.263		Not Detected		

(a) The effect of a variable (in brackets) on mean abundance (λ) and the probability of detection (r) for that species. For example, survey start time may influence the probability of detection for some species, as represented by r(time). In some cases, no variables were found to influence mean abundance or the probability of detection, as represented by λ(.) or r(.). See Section 2.2.2 for definitions of the variables. Some species have more than one set of models that best explain the mean abundance results (e.g., American redstart) based on the principles of Akaike's Information Criterion (AIC).

(b) The total number of detections across all survey plots for that species during the survey period (June 20 – 25, 2023) that were analyzed in the model to determine mean abundance (λ).

3.3 COMMUNITY COMPOSITION

The majority of species identified within the Hazeltine Creek corridor were those that typically utilize early successional herb (SS2) and shrub habitat (SS3); however, a few species typically associated with mature forest habitat, such as ruby-crowned kinglet and Hammond's flycatcher, were also detected within the Hazeltine Creek corridor which may be due to mature forest overlapping with some of the reclaimed survey plots (Table 8).

Table 8. Habitat and resource associations for 24 species identified within the Hazeltine Creek corridor, as well as Young and Mature Forest Reference areas, during point count surveys from June 20 – 25, 2023, within 0 – 50 m from plot center

Species (citation)	Vegetation Structural Stage[(a)]	Habitat Type	Nest Site	Foraging Area	Broad Diet (preferred food types)
Alder Flycatcher (Lowther 2020)	SS3	riparian, shrub	shrubs	aerial, foliage	arthropods (insects)
American Redstart (Sherry et al. 2020)	SS3, SS5, SS6	deciduous forest	shrubs	ground, foliage, canopy	arthropods (insects)
American Robin (Vanderhoff et al. 2020)	SS3, SS4, SS5	riparian, open, mixed forest	ground, shrub, tree	ground, foliage, canopy	fruit, arthropods (insects)
Cedar Waxwing (Witmer et al. 2020)	SS3, SS5	riparian, open, shrub, conifer, mixed forest	shrub, tree	riparian, shrubs, foliage	fruit, arthropods (insects with an aquatic life stage)
Chipping Sparrow (Middleton 2020)	SS2, SS3, SS5	conifer forest, shrub	shrub, tree	ground, low vegetation	seeds, arthropods (insects)
Golden-crowned Kinglet (Swanson et al. 2020)	SS6, SS7	conifer forest	tree	canopy	arthropods
Hammond's Flycatcher (Sedgwick 2020a)	SS6, SS7	conifer or mixed forest	tree	aerial	arthropods (insects)
Lincoln's Sparrow (Ammon 2020)	SS2, SS3	riparian, shrub	ground	ground, low vegetation	arthropods
MacGillivray's Warbler (Pitocchelli 2020)	SS3, SS5	riparian, shrub	ground	ground, low vegetation	arthropods (insects)
Magnolia Warbler (Dunn and Hall 2020)	SS4, SS5, SS6	conifer forest	tree	foliage	arthropods
Northern Flicker (Wiebe and Moore 2023)	SS2, SS3, SS4, SS5, SS6, SS7	open, mixed forest, forest edges, grassland	tree cavity	ground	arthropods (ants)

Species (citation)	Vegetation Structural Stage[a]	Habitat Type	Nest Site	Foraging Area	Broad Diet (preferred food types)
Northern Waterthrush (Whitaker and Eaton 2020)	SS3, SS5, SS6, SS7	riparian, shrub, conifer forest, mixed forest	ground	ground, low vegetation, riparian	arthropods (insects)
Orange-crowned Warbler (Gilbert et al. 2020)	SS3, SS5	open, mixed forest, deciduous forest, conifer forest edges, shrub	ground	shrubs, foliage	arthropods (insect larvae)
Pacific Wren (Toews and Irwin 2020)	SS6, SS7	riparian, conifer forest, mixed forest	tree, ground, cavities	ground	invertebrates
Red-winged Blackbird (Yasukawa and Searcy 2020)	SS3	riparian	shrub	low vegetation, riparian	arthropods (insects), seeds
Ruby-crowned Kinglet (Swanson et al. 2021)	SS5, SS6, SS7	conifer forest, mixed forest	tree	foliage	arthropods
Savannah Sparrow (Wheelright and Rising 2020)	SS2	open, grassland	ground	ground, low vegetation	arthropods (insects)
Song Sparrow (Arcese et al. 2020)	SS3, SS5, SS6	riparian, mixed forest, shrub	ground, shrub	ground, low vegetation	seeds, arthropods (insects), small invertebrate groups
Swainson's Thrush (Mack and Yong 2020)	SS4, SS5, SS6, SS7	conifer forest	shrub	ground, low vegetation	arthropods (insects)
Varied Thrush (George 2020)	SS6, SS7	conifer forest	tree, shrub, ground	ground	arthropods
Warbling Vireo (Gardali and Ballard 2020)	SS5, SS6, SS7	riparian, deciduous forest	shrub, tree	foliage	arthropods (insects)
White-throated Sparrow (Falls and Kopachena 2020)	SS3, SS5, SS6	deciduous forest, mixed forest	ground	ground, low vegetation	arthropods (insects), fruits, seeds
Willow Flycatcher (Sedgwick 2020b)	SS3	riparian, shrubs	shrub	foliage	arthropods (insects)

Species (citation)	Vegetation Structural Stage[(a)]	Habitat Type	Nest Site	Foraging Area	Broad Diet (preferred food types)
Yellow Warbler (Lowther et al. 2020)	SS3	shrub	shrub, tree	foliage	arthropods (insects)

(a) *Based on the Field Manual for Describing Terrestrial Ecosystems 2nd Edition* (Province of BC 2010), where SS2 represents predominantly herb habitat, SS3 represents shrub habitat, SS4 represents pole/sapling forest, SS5 represents young forest, SS6 represents mature forest, and SS7 represents old growth forest.

Warbling vireo was detected in all three study areas (Hazeltine Creek corridor, Young Forest, and Mature Forest) during the survey period, as represented by Figure 4.

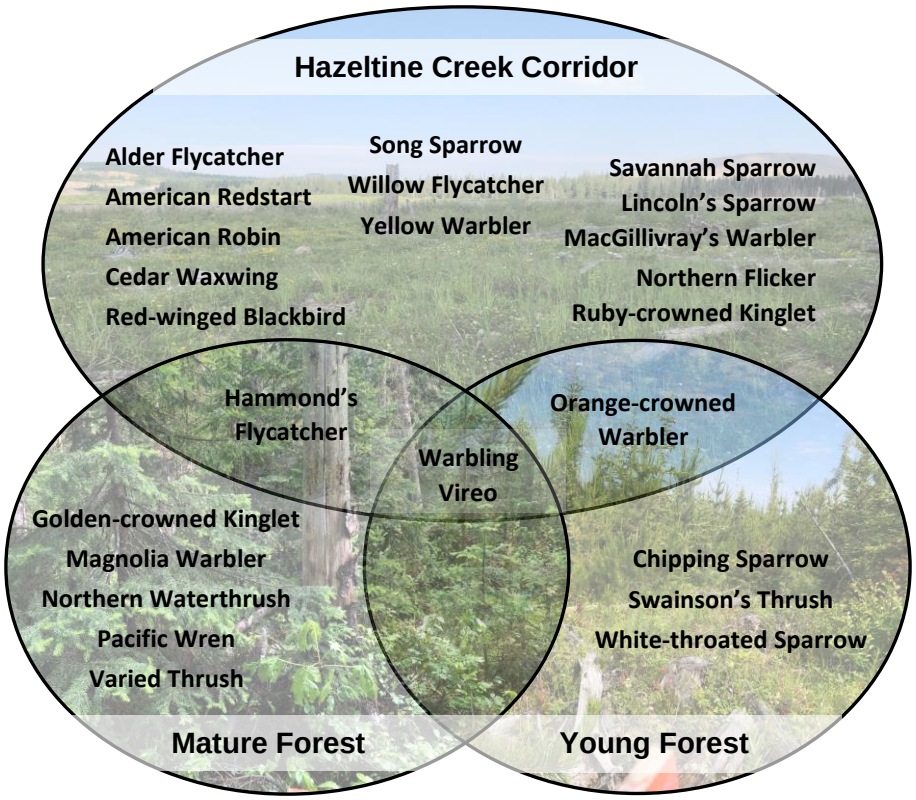

Figure 4. Bird species detected during point count surveys conducted from June 20 – 25, 2023, across three study areas representative of different habitat characteristics; overlapping circles represent detections that occurred in more than one study area (e.g., Hammond's flycatcher was detected in the Mature Forest and the Hazeltine Creek corridor, while warbling vireo was detected within all three study areas)

Chipping sparrow, Swainson's thrush, and white-throated sparrow were only detected in the Young Forest survey plots (Figure 4); these species may be valuable indicators of ecological progression in the Hazeltine Creek corridor as the vegetation within the reclaimed areas mature over time. It is important to note that Table 8 and Figure 4 do not represent every single species detected within each study area, but rather the species that could be included in the analysis for abundance based on sample size (>5 detections) and the reliability of the estimates (i.e., with reasonable variability; see Section 3.2).

3.4 BREEDING OBSERVATIONS

A total of 15 actively breeding species were observed across all study areas as incidental observations (outside of survey point count surveys) in Year 4, including 13 species within the Hazeltine Creek corridor, 3 species within the Young Forest areas, and 1 species within the Mature Forest areas (Table 9).

Table 9. Evidence of breeding documented within the Hazeltine Creek corridor and Reference areas between June 20 – 25, 2023

Species	Study Area[(a)]	Closest Plot Location	Breeding Evidence
American Robin	UH	BBS08	Adults observed displaying territorial behaviour (Chasing after Eastern Kingbird).
Belted Kingfisher	LH-CWD	N/A	Adult observed carrying food from Quesnel Lake up Hazeltine Creek. Breeding suspected in steep soft banks.
Bufflehead	LH-QL	BBS01	Adult female observed checking out various cavities is cottonwood snags.
Canada Jay	LH-HZ	BBS13	Adult pair observed.
Chipping Sparrow	REF-YF	Between BBS25-BBS27	Adult observed carrying food and alarm calling.
	REF-YF	BBS30	Adult pair observed alarm calling persistently.
	REF-YF	BBS30	Adults observed carrying food and alarm-calling within 50 m of BBS30.
Common Merganser	LH-QL	BBS01	Adult male and female observed checking out various cavities in cottonwood snags.
Dark-eyed Junco	REF-YF	BBS14	Nestlings heard. Adult observed flying up from grass. Observed within 50 m of BBS14.
	LH-CWD	BBS30	Adults observed displaying defensive behaviour and territorial calling.
Killdeer	PF	N/A	Adult observed displaying broken wing behaviour.
Lincoln's Sparrow	UH	BBS08	Adults observed consistently and persistently calling at this location over multiple survey sessions.
	PF	BBS11	Adults observed carrying food within 50 m of BBS11.
	UH	BBS15	Adult observed persistently calling over multiple survey sessions.
Northern Flicker	LH-QL	BBS01	Adult observed feeding young at cavity nest in tree snag.
	LH-QL	BBS01	Active cavity nest observed within 100m of BBS01.
Savannah Sparrow	PF	BBS10	Adult observed territorial alarm-calling.

Species	Study Area[(a)]	Closest Plot Location	Breeding Evidence
	PF	BBS11	Adults observed territorial alarm-calling persistently.
Spotted Sandpiper	PF	N/A	Adult observed hovering and alarm-calling.
	LH-QL	Between BBS01-BBS02	Adult observed displaying broken wing behaviour.
Spruce Grouse	REF-YF	Between BBS25-BBS27	Female adult observed displaying territorial behaviour.
	REF-MF	Between BBS19-BBS21	Female adult observed displaying territorial behaviour.
Tree Swallow	LH-CWD	BBS06	Observed nesting in birch snag cavity located within 50 m of BBS06.
	PF	BBS09	Observed using nesting box within 50 m of BBS09.
	PF	BBS10	Two nest boxes confirmed to be in use (3 After Hatch Year and 1 Second Year female).
Wilson's Snipe	PF	BBS11	Adults observed circling around plot. Adult pair observed calling.
	PF	N/A	Flushed adult. Adult observed alarm-calling.

(a) Within the Hazeltine Creek corridor, study area includes Polley Flats (PF), Upper Hazeltine (UH), Lower Hazeltine – CWD (LH-CWD), Lower Hazeltine – Quesnel Lake (LH-QL), and Lower Hazeltine – Halo Zone (LH-HZ), while the Reference areas are represented by Young Forest (REF-YF) and Mature Forest (REF-MF). Some species were observed in multiple study areas.

Northern flicker have been observed using the retained dead-standing trees at advanced stages of decay for two years in a row within the Hazeltine Creek corridor (Figure 5).

Figure 5. Female northern flicker attending to a tree nest cavity with nestlings present; photo was captured by Jesse Lewis at Plot BBS01 in the Lower Hazeltine – Quesnel Lake study area during the survey period June 20 – 25, 2023

3.5 PLOT HABITAT CHARACTERISTICS

Habitat characteristics were documented within 0 – 50 m for each point count survey plot in Year 4 (Table 10)

Table 10. Habitat characteristics documented for each point count survey plot from June 20 - 23, 2023, within 0 – 50 m from plot center

Study Area	Plot ID	Adjacent Watercourse	Forest Cover (%)	Vegetation Ground Cover (%)	Exposed Ground (%)	CWD (%)
Lower Hazeltine - Quesnel Lake	BBS01	Hazeltine Creek, Quesnel Lake	20	95	5	15
	BBS02	Quesnel Lake, Hazeltine Creek	0	95	5	30
	BBS12	Edney Creek, Quesnel Lake	10	not collected	15	10
		Mean:	**30**	**95**	**8**	**18**
Lower Hazeltine - Halo Zone	BBS03	Quesnel Lake	95	not collected	5	30
	BBS04	Quesnel Lake	75	not collected	40	5
	BBS13	Quesnel Lake	100	not collected	15	5
		Mean:	**90**	**n/a**	**20**	**13**
Lower Hazeltine - CWD	BBS05	Hazeltine Creek, Edney Creek	0	not collected	30	30
	BBS06	Hazeltine Creek, Edney Creek	5	not collected	0	20
	BBS14	Hazeltine Creek	20	100	0	15
		Mean:	**8**	**n/a**	**10**	**22**
Upper Hazeltine	BBS07	Hazeltine Creek	10	85	15	5
	BBS08	Hazeltine Creek	10	75	25	5
	BBS15	Hazeltine Creek	5	60	40	15
		Mean:	**10**	**73**	**27**	**8**
Polley Flats	BBS09	Hazeltine Creek	0	50	50	20

Study Area	Plot ID	Adjacent Watercourse	Forest Cover (%)	Vegetation Ground Cover (%)	Exposed Ground (%)	CWD (%)
	BBS10	Hazeltine Creek	0	85	15	25
	BBS11	Hazeltine Creek	0	100	0	25
		Mean:	**0**	**78**	**22**	**23**
Reference-Mature Forest	BBS19	Jacobie Creek	100	N/A	20	10
	BBS20	Jacobie Creek	100	N/A	20	25
	BBS21	Jacobie Creek	55	N/A	5	10
	BBS22	Moorehead Creek, Bootjack Lake	90	100	0	5
	BBS23	Moorehead Creek, Bootjack Lake	100	100	0	15
	BBS24	Moorehead Creek, Bootjack Lake	100	100	0	15
		Mean:	**91**	**100**	**8**	**13**
Reference-Young Forest	BBS25	Warren Creek	40	N/A	10	15
	BBS26	N/A	45	N/A	5	10
	BBS27	Warren Creek	100	N/A	0	5
	BBS28	N/A	100	100	0	15
	BBS29	N/A	100	100	0	5
	BBS30	Wetland Fen	75	100	0	10
		Mean:	**77**	**100**	**3**	**10**

Vegetation and tree species documented within the plots in Year 4 are summarized in Table 11; note that adjacent mature forest that had been unimpacted by the breach overlapped with many of the survey plots in the Hazeltine Creek corridor to varying extents.

Table 11. Vegetation and forest composition of each point count survey plot documented from June 20 – 23, 2023, within 0 – 50 m of plot center; dominate vegetation (≥ 15% cover) is represented in bold font

Study Area	Plot ID	Open Habitat Vegetation Composition	Forest Composition
Lower Hazeltine - Quesnel Lake	BBS01	**horsetail, alder, red raspberry, cottonwood (saplings), willow,** twinberry honeysuckle, clover, yellow hawkweed, lodgepole pine (young), bird's-foot trefoil, hybrid spruce (young), bull thistle, burdock, snowberry, thimbleberry, fireweed	Black cottonwood: 90% Paper birch: 5% Hybrid white spruce: 5%
	BBS02	**Grasses, horsetail, alder**, red raspberry, clover, willow, oxeye daisy, pine (saplings), spruce (saplings), fireweed, burdock, yellow hawkweed	no forest within 0-50 m
	BBS12	**Red raspberry, horsetail, grasses, poplar (saplings)**, willow, alder, cattails, sedges, fern, fireweed, moss, columbine, common self-heal, yellow columbine, thistle, sarsaparilla	Hybrid white spruce: 45% Interior Douglas-fir: 45% Balsam poplar: 10%
Lower Hazeltine - Halo Zone	BBS03	**horsetails, grasses, alder, willow,** poplar (saplings), thistle, birch (sapling), red raspberry, fireweed, prickly rose, clover	Lodgepole pine: 50% Trembling aspen: 20% Balsam poplar: 20% Interior Douglas-fir: 10% Western redcedar: trace Hybrid white spruce: trace
	BBS04	**Alder, willow, sarsaparilla, red raspberry,** horsetail, poplar (saplings), clover, prickly rose, clover, fireweed	Balsam poplar: 50% Trembling aspen: 30% Interior Douglas-fir: 10% Hybrid white spruce: 10% Western redcedar: trace Lodgepole pine: trace
	BBS13	**Willow, alder, horsetail,** max chrysanthemum, yellow hawkweed, thistle, fireweed, bunchberry, red raspberry, pearly everlasting	Interior Douglas-fir: 25% Hybrid white spruce: 25% Trembling aspen: 20% Balsam poplar: 20% Lodgepole pine: trace Paper birch: trace Western redcedar: trace
Lower Hazeltine - CWD	BBS05	**Balsam poplar (saplings),** clover, grass, alder, horsetail, lupine, spruce (saplings), oxeye daisy, lodgepole pine (saplings), yellow hawkweed, vetch, willow	No forest within 0-50 m

Study Area	Plot ID	Open Habitat Vegetation Composition	Forest Composition
	BBS06	**Balsam poplar (saplings), horsetail,** alder, willow, twinberry honeysuckle, prickly rose, grasses, yellow hawkweed, lodgepole pine (saplings), dandelion, clover, thistle, paintbrush, red raspberry, snowberry, spruce (saplings)	Hybrid white spruce: 50% Interior Douglas-fir: 40% Paper birch: 10%
	BBS14	**Red raspberry, grasses,** thistle, poplar (saplings), alder, clover, horsetail, lupine, oxeye daisy, yellow hawkweed, fireweed, pine (seedlings), dandelion, strawberry, prickly rose	Western redcedar: 50% Paper birch: 40% Hybrid white spruce: 10% Black cottonwood: trace
Upper Hazeltine	BBS07	**Poplar (saplings), red clover,** willow, oxeye daisy, hawkweed, lupine, cattails, sedges, spruce (seedlings), grasses, fireweed, paintbrush	Hybrid white spruce: 30% Western redcedar: 30% Interior Douglas-fir: 30% Balsam poplar: 10%
	BBS08	**Poplar (saplings), clover, horsetails,** willow, cattails, lupine, alder, yellow hawkweed, spruce (seedlings), common yarrow, oxeye daisy, pine (seedlings), alfalfa	Hybrid white spruce: 60% Western redcedar: 5% Black cottonwood: 10% Subalpine fir: 20% Interior Douglas-fir: 5%
	BBS15	**Willow, horsetail,** alder, poplar (saplings), clover, lupine, yellow hawkweed, spruce (seedlings), pine (seedlings), cedar (seedlings), red raspberry, fireweed, soapberry, sedges	Hybrid white spruce: 100%
Polley Flats	BBS09	**Alder, red clover, grasses, horsetail,** bird's-foot trefoil, cottonwood (saplings), willow, fir (sapling), yellow hawkweed, lupine, spruce (sapling), cattail, sedges, pine (sapling), fireweed	No forest within 0-50 m
	BBS10	**Horsetail, alder, grass,** cottonwood (sapling), red clover, red raspberry, fireweed, spruce (sapling), fir (sapling), pine (sapling), cedar (sapling), oxeye daisy, thimbleberry, thistle, elderberry, lupine	No forest within 0-50 m
	BBS11	**Grass, red clover,** bird's-foot trefoil, alder, oxeye daisy, horsetail, spruce (seedling), thistle, willow	No forest within 0-50 m
Reference-Mature Forest	BBS19	**Devil's club, alder,** oak fern, twisted stalk, bride's bonnet, bunchberry, black current, three-leaved foamflower	Interior Douglas-fir: 50% Hybrid white spruce: 25% Balsam poplar: 25% Lodgepole pine: trace

Study Area	Plot ID	Open Habitat Vegetation Composition	Forest Composition
	BBS20	**Devil's club, ostrich plume, alder,** oak fern, false solomon's seal, three-leaved foam flower, bunchberry, blackcurrant, boxwood	Interior Douglas-fir: 50% Hybrid white spruce: 40% Balsam poplar: 10%
	BBS21	**Willow, alder,** ferns, grasses, horsetail, devil's club	Interior Douglas-fir: 50% Hybrid white spruce: 50%
	BBS22	Devil's club, fir (saplings), twinberry honeysuckle, thimbleberry, false solomon's seal, sedges, fern, grasses, ribes sp., willow, horsetail, five-leaved dwarf bramble, sarsaparilla, snowberry	Hybrid white spruce: 50% Subalpine fir: 30% Paper birch: 10% Black cottonwood: 10% Western redcedar: trace
	BBS23	Thinleaf huckleberry, devil's club, false solomon's seal, bunchberry, horsetail	Western redcedar: 40% Subalpine fir: 20% Hybrid white spruce: 40%
	BBS24	Prickly rose, horsetail, twinberry honeysuckle, devil's club, fern, bunchberry, interrupted club moss, fir (sapling)	Hybrid white spruce: 50% Subalpine fir: 40% Paper birch: 5% Western redcedar: 5%
Reference-Young Forest	BBS25	Trembling aspen, alder, fir (sapling), spruce (sapling), fireweed, strawberry, false solomon's seal, paintbrush, yellow hawkweed, saskatoon, rosy twisted stalk, brides bonnet, twinflower, mountain ash	Hybrid white spruce: 30% Lodgepole pine: 40% Interior Douglas-fir: 10% Trembling aspen: 20%
	BBS26	Alder, prickly rose, sedge, birch-leaved spirea, twinflower, saskatoon berry, huckleberry, tiger lily, orange boxwood, mountain ash, high bush cranberry	Fir (species unknown): 25% Lodgepole pine: 70% Hybrid white spruce: 5%
	BBS27	**Sedges, moss,** prickly rose, twisted stalk, birch-leaved spirea, bunchberry, red raspberry, fireweed, twinflower, woodland pinedrops, mountain ash, sarsaparilla	Lodgepole pine: 50% Hybrid white spruce: 20% Fir (species unknown): 20% Alder: 5% Willow: 5%
	BBS28	**Birch-leaved spirea, thin-leaved huckleberry, aspen (sapling),** bunchberry, Oregon boxwood, sarsaparilla, false solomon's seal, snowberry, grass, fireweed, strawberry, prickly rose, tiger lily, dogwood, twin flower	Lodgepole pine: 60% Trembling aspen: 30% Hybrid white spruce: 10%
	BBS29	Clover, prickly rose, grasses, twinberry honeysuckle, soapberry, huckleberry, coltsfoot, viburnum sps. Strawberry, twinflower, moss, vetch, bedstraw, saskatoon, paintbrush	Lodgepole pine: 80% Hybrid white spruce: 10% Willow and Alder: 5% Fir (species unknown): 5%

Study Area	Plot ID	Open Habitat Vegetation Composition	Forest Composition
	BBS30	Saskatoon berry, grass, prickly rose, red raspberry, willow, bedstraw, hawkweed	Lodgepole pine: 70% Hybrid white spruce: 10% Trembling aspen: 20%

Vegetation characteristics will be included in the multi-year analysis for species abundance in Year 5 to determine if there are any associations between vegetation cover and species richness and abundance.

4.0 SPECIES AT RISK

A total of four species detected during point count surveys are designated as species at risk (BC CDC 2024). Table 12 summarizes species observed during 2023 surveys that are identified as a species of conservation concern in BC, or as an at-risk species requiring additional legal protection under the Canada *Species at Risk Act* (SARA) or the BC *Forest and Range Practices Act* (FRPA).

Table 12. Species identified during surveys in 2023 that are recognized as an at-risk species by the British Columbia (BC) Conservation Data Centre (CDC), or identified as an at-risk species requiring additional legal protection under the Canada *Species at Risk Act* (SARA) or the BC *Forest and Range Practices Act* (FRPA)

Common Name (scientific name)	BC CDC Designation[(a)]	SARA (Year of Designation)[(b)]	FRPA (Yes/No)[(c)]	Observation Location
Barn Swallow (*Hirundo rustica*)	Yellow	Threatened (2017)	not applicable	Lower Hazeltine – Halo Zone
Killdeer (*Charadrius vociferus*)	Blue	not applicable	not applicable	Lower Hazeltine – Quesnel Lake, Polley Flats
Olive-sided flycatcher (*Contopus cooperi*)	Yellow	Special Concern (2023)	not applicable	Polley Flats
Sandhill Crane	Yellow	not applicable	Yes	Reference Area – Young Forest

(a) Conservation status designated by the British Columbia Conservation Data Centre, which include Yellow (Not-at-Risk), Blue (Special Concern), or Red (Endangered).

(b) At-Risk category designated under the Canada *Species at Risk Act,* which may include Special Concern, Threatened, or Endangered.

(c) Confirmation (Yes or No) of whether a species is identified as a species at risk under the British Columbia *Forest and Range Practices Act* (FRPA).

All species in Table 12 are common to the region and typically breed during the spring and summer months. Barn swallow nests occur almost exclusively on anthropogenic structures and have additional protection when defined as a 'residence' under SARA. This period occurs from May 1st or the date when adults are first seen building or occupying the nest, whichever is earlier, to August 31st or the date when a bird is last seen at the nest, whichever is later (Government of Canada 2019). Species listed under FRPA, such as sandhill crane, may have specific management requirements during forest and range activities which may be included as conditions for any authorizations under FRPA.

5.0 DISCUSSION

When accounting for all species detected during point count surveys in Year 4 within the Hazeltine Creek Corridor (0 – 100 m and flyovers), a total of 61 species were detected, which is higher compared to Year Year 1 (54 species), Year 2 (60 species), and Year 3 (52 species), excluding incidental observations. Inter-annual variation is to be expected and these totals are not necessarily attributable to site-specific characteristics. For the Reference areas, a total of 29 species were detected within Young Forest and 36 species within Mature Forest, (including all species detected within 0 – 100 m of plot center and flyovers). Lower species counts were anticipated for the Mature Forest plots, since mature structural forest stages tend to support a unique community of bird species rather than just higher numbers of species. Detections within 50 – 100 m of plot center were also expected to be lower for the Mature Forest plots due to the increased challenges of accurately detecting and identifying species in enclosed forest stands.

An analysis of species richness within 0 – 50 m of plot center revealed a notably higher species count in the Lower Hazeltine – CWD study area for a second year in a row, as well as notably lower species counts in the Upper Hazeltine and Polley Flats study areas (Figure 2). Habitat characteristics may account for these differences. The Upper Hazeltine and Polley Flats study areas had a higher percentage of exposed ground compared to the other study areas, including Lower Hazeltine – CWD (Table 10). Exposed ground may be a proxy for undeveloped vegetation cover or undeveloped soil substrate capable of supporting invertebrates that are an important food resource for birds. Inclusion of habitat characteristics in Year 5 of analysis will directly assess the role of vegetation cover and other habitat features on the number of species present in the reclaimed areas.

Although a higher total number of species were detected in Mature Forest plots, there was no significant difference in species richness between the Reference areas (including Young Forest), Lower Hazeltine – Halo Zone, or the Lower Hazeltine – Quesnel Lake study areas after accounting for surveyor detection ability in the 2023 models (Figure 2). However, the Reference areas will likely require an increase in sampling effort to improve sample size before meaningful assertions can be made.

Within the Hazeltine Creek corridor, relative mean abundance was highest for song sparrow, particularly in the Polley Flats and Lower Hazeltine – Quesnel Lake study areas in 2023 (Table 6). Furthermore, song sparrow abundance estimates have consistently increased within the Hazeltine Creek corridor since 2021 (Figure 3), though it is important to highlight that the standard error for song sparrow was high in 2023 and, therefore, the result should be interpreted with caution. Overall, species that demonstrated the highest mean abundance estimates across all survey plots were those that typically use habitat in early successional stages dominated by herb and shrub vegetation cover for nesting and foraging (Table 8).

Based on incidental observations, it was determined that 13 species were actively breeding within Hazeltine Creek corridor study areas in 2023 (Table 9). This included several cavity-nesting species, such as northern flicker, bufflehead, common merganser and tree swallow, suggesting that the standing trees at later stages of decay that have been retained in the Hazeltine Creek corridor are providing breeding habitat for cavity nesters.

Although evidence of breeding may be an indicator that the reclaimed sites are providing sufficient resources in terms of nesting habitat and food availability, additional evidence is required to be able to infer habitat quality. For example, birds may select breeding territories based on other selection pressures early in the season before peak insect emergence occurs (Abrahams 1986, Turner and McCarty 1998). Sampling of terrestrial invertebrates is currently scheduled for Years 5 and 10 of the Wildlife Monitoring Plan (DWB 2021). Invertebrate sampling will provide additional evidence for whether the reclaimed sites

are supporting invertebrate communities, and thereby potential food resources, for birds utilizing these areas.

Orange-crowned warbler and Swainson's thrush demonstrated the highest mean abundance values in Young Forest plots, while varied thrush and Hammond's flycatcher had the highest mean abundance in Mature Forest areas (Table 7). The mean abundance estimates for species within the Reference areas were subject to a high degree of variability and a number of species had to be removed from the final results due to high standard errors (i.e., standard error > mean abundance estimate). Therefore, the Reference area results would likely benefit from greater survey effort to increase sample size, as well as the inclusion additional explanatory variables (covariates) in the models that could improve interpretability for these sites.

Inclusion of the Reference plots in 2023 was beneficial for highlighting differences in species composition between the study areas (Figure 4). Three species that were only identified within the Young Forest plots, including chipping sparrow, Swainson's thrush, and white-throated sparrow, may be useful future indicators of ecological succession within the Hazeltine Creek corridor. Future models that assess changes in species assemblages between the Reference areas and Hazeltine Creek corridor should also account for broader regional differences, such as elevation and BEC zone, when making these comparisons.

6.0 CLOSURE

Overall, Year 4 results suggest that the reclaimed sites along the Hazeltine Creek corridor are attracting avian species that typically utilize early successional habitats dominated by herbaceous plants and shrubs. Surveyors also confirmed that some species were actively nesting within the reclaimed areas, which suggests these areas provide some support for breeding birds. Lower Species richness in Polley Flats and Upper Hazeltine may be attributed to underdeveloped vegetation and soil cover; therefore, these attributes should continue to be closely monitored in future years. Reference areas representative of different stages of successional maturity that were not impacted by the tailings breach were included in the analyses for Year 4. Results comparing the Hazeltine Creek corridor and Reference areas provide some preliminary insight on differences in species composition that will be beneficial in future years of comparison between study areas.

Year 5 of the study is planned for 2024 and will continue to incorporate the Reference areas. Multi-year analyses that explore differences in species abundance and community composition over time is planned for Years 5 and 10 of the study. Multiple years of survey data will also improve sample size for analysis of population metrics and assist in detecting annual variation in avian species using the reclaimed sites over time. Future survey years will also incorporate invertebrate sampling (Years 5 and 10) to provide additional information on habitat and resource availability in the reclaimed areas and allow for a comparison of potential food resources between reclaimed areas and reference areas. Species richness and abundance estimates have provided quantifiable metrics for understanding and monitoring avian populations and communities along the reclaimed areas of the Hazeltine Creek corridor. Future years will continue to provide information that will ensure the objectives and benchmarks of the Wildlife Monitoring Plan are being met.

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Appendix A

Maps of Survey Locations

Mount Polley Avian Point Count Surveys

Overview Map

N

0 0.5 1 1.5 2

Kilometers

1:70,000

North American 1983 | NAD 1983 BC Environment Albers

- Mount Polley Mine
- Community
- Paved Road
- Gravel Road
- Stream
- Waterbody

Reference Site

- Mature Forest
- Young Forest

Study Area

- Polley Flats
- Upper Hazeltine Creek
- Lower Hazeltine - CWD
- Lower Hazeltine - Quesnel Lake
- Lower Hazeltine - Halo Zone

Service Layer Credits: Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS

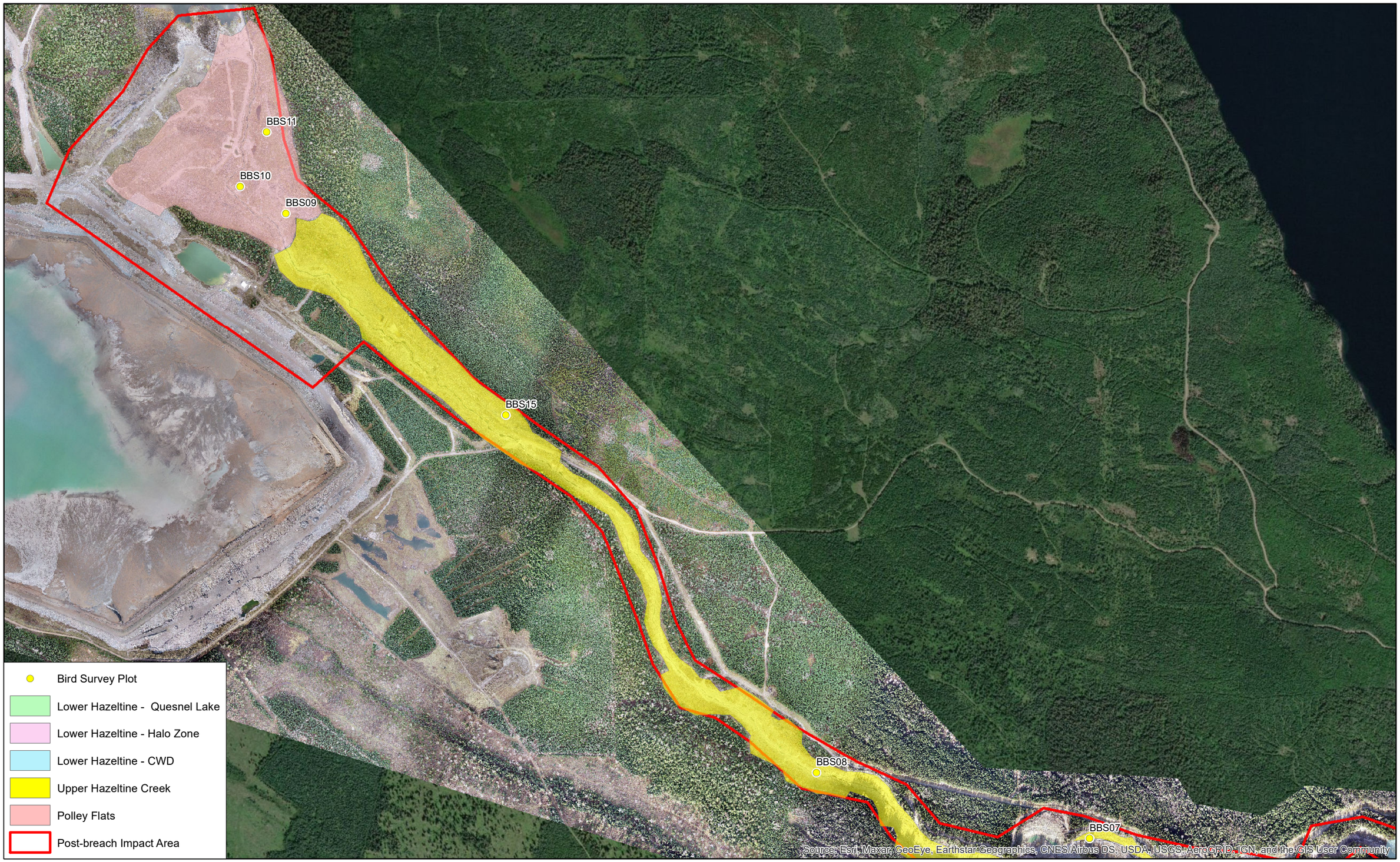
PROJECT #:
IMC_24274-008

MAP NAME:
IMC_24274-006_AvianPointCountSurvey_Overview

DATE:
2024/03/25

DWB Consulting Services Ltd.

Hydraulic
Likely
Mount Polley Mine
Warren Creek - Young Forest
Moorehead Creek - Mature Forest
Jacobie Creek - Young Forest
Jacobie Creek - Mature Forest
Miles Creek - Young Forest
Miles Creek - Mature Forest
Polley Flats
Upper Hazeltine Creek
Lower Hazeltine - CWD
Lower Hazeltine - Quesnel Lake
Lower Hazeltine - Halo Zone
Jackpine Creek
Littlelake Creek
Little Lake-Quesnel River Rd
Morehead Creek
Dancing Bill Creek
Bullion Rd
Sharpe Rd
Prior Rd
Quesnel River
Foley Creek
Quesnel Forks Rd
Kingfisher Creek
Youngren Creek
South Likely Rd
Powerline Creek
Kennley Creek Rd
Spanish Lake Rd
Spanish Creek
Drop Creek
Slum Gulch Creek
Bilboa Creek
Fisher Creek
Grogan Creek
Cedar Creek
Winkley Creek Rd
Warren Creek
Morehead-Bootjack FSR
Sam Creek
Morehead Lake
Spectacle Lake Road FSR
2600 Rd
Jacobie Creek
Jacobie Lake FSR
35 Mile Road FSR
Miles Creek
S Jefferson Road FSR
Tho Creek
Mart Creek
Dow Creek
Horsefly-Likely FSR
Dag Creek
Cub Creek
Polley Lake
Bootjack Lake
Bootjack Creek
Quesnel Lake
Raft Creek
Meadowy Creek
Hazeltine Creek
3 Mile Creek
Opheim Lake
Opheim Lake Rd
Jacobson Rd
Beaver Creek
Beaver Lake Rd
Beaver Lake
Beaver Valley Rd
Watson Creek
Likely Rd
Fire Lake Rd
Gavin Lake Rd
Gavin Creek
Honeybee Rd
Edney Lake Rd
Moorhouse Creek
Edney Creek
Cedar Rd
Teasdale Creek Rd



- Bird Survey Plot
- Lower Hazeltine - Quesnel Lake
- Lower Hazeltine - Halo Zone
- Lower Hazeltine - CWD
- Upper Hazeltine Creek
- Polley Flats
- Post-breach Impact Area

IMC Mount Polley Mine Bird Surveys

Scale: 1:15,000

0 75 150 300 450 600 m

Map: 2 of 2

N W E S

Date: December 09, 2020

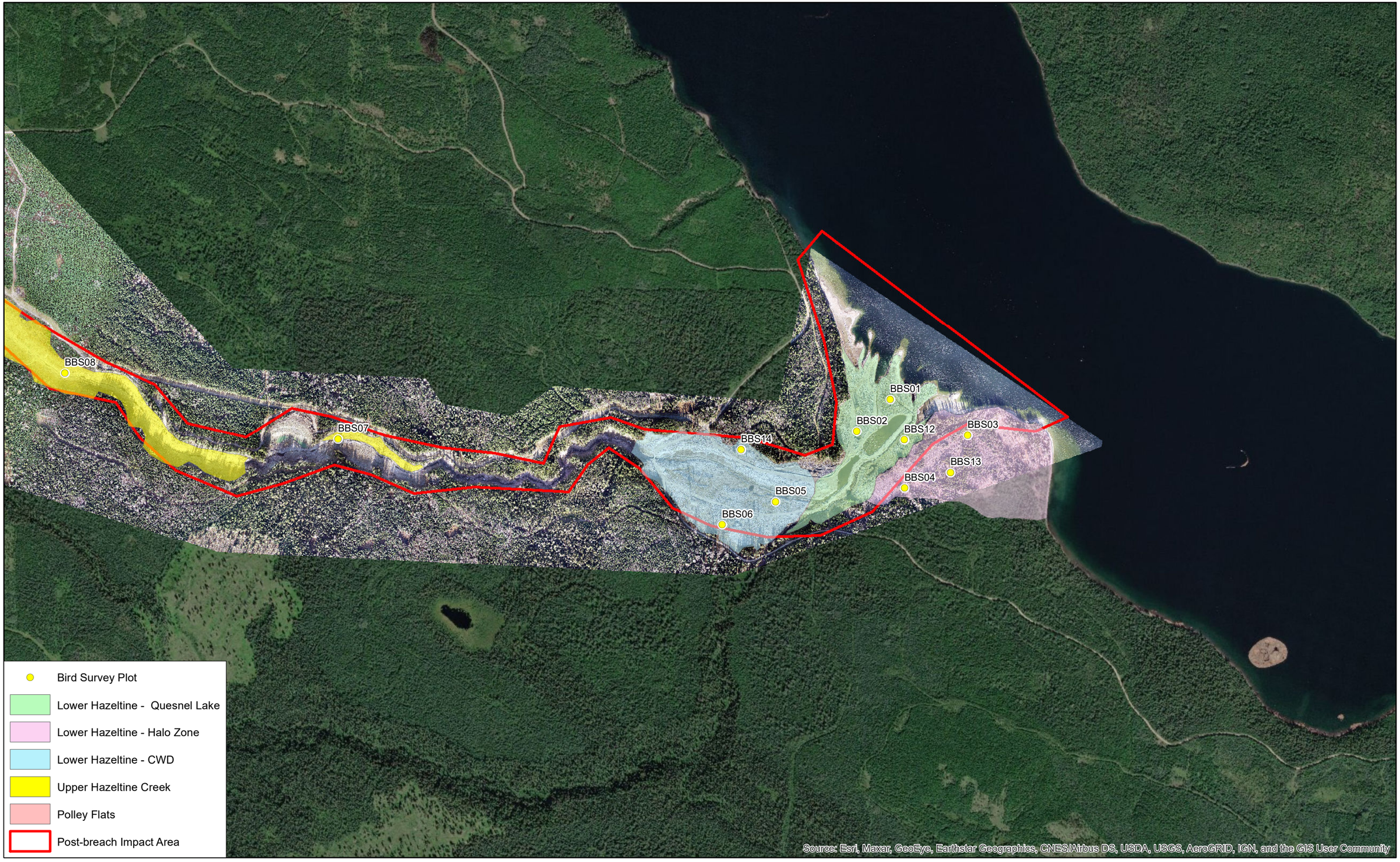
Basemap Source: DataBC

Orthoimagery: IMC Drone, World Imagery

Map Datum: NAD 1983 UTM Zone 10N

DWB Consulting Services Ltd.

IMC_20274_172_BirdSurvey.mxd



IMC Mount Polley Mine Bird Surveys

Scale: 1:15,000

0 75 150 300 450 600 m

Map: 1 of 2

N W E S

Date: December 09, 2020

Basemap Source: DataBC Orthoimagery: IMC Drone, World Imagery

Map Datum: NAD 1983 UTM Zone 10N

DWB Consulting Services Ltd.

IMC_20274_172_BirdSurvey.mxd

LEGEND

- Start of Access Road
- Survey Site - Mature Forest
- Survey Site - Young Forest
- Paved Road
- Gravel Road
- Stream

DWB Consulting Services Ltd.

PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/27**

PREPARED BY: **DWB GIS**

Mount Polley
Avian Point Count Surveys

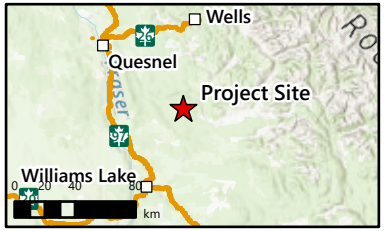
Reference Areas - Plot Location Map

FILE NAME: **IMC_24274-006_AvianPointCountSurvey**

FIGURE 2

SCALE: **1:40,000**

0 0.5 1 km



Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Start of Access Road
- Survey Site - Mature Forest
- Survey Site - Young Forest
- Paved Road
- Gravel Road
- Stream

DWB Consulting Services Ltd.

PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/27**

PREPARED BY: **DWB GIS**

Mount Polley
Avian Point Count Surveys

Reference Areas - Plot Location Map

FILE NAME: **IMC_24274-006_AvianPointCountSurvey**

FIGURE 3

SCALE: **1:40,000**

0 0.5 1 km

Appendix B

Survey Plot Photographs

Photo 1. BBS01 Plot Center Stake

Photo 2. BBS01 North of Plot Center

Photo 3. BBS01 East of Plot Center

Photo 4. BBS01 South of Plot Center

Photo 5. BBS01 West of Plot Center

Photo 6. BBS02 Plot Center Stake

Photo 7. BBS02 North of Plot Center

Photo 8. BBS02 East of Plot Center

Photo 9. BBS02 South of Plot Center

Photo 10. BBS02 West of Plot Center

Photo 11. BBS03 Plot Center Stake

Photo 12. BBS03 North of Plot Center

Photo 13. BBS03 East of Plot Center

Photo 14. BBS03 South of Plot Center

Photo 15. BBS03 West of Plot Center

Photo 16. BBS04 Plot Center Stake

Photo 17. BBS04 North of Plot Center

Photo 18. BBS04 East of Plot Center

Photo 19. BBS04 South of Plot Center

Photo 20. BBS04 West of Plot Center

Photo 21. BBS05 Plot Center Stake

Photo 22. BBS05 North of Plot Center

Photo 23. BBS05 East of Plot Center

Photo 24. BBS05 South of Plot Center

Photo 25. BBS05 West of Plot Center

Photo 26. BBS05 Exposed ground

Photo 27. BBS06 Plot Center Stake

Photo 28. BBS06 North of Plot Center

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DWB Consulting Services Ltd.

Mount Polley Mine

2022 Mammal Monitoring Summary

Engineering | Environmental | Forestry

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OQM | Organizational Quality Management Program

Signature Page

DWB Consulting Services Ltd. is pleased to submit this report for your review. This report has been prepared using sound technical and professional judgement, based on our knowledge and experience, applicable regulatory framework, industry best management practices, and current understanding of project conditions, design, and project setting.

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PREPARED FOR: Mount Polley Mining Corporation

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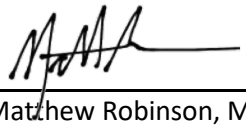
WRITTEN BY: 

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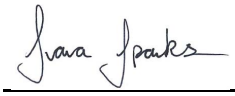
REVIEWED BY: 

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Executive Summary

In 2022, wildlife cameras were deployed in the Hazeltine Creek corridor and nearby reference areas as part of Mount Polley's Mammal Monitoring Plan. The work represented the second year of wildlife camera surveys at Mount Polley Mine; reference areas were included for the first time in 2022 to allow a comparison of wildlife detections between rehabilitated and reclaimed sites of the Hazeltine Creek corridor, and areas off the mine site not impacted by the 2014 tailings storage facility breach. The work was performed as part of Year 4 of the mine's 10-year terrestrial wildlife monitoring program and overarching reclamation research program.

Within the Hazeltine Creek corridor, four of the study areas (Polley Flats, Upper Hazeltine, Lower Hazeltine – CWD and Lower Hazeltine – Quesnel Lake) represent areas where rehabilitation treatments have been applied, while the fifth (Lower Hazeltine – Halo Zone) represents an area where mature trees survived the breach and native vegetation has naturally reestablished. Young and mature reference areas are considered representative of early- and mature-successional forest conditions, respectively.

For large mammals, seven cameras were deployed in the Hazeltine Creek corridor, and six in nearby reference areas (three in young forest and three in mature forest). The goal of large mammal camera deployments was to maximize detections of large- and medium-sized mammal species within the Hazeltine Creek corridor to confirm species composition and presence, and determine which areas and features are being used within the reclaimed sites relative to reference areas. A total of 33 cameras were deployed for small mammals, including 15 in Hazeltine Creek and 18 in reference areas. The goal of the small mammal deployments was to compare relative abundance and species composition of small mammals between the Hazeltine Creek corridor and nearby reference areas, and between the study areas within the Hazeltine Creek corridor. Standardized capture rates (catch-per-unit-effort) were calculated from independent species detections and used as a proxy for species abundance to allow comparisons of small mammal detections between areas.

Mule deer, moose, coyote, and black bear were the four most frequently detected species on large mammal cameras, making up 74% of all detections. Other species detected less frequently included lynx, wolves, mink, river otter, beaver, red squirrel, northern flying squirrel and chipmunk. Species composition was nearly identical between Hazeltine Creek and the reference areas. Detections of river otter, mink and grizzly bear occurred in Hazeltine Creek, but not in the reference areas. Wolves were detected on large mammal cameras for the first time in 2022, both in the Hazeltine Creek corridor and the reference areas. With respect to the large mammal monitoring benchmark, observations of adults feeding, traveling and accompanied by young-of-the-year suggest reclaimed areas of the Hazeltine Creek corridor may be providing required resources for large mammal species.

There were 5963 independent wildlife detections across all small mammal cameras, with 8 species of small mammal making up the majority of detections (94.2%). Deer mice, voles and shrews were the three most frequently detected species, while red squirrel, northern flying squirrel, yellow-pine chipmunk, snowshoe hare and jumping mice made up the remainder. Small mammal species composition was identical between the Hazeltine Creek corridor and reference areas for small mammal groups.

Mean capture rates for deer mice were not significantly different between the Hazeltine Creek corridor and references areas, but mean captures rates for voles, shrews, red squirrels, and northern flying squirrel

were all significantly higher in reference areas compared to the Hazeltine Creek corridor. For both voles and shrews, mean captures rates were significantly higher in both young and mature reference areas compared to Hazeltine Creek. In contrast, mean capture rates for red squirrels and northern-flying squirrels – two predominantly arboreal species – were significantly lower in Hazeltine Creek and young references areas compared to mature references areas. For yellow-pine chipmunks, jumping mice and snowshoe hares, average capture rates were higher in Hazeltine Creek and young references areas, compared to mature sites, though differences were not statistically significant.

The 2022 results appear to highlight the disparity in responses of different small mammal groups to disturbed forest environments. Habitat generalist species, such as deer mice, had relative abundance levels that were comparable between the Hazeltine Creek corridor and nearby reference areas, as well as between study areas in the Hazeltine Creek corridor. In contrast, species that are more dependant on intact forest environments (southern red-backed vole, red squirrel, northern flying squirrel) and/or moist ground conditions and cover (*Sorex* shrew species), were less abundant in the Hazeltine Creek corridor. Further analyses that incorporate habitat characteristics are needed to address potential influence of habitat conditions on small mammal relative abundance. Since small mammal populations vary year-to-year, it is also important to sample over multiple years to assess long-term trends.

Overall, remote cameras were effective at detecting target small mammal groups in the Mount Polley study areas. Due to the non-invasive and cost-effective nature of this sampling technique, the same design and sampling procedures are recommended for future years. Deer mice, voles, shrews red squirrels and northern flying squirrels have the potential to act as 'index' groups for long term monitoring of small mammals. The relatively high capture rates of these groups will permit statistically meaningful comparisons between the Hazeltine Creek corridor and reference areas in future years, as well comparisons of relative abundance between years. Deer mice are considered habitat generalists; however, voles, shrews, red squirrels and northern flying squirrels have more specialized habtiat requirements that are characteristic of early-successional or mature forest environments, and therefore, may be good indicators of ecological succession and post-disturbance recovery.

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We do not represent, warrant, undertake or guarantee:

- That all project environmental-related information has been received.
- That regulations and standards of practices shall remain constant through the duration of the project.
- That the use of guidance in the report will lead to any particular outcome or result; or, in particular,
- That by using the guidance in the report, the client will be approved by the contract holder for the applied works.

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1.0 INTRODUCTION

1.1 PROJECT SCOPE

DWB Consulting Services Ltd. (DWB) was retained by Mount Polley Mining Corporation (MPMC) to report on mammal monitoring at the Mount Polley Mine (hereafter, Mount Polley) conducted in 2022. Mammal monitoring is part of the mine's terrestrial wildlife monitoring program which was developed to assess the progress of ecological succession in the Hazeltine Creek corridor following the tailings breach in 2014 (DWB 2021; Section 1.21). A formal mammal monitoring program in the Hazeltine Creek corridor began in 2021 to help track the success of remediation work that was completed after the corridor was impacted by the 2014 tailing storage breach. This plan involved a combination of remote wildlife cameras, as well as incidental staff observations, to document the presence, abundance and spatial distribution of mammal species in the Hazeltine Creek corridor.

The first year of wildlife camera-based monitoring occurred in 2021 and focused exclusively on large and medium-sized mammals (hereafter, large mammals) in the Hazeltine Creek corridor (DWB 2022). In 2022, six reference areas were established outside the mine site to compare abundance and species composition of large and small mammals within the Hazeltine Creek corridor. In addition, a formal study was established to examine abundance and distribution of small mammals within the Hazeltine Creek corridor, as well as between hazeltine creek and nearby reference areas. The focus of this report is to summarize the results of wildlife camera deployments in 2022.

1.2 BACKGROUND

1.2.1 Tailings Facility Breach and Reclamation

The Hazeltine Creek corridor was impacted by a breach in the Mount Polley tailings storage facility embankment in 2014, which released tailings, supernatant, and construction materials into Hazeltine Creek, as well as Edney Creek and Quesnel Lake, located further downstream. Since the event, extensive remediation work has been completed along the corridor, including reconstruction of Hazeltine Creek, Edney Creek and the shoreline of Quesnel Lake. Rehabilitation of riparian habitat was initiated by planting native trees, shrubs, and graminoids, and using landscape techniques to improve site growing conditions, such as mounding soil, spreading coarse woody debris (CWD), and adding mulch. Planting of riparian vegetation and installation of habitat features favourable to birds, such as vertical CWD tree perches and nest boxes, were also completed at several of the sites.

1.2.2 Mammal Monitoring Program

An Ecological Risk Assessment was completed for MPMC in 2019 (Golder 2019a). The results determined that the risk of metal uptake by terrestrial receptors from contaminated soil and sediment was low compared to the ecological risk posed by the physical disruption that the tailings breach caused to soil, vegetation, and riparian habitat (Golder 2019a). Therefore, The Wildlife Monitoring Plan was developed with a focus on rehabilitation of physical habitat attributes, since the risk of metal toxicity to terrestrial wildlife through bioaccumulation and biomagnification was designated as low.

The large mammal camera program was initiated in 2021 and was guided by the *Mammal Monitoring Plan for the Hazeltine Creek Corridor* (DWB 2020; referred to as the 2020 Mammal Monitoring Plan). The

2020 Mammal Monitoring Plan was designed as an addition to Mount Polley's prior terrestrial wildlife monitoring program (Golder 2019b). The addition of mammal monitoring was implemented in response to a request to incorporate one into the program by the Mount Polley Government to Government Technical Working Group (hereafter, Technical Working Group), which represented the local Xatśūll [Soda Creek] and T'exelc [Williams Lake] First Nations, as well as the BC Ministry of Environment and Climate Change Strategy [BC ENV]).

The 2020 Mammal Monitoring Plan focused exclusively on large and medium-sized mammal groups, and was not designed to assess population metrics, such as relative abundance, or provide a complete inventory of large mammal species within the Hazeltine Creek corridor. However, information collected from remote cameras will supplement the results of other studies in the updated plan (birds, small mammals) and provide stronger evidence that reclamation initiatives are supporting wildlife populations (DWB 2021).

The 2020 Mammal Monitoring Plan, in combination with incidental wildlife observations identified by Mount Polley staff, are also intended to meet the objectives outlined in Section 6.17 of the Comprehensive Environmental Management Plan (CEMP; MPMC 2019), by documenting wildlife sightings, evidence of wildlife presence, and wildlife behaviour on the mine site and adjacent areas. Therefore, this report is designed to fulfill requirements under Section 3.2.6 of Permit 11678 and Section 9.4 of the CEMP (MPMC 2019) by summarizing the results of the mammal monitoring in 2022.

Results of the Mammal Monitoring Plan are also intended to support the objectives of the *Updated Scope for the Terrestrial Wildlife Monitoring Plan for the Hazeltine Creek Corridor* (DWB 2021), which was developed to expand on the original wildlife monitoring program by incorporating additional feedback provided by the Technical Working Group. The Updated Plan will use the remote camera data to confirm the presence and identity of small and large mammals in the Hazeltine Creek corridor and as evidence that the reclaimed features in the corridor are attractive for the purposes of breeding, foraging, travel, and/or shelter (DWB 2021).

1.2.3 Inclusion of Small Mammal Monitoring

The small mammal monitoring program was initiated in 2022 and involved the deployment of remote cameras in the Hazeltine Creek corridor, as well as nearby reference areas (see Section 2.2). The goal of the small mammal study was to compare relative abundance and species composition of target small mammal groups between the restored areas of the Hazeltine Creek corridor and nearby references areas. This program was developed to address gaps in the 2020 Mammal Monitoring Plan identified by the Mount Polley Technical Working Group, who identified that the original plan did not include provisions to address small mammal communities in the Hazeltine Creek corridor. Remote cameras were selected as the preferred method of data collection instead of live trapping. Though live trapping was initially suggested as the preferred a sampling method for small mammals by the Technical Working Group, remote cameras were selected as they required less frequent maintenance by field staff (live traps have to be checked daily) and they pose little to no risk of injury or death to target small mammal species.

1.3 Study Objectives

As part of the *Updated Scope for the Terrestrial Wildlife Monitoring Plan for the Hazeltine Creek Corridor* (DWB 2021), benchmarks were identified for key biological (wildlife) performance indicator groups as a

means to track progression of ecological succession in the Hazeltine Creek corridor and to assess the success of reclamation treatments applied in different areas of the corridor aimed at increasing availability of wildlife habitat. The benchmarks for indicator groups relevant to this report (large and small mammals) are listed in Table 1).

The objective of the wildlife monitoring program is to complete a quantifiable study that will provide the following evidence at the end of the program:

1. Ecological succession is actively occurring in the Hazeltine Creek corridor in response to reclamation initiatives.

2. Wildlife is utilizing the available habitat on the reclaimed sites.

3. The habitat on the reclaimed sites is capable of supporting important wildlife life-history functions, such as breeding, foraging, and establishing territories. Direct measures of wildlife status and trends will be used to assess the dynamics of wildlife and relevant fauna that were chosen as performance indicators for this study.

Table 1. Benchmarks for large and small mammals developed for the wildlife monitoring program.

Indicator Group	Benchmark(s)	Relevant Literature
Large Mammals	Large mammals are being detected on the reclaimed sites and are using the reclaimed features for foraging, hunting, travel, and shelter.	*Rovero et al. 2013*
Small Mammals	The relative abundance **and/or** species richness on the reclaimed sites: • Is similar to the results of the reference sites, particularly the reference sites that are examples of mid-successional habitat, **and/or** • Is higher on the reclaimed sites where amendments and improvements have been applied for a longer duration of time, indicating that these reclaimed sites will have a higher likelihood of success, **and/or** • Is higher in Year 10 when compared to previous years, indicating that small mammal populations have improved.	*Hawkes and Gerwing 2019* *Pearce and Venier 2005* *Rowe and Terry 2014*

2.0 METHODS

2.1 STUDY AREAS

Cameras for large and small mammals were deployed across five study areas within the Hazeltine Creek corridor and at six reference areas west of the Mount Polley Mine in 2022. The Hazeltine Creek corridor is defined as the boundaries of disturbance that resulted from the tailings embankment breach in 2014. Disturbed areas have been subject to various post-breach habitat restoration and reclamation efforts, such as channel reconstruction, riparian re-vegetation, and application of stockpiled topsoil with surface treatment landscape techniques to improve site growing conditions (Table 2). The Hazeltine Creek corridor has been partitioned into five study areas based on distance from the tailings storage facility, existing vegetation structure, and the types of rehabilitation treatments applied following the breach event. The Hazeltine Creek study areas and associated reclamation treatments are listed in Table 2.

Table 2. Study areas and associated reclamation treatments in Hazeltine Creek corridor.

Study Area	Area (ha)	Rehabilitation Treatment Applied
Polley Flats	45	• Ripped with CWD • Mounded with CWD • Placement of soil with CWD
Upper Hazeltine	61	• Mounded with CWD • Recontoured with topsoil and CWD
Lower Hazeltine - CWD	25	• Recontoured with topsoil and CWD • Ripped with CWD • Mounded with CWD • Added wood chip mulch with CWD
Lower Hazeltine – Quesnel Lake	19	• Mounded with CWD • Recontoured with topsoil and CWD
Lower Hazeltine – Halo Zone	26	• Halo – Pre-breach vegetation is still intact

Reference sites were included in the study design in 2022 to allow a comparison of large and small mammal detections between disturbed areas of the Hazeltine Creek corridor and nearby areas not disturbed by the 2014 tailings breach. Both young and mature forest stands were selected for reference areas to represent a natural gradient of forest succession. Mature forest areas are intended to represent undisturbed forest conditions, while young forest areas are meant to represent similar habitat conditions that may be present following 10+ years of vegetation regrowth in Hazeltine Creek. However, most of the reference area locations have experienced silviculture practices in the past.

Reference areas were selected prior to camera deployment in spring 2022 and included three mature forest areas and three young forest areas (Table 3). Potential reference areas were selected that were outside the immediate influence of the tailings breach, but close enough to the mine site to allow efficient collection of data and camera maintenance by field crews. Areas were selected that were adjacent to

stream features to emulate the layout of the Hazeltine Creek corridor and attempt to capture riparian influences. Age of mature and young forest reference sites were determined by consulting the "Leading Species Age" attribute (PROJ_AGE_1) in the most current version of the provincial Vegetation Resource Inventory (VRI; Province of BC 2022). The target age range of young forest areas was 13-15 years, while target mature forest areas ranged from 47-172 years (Table 3).

A total of 11 potential reference area polygons were delineated in the spring of 2022 before camera deployment. A field reconnaissance was performed at each potential site to assess suitability. The final six areas were selected based on verification of forest maturity criteria, as well as ease of access for field crews. References areas had to have reasonable to access to allow camera maintenance checks to occur over a period of 3-4 days, every 2-3 weeks (Section 2.3). Reference site polygons selected as final study areas were comparable in size (range: 13 -33 ha) to the Hazeltine Creek study area polygons (range: 19-61 ha; Tables 2 and 3).

Young forest reference areas all consisted of regenerating timber harvest blocks (stand age 13-15 y), with lodgepole pine (*Pinus contora*) as the dominant or leading species. Young forest areas included Warren Creek, Miles Creek and Jacobie Creek. Mature forest areas included a mix of conifer tree species including white spruce (*Picea glauca*), subalpine fir (*Abies lasiocarpa*), Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), as well as deciduous species such as trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*). Stand age and tree species composition of each reference area are summarized in Table 3. Maps showing location of study areas are provided in Appendix A.

Table 3. Stand age and tree species composition of six reference areas established in 2022. Tree species in bold indicate leading or dominant species.

Study Area	Reference Area Type	Area (ha)	Stand Age * (years)	Tree Species* Composition	Adjacent Watercourse
Morehead Mature	Mature Forest	26	47-127	**White Spruce** Subalpine Fir Western Red Cedar Douglas Fir Trembling Aspen	Morehead Creek
Jacobie Mature	Mature Forest	17	52-135	**Douglas Fir** **Subalpine Fir** **White Spruce** Trembling Aspen Western Red Cedar	Jacobie Creek
Miles Mature	Mature Forest	28	132-172	**White Spruce** **Balsam Poplar** Trembling Aspen Subalpine Fir Douglas Fir Lodgepole Pine	Miles Creek
Miles Young	Young Forest	33	15	**Lodgepole Pine** Trembling Aspen	Miles Creek
Jacobie Young	Young Forest	19	15	**Lodgepole Pine** White Spruce	Jacobie Creek

Study Area	Reference Area Type	Area (ha)	Stand Age * (years)	Tree Species* Composition	Adjacent Watercourse
Warren Young	Young Forest	13	13	**Lodgepole Pine** White Spruce Douglas Fir Trembling Aspen	Warren Creek

* Stand age based on leading or dominant tree species as indicated in VRI (Province of BC 2022).

2.2 WILDLIFE CAMERA DEPLOYMENT

2.2.1 Large Mammal Cameras

The goal of the large mammal monitoring plan was to maximize the number of detections of large- and medium-sized mammal species to determine which species are present and assess which areas and features within the reclaimed corridor are being used. A *deployment site* refers to a location where a remote camera was installed to collect data. A *deployment period* refers to a distinct time period that a camera is active and collecting photos. This period usually corresponds to the time interval between a camera being deployed and activated, and the time it becomes inactive.

A total of seven cameras were installed by Mount Polley staff in the Hazeltine Creek corridor. Cameras were allocated among the five Hazeltine study areas based on total area, with the largest study area (Upper Hazeltine) having the most cameras (3). One camera was deployed in each of the other four study areas. Large mammal cameras remained active throughout the year; therefore, the start of the sampling period was considered to be January 1, 2022. Six cameras were also deployed in the reference areas (one in each of the six study areas). Reference area cameras were deployed on July 21 and 22, 2023, as soon as the reference sites had been established.

A single deployment period (Deployment 1) was defined for large mammal cameras, corresponding with the date cameras were initially deployed at a site (start date) and the date taken as the end of the annual sampling period (end date; Table 4). The end date for Deployment 1 was taken as December 31, 2022. Although cameras were turned off for short periods when they were maintained and/or moved, this time was assumed to have been negligible (i.e., < 1 day). Therefore, when determining sampling effort (number of days camera was active at a deployment location), data were treated as if cameras had been continuously active.

Large mammal cameras were not rotated among different deployment sites in 2022. The cameras had been rotated to different locations in 2021 to test different areas and habitats of the Hazeltine Creek corridor to assess where cameras would be most effective at capturing different mammal species (DWB 2022). For 2022, cameras remained at the same deployment sites year-round in areas expected to result in the highest number of detections for the largest number of mammal species (Rovero et al. 2013). The only exception was the camera in the Lower-Hazeltine-Quesnel Lake study area, where the camera was moved between two sites. The camera was first moved from on May 25, 2021, from the LHQ05-A to LHQ05-B. This was done to avoid rising springtime water levels from Quesnel Lake. The LHQ05-B deployment site was located 75 m south of the lakeshore. The camera was returned to its original location (LHQ05-A) on November 9, 2022. Camera deployment maps are provided in Appendix A and deployment data are provided in Appendix C.

Mount Polley used Reconyx Hyperfire 2 Covert cameras. Large mammal cameras were programmed prior to deployment in the field with the following settings: three pictures per trigger, one second pause between pictures, no delay between triggers, high PIR sensitivity, day and night operation, optimized shutter, and 16:9 wide resolution. Cameras were visited approximately every month to conduct maintenance checks, during which time memory cards were checked and images were downloaded.

Table 4. Start and end dates for a single deployment period (Deployment 1) for large mammal cameras in 2022.

Area Type	Number of Cameras	Start Date	End Date	Survey Effort per camera (days)
Hazeltine Creek Corridor	7	2022-01-1	2022-12-31	364
Reference Young	3	2022-07-22	2022-12-31	162
Reference Mature	3	2022-07-21	2022-12-31	163

2.2.2 Small Mammal Cameras

Between July 18-22, 2022, a total of 33 wildlife cameras were installed at pre-selected deployment sites in the Hazeltine Creek corridor (15 cameras) and reference areas (18 cameras), with three cameras placed in each study area. Small mammal camera sites were selected randomly using the random points tool in QGIS, and were selected to be a minimum of 200 m from adjacent cameras, and at least 50 m from study area polygon boundaries to reduce edge effects.

Cameras were installed approximately 50-70 cm above the ground and angled downward to target a ground-level field of view (Figure 1). Camera sites were baited with a mixture of peanut butter and oats. Bait was placed within a metal tea infuser to prevent degradation and consumption by target and non-target mammal species. The bait holder was secured to ground using two 4-inch vegetation staples. Vegetation was cleared from the ground-level field of view to reduce the incidence of false camera triggers. Cameras were programmed to take 5 photo per trigger and have a 1-minute "quiet" period before the camera could be triggered again. The PIR sensitivity was initially set to 'high' for all cameras, but was changed to "medium-high" during the first maintenance check to reduce incidences of false detections (see Section 2.5 for more details).

Maintenance visits were conducted at each camera site approximately every 2-3 weeks. During maintenance visits, SD cards were replaced with new (empty) cards and the bait at each site was refreshed. Cameras were also repositioned if they had been mis-directed during the previous deployment period. Any new vegetation growth was also removed from the camera's field of view to reduce false detections. During each camera check, a *Field Data Collection Sheet* was filled out that detailed the nature of the visit and any changes to the camera deployment site. An example Data Collection Sheet is provided in Appendix B and detailed camera deployment data are provided in Appendix C. All camera data collection methods were consistent with the guidelines provided in the *BC Wildlife Camera Metadata Protocol* (RISC 2019).

Five deployment periods (D1 – D5) were defined for small mammal cameras corresponding to the period between camera maintenance visits when the bait was refreshed (Table 5). However, the deployment period lengths varied for each camera site (see Section 2.5). Detailed deployment histories for each camera and deployment period are provided in Appendix C.

Small mammal groups targeted by cameras included mice, voles, shrews, jumping mice, squirrels and chipmunks and lagomorphs (rabbits and hares). A list of small mammal species potentially occurring in Mount Polley study areas is provided in Table 6. Identification of small mammal species is discussed in more detail in Section 2.4. Since small mammal cameras were baited with food, a General Wildlife Permit was required for camera deployment. All work was performed in accordance with the conditions in General Wildlife Permit number WL22-747312.

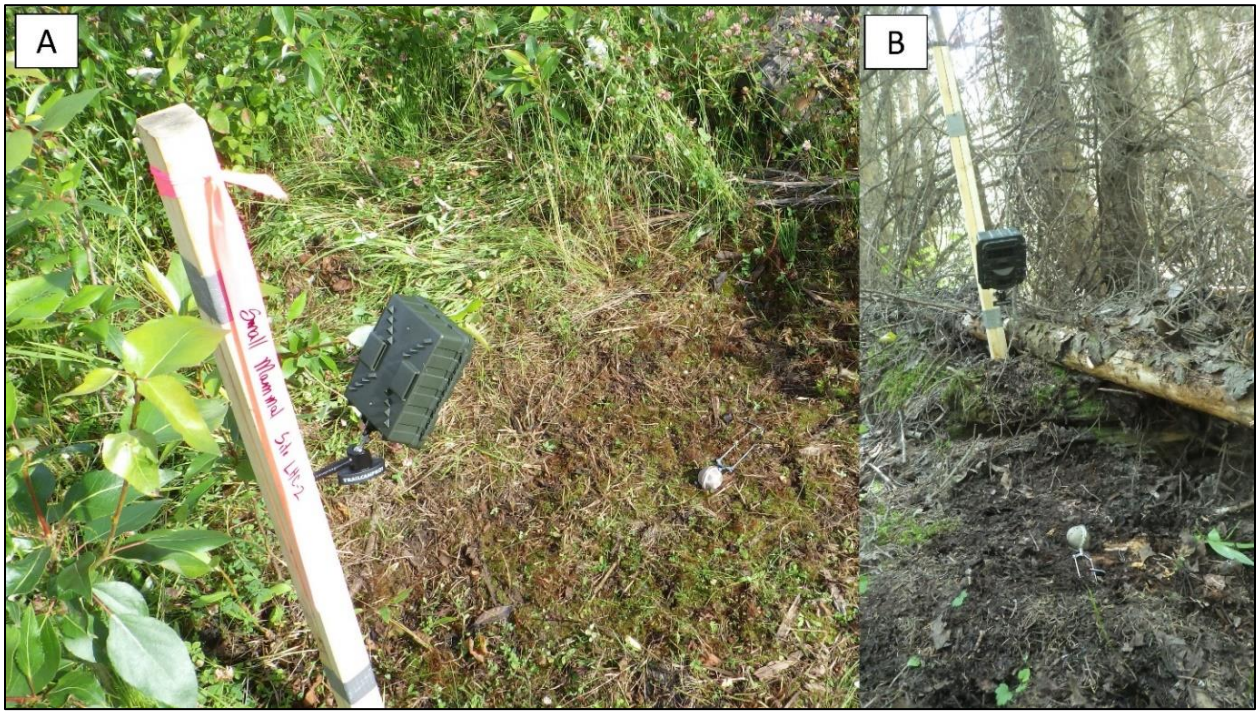

Figure 1. Example of small mammal camera deployment set-ups at (A) Lower Hazeltine-Cwd in the Hazeltine Creek corridor and (B) the Morehead-Mature reference area.

Table 5. Approximate deployment periods* for the small mammal cameras in 2022.

Deployment	Start Date	End Date	Days
D1	18-Jul-22	11-Aug-22	24
D2	11-Aug-22	01-Sept-22	21
D3	01-Sept-22	22-Sept-22	21
D4	22-Sept-22	17-Oct-22	25
D5	17-Oct-22	2-Nov-22	16
Total			**107**

* Start and end dates reflect the approximate period between camera maintenance checks when bait was refreshed, but not necessarily when each camera was active. Detailed deployment histories for each camera site are provided in Appendix C.

2.3 IMAGE REVIEW

All images were reviewed by Mount Polley Environmental staff. Large mammal images were reviewed manually without the aid of wildlife camera process software. Small mammal images were reviewed using Timelapse® software (Greenberg 2022) which allows for the efficient processing of wildlife camera

images. A custom template was developed for image processing and training was provided to the Mount Polley image review team on use of Timelapse® software and on small mammal species identification. Data collection categories collected for each image included site ID, deployment ID, study area, species present, total number of individuals, life stage (adult or juvenile), and activity (feeding on bait, traveling etc.). Reviewers also documented when cameras were mis-aligned (no longer pointed at bait or target feature) or when the bait was removed. This allowed for the removal of such images from final analyses (see Section 2.5).

At the onset of the mammal monitoring program in 2021, images from large mammal cameras were reviewed manually. Images were viewed using a generic image viewer (e.g., Window Photo Viewer) and data was manually entered into a custom excel spreadsheet. Data were entered into this spreadsheet on an ongoing basis following collection of the memory cards from each camera maintenance visit. The use of Timelapse® was first incorporated into the methods in the Fall of 2022 after the small mammal cameras had been removed. For this reason, only the six large mammal cameras in the reference sites were processed with Timelapse® software for 2022.

2.3.1 Species Identification

Small mammals observed in images were identified to species or genus, where possible. Identification of small mammals was limited to physical features visible in photographs. The majority of detections of deer mice, voles, shrews and jumping mice tended to occur at night. Reconyx Hyperfire 2 cameras use an Infrared (IR) flash which results in black and white nighttime photos. Therefore, identification based on fur color was not possible for many images.

Several vole and shrew species are potentially present in the Mount Polley study areas. In total, four species of vole and five species of shrew may be present (Table 6). Potential vole species may include southern red-backed vole, meadow vole, long-tailed vole and western heather vole. Southern red-backed voles have a distinctive red-orange median stipe on the dorsal fur (pelage) that separates them from other species (Nagorsen 2005). This feature, however, was only visible in daylight images. Due to the majority of vole detections occurring at night (usually around dusk or dawn), not all voles could be confidently identified to species. Therefore, all vole detections were grouped as “voles”.

Similarly, the five species of shrew potentially present are nearly impossible to confidently identify without examination of dentitions and/or measurements of skull size and other body size measurements (Nagorsen and Panter 2024). Fur color (pelage) can sometimes be used help differentiate species, but this tends to vary regionally for many species (Nagorsen and Panter 2024). Based on this uncertainty, all shrew detections were classified as “shrews”.

Jumping mice were easily distinguished from deer mice and other small mammals due to their very long, thin tail and distinct dorsal band of dark grey fur that was clearly visible even in black and white photos. The two species of jumping mice potentially present in the area, the western jumping mouse (*Zapus princeps*) and the meadow jumping mouse (*Zapus hudsonius*), are nearly indistinguishable from photographs alone. For this reason, all jumping mouse detections were classified as “jumping mice”.

Yellow-pine chipmunks (*Neotamias amoenus*) and least chipmunks (*Neotamias minimus*) are the two chipmunk species potentially present in the Mount Polley study areas. The two species have overlapping ranges and nearly identical physical features and vocalizations, making them very difficult to tell apart

(Reid 2006). However, since least chipmunks tend occupy more rugged, montane habitats at higher elevations (Reid 2006, Nagorsen 2005), all chipmunks were assumed to be yellow-pine chipmunks.

Table 6. Target small mammal species* potentially present in the Mount Polley study areas.

Family	Common Name	Scientific Name	Note on Identification
Muridae (Mice and Voles)	North American Deer Mouse	*Peromyscus maniculatus*	*Easily identified in images*
	Southern Red-backed Vole	*Clethrionomys gapperi*	*Not able to confidently identify all images to species*
	Meadow Vole	*Microtus pennsylvanicus*	
	Long-tailed Vole	*Microtus longicaudus*	
	Western Heather Vole	*Phenacomys intermedius*	*All detections classified as "voles"*
Dipodidae (Jumping Mice)	Western Jumping Mouse	*Zapus princeps*	*Cannot differentiate two species from photos. All detections classified as "jumping mice*
	Meadow Jumping Mouse	*Zapus hudsonius*	
Soricidae (Shrews)	Cinerus/Masked Shrew	*Sorex cinerus*	*Cannot confidently separate species from photos*
	Dusky Shew	*Sorex monticolus*	
	Western Water Shrew	*Sorex navigator*	
	Western Pygmy Shew	*Sorex eximius*	
	Vagrant Shrew	*Sorex vagrans*	*All detections classified as "shrews"*
Sciuridae (Squirrels and Chipmunks)	Yellow-Pine Chipmunk	*Neotamias amoenus*	*All detections assumed to be yellow-pine chipmunks based on habitat preference*
	Least Chipmunk	*Neotamias minimus*	
	American Red Squirrel	*Tamiasciurus hudsonicus*	*Easily identified in images*
	Northern Flying Squirrel	*Glaucomys sabrinus*	*Easily identified in images*
Leporidae (Hares and Rabbits)	Snowshoe Hare	*Lepus americanus*	*Easily identified in images*

* Based on range maps in Reid (2006), Nagorsen (2005), Nagorsen and Panter (2024).

2.4 Data Quality Control

Image data collected by Mount Polley Environmental staff was provided to DWB for further review. All Timelapse® files were initially examined by DWB to ensure completeness and accuracy of data, and that all deployment sites and deployment periods were accounted for. For large mammals, the species category was reviewed for consistency in labeling. Since large mammal images for 2022 were reviewed manually (i.e., not using Timeplase software), species identification labels were occasionally inconsistent (e.g., use of capitalization, species names). These were corrected in a modified spreadsheet. Behaviours of species observations were also converted to standardized "behaviour codes" to be consistent with BC Provincial Wildlife Data Standards and Wildlife Data Submission Templates (Province of BC 2024). Following verification of Timelapse data files, data were exported as .csv files for further analysis.

2.5 STATISTICAL ANALYSIS

All data were imported into R (version 4.2.1; R Core Team 2022). Both large and small mammal datasets were filtered to only include images with wildlife detections. The small mammal dataset was further filtered to remove images where the camera was knocked out of position (not pointed at bait) or where the bait was no longer present (i.e., removed by wildlife). In some cases, entire deployment periods for some camera sites were dropped if the bait was poorly positioned (i.e., out from frame or only partially visible). In other cases, only certain portions of a deployments were dropped, such as the time following a camera becoming misdirected following wildlife interference. All data from Deployment 1 were excluded from small mammal analyses since the PIR sensitivity was changed from 'high' to 'med-high' in Deployments 2 to 5 to reduce false detections. This was performed to ensure consistency in the data being compared.

For both small and large mammal datasets, we calculated the number of independent detections for each species and camera deployment site. An *independent image series* (also known as an *independent detection*) was defined as a series of consecutive images from a deployment site assumed to have the same unique individual or group of individuals of a particular species. For large mammals, images separated by 1-hour or more were considered independent detections, while for small mammals the minimum time interval for independent detections was set at 30-minutes. The *minimum group size* was assigned to each independent image series, which was defined as the minimum number of unique individuals present in an independent image series. This allowed for an accurate determination of the total number of independent detections across all images.

For both large and small mammal cameras, survey effort (number of days a camera was active at a site) varied among camera deployment locations and study areas. In the case of large mammal cameras, variation in survey effort was due to a full year (January to December 2022) of deployment for cameras in the Hazeltine Creek corridor, while reference site cameras were only deployed from July to December, 2022. For small mammal cameras, survey effort for each deployment and camera deployment site varied due to exclusions of certain data from final analyses (see below). To address variation in survey effort among camera sites, all independent detections were combined at each camera site and converted to "Catch per Unit Effort (CPUE)" by dividing the total number of independent detections for each species at a camera site, by the total number of days the camera was active, and multiplying by 100. This resulted in a standardized detection rate metric of "detections per 100 traps days" and allowed for a standardized comparison of wildlife detections among locations.

For the purposes of statistical analysis, individual camera deployment sites were considered independent sampling units. For large mammal cameras, there was typically only one camera per study area (except for Upper Hazeltine, which had three). For large mammal cameras**,** statistical comparisons were only performed for the species with the highest number of detections. All other large mammal data are summarized by the number of independent detections for each species, as well as a comparison of mean capture rates between Hazeltine Creek and reference areas for the most frequently detected species (see below). Small mammal detections from large mammal cameras (e.g., squirrels, chipmunks) were also included in the large mammal detection summary results, since they made up a notable portion of total detections.

For small mammal cameras, mean capture rates were compared statistically between the Hazeltine Creek corridor (all study areas combined) and young and mature reference areas. Mean capture rates for each species were also compared among the five study areas of the Hazeltine Creek corridor. Mean capture rates were compared among areas using one-way ANOVA, with mean capture rates log-transformed to meet assumptions of linear regression (normality and homoscedasticity); normality was tested for each species and study area using Shapiro Wilks tests, and homoscedasticity (equal variances among groups) was tested with Fligner-Killeen tests. Fligner-Killeen tests are used as a non-parametric test for homoscedasticity of group variances when data are non-normally distributed or when problems related to outliers in the dataset cannot be resolved. Where data did not meet assumptions of linear regression, non-parametric Kruskal-Wallis tests were used to compare mean capture rates of a species. Statistically significant differences among individual groups were assessed using Tukey's Pairwise comparison tests. Statistical significance was set at $p < 0.05$.

3.0 RESULTS

3.1 SAMPLING EFFORT

3.1.1 Large Mammals

Large mammal cameras in the Hazeltine Creek corridor were deployed throughout the year in 2022, with a total sampling effort at each deployment site of 364 days (Figure 2). The Upper Hazeltine study area had collectively more sampling effort (1092 days) than the other four Hazeltine Creek study areas (364 days each), since it had three cameras deployed, rather than one. The 364 days of sampling effort for the Lower Hazeltine-Quesnel Lake study area was split between the alternative site (LHQ05-B; 312 days) and the original site LHQ05-A (52 days). Cameras deployed in the reference areas (one per study area) were deployed mid-summer (July 21 or 22) and, therefore, had either 162 or 163 days of sampling effort.

Sampling effort was approximately 2.6-times greater in the Hazeltine Creek corridor (2548 days) than the references areas (974 days). Deployment dates and sampling effort of large mammal cameras are provided in Table C2, Appendix C.

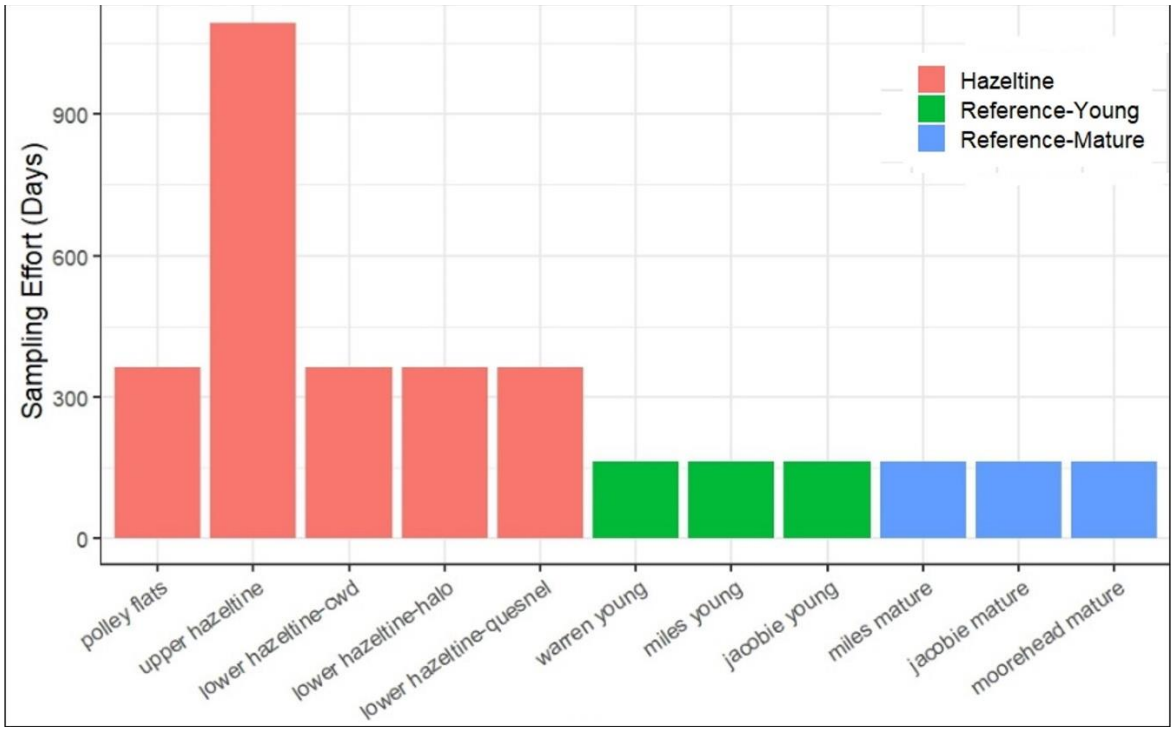

Figure 2. Sampling effort for study areas in the Hazeltine Creek corridor and nearby reference areas.

3.1.2 Small Mammals

A total of 2130 days of sampling effort was used across all small mammal camera sites and study areas (Table 7). Sampling effort was approximately twice as high in the Hazeltine Creek study areas (1057 days) compared to the young and mature forest reference areas (456 and 617 days, respectively). Sampling effort for each camera site and deployment period is provided in Appendix C.

Table 7. Sampling effort for small mammal cameras in the Hazeltine Creek corridor and nearby reference areas.

Area Type	Study Area	Deployment*				
		D2	D3	D4	D5	Total
Hazeltine Creek	Polley Flats	26	44	58	51	179
	Upper Hazeltine	41	51	66	60	218
	Lower Hazeltine-Cwd	55	48	16	59	178
	Lower Hazeltine -Quesnel	63	63	49	57	232
	Lower Hazeltine-Halo	63	64	66	57	250
	Total	**248**	**270**	**255**	**284**	**1057**
Reference Young	Warren Young	43	42	66	60	211
	Miles Young	33	21	21	19	94
	Jacobie Young	44	25	44	38	151
	Total	**120**	**88**	**131**	**117**	**456**
Reference Mature	Miles Mature	44	42	50	15	151
	Jacobie Mature	66	38	71	49	224
	Morehead Mature	63	62	55	62	242
	Total	**173**	**142**	**176**	**126**	**617**
All Areas	**Total**	**541**	**500**	**562**	**527**	**2130**

*Deployment 1 data not shown, as this data was excluded from the analysis

3.2 LARGE MAMMALS

3.2.1 Detection Summary

There was a total of 395 independent mammal detections across all cameras in the Hazeltine Creek corridor and reference sites (Table 8). Hazeltine Creek sites made up the highest proportion of total detections (297 detections; 75.1%), while the young and mature reference areas had 32 and 66 total detections which accounted for the remaining 24.9% of detections (Table 8). Domestic cows made up nearly 40% of the total detections, with most being detected in the Upper Hazeltine study area (250 individuals). Since cows were not a target species, they were excluded from the total detections to avoid inflating detections.

Among large mammal species, mule deer were the most frequently detected species overall (36.2% of total detections), followed by moose (14.7%), coyotes (12.9%), black bears (10.1%), lynx (4.0%) and wolves (3.3%). Red squirrels and chipmunks were two small mammal species that accounted for 12.6% and 2.5% of total detections, respectively. Other species that were detected less frequently included otters, mink, northern flying squirrel, beavers and snowshoe hare. Species composition was nearly identical between Hazeltine Creek and reference areas. Otter, mink and grizzly bear were the only large mammal species detected in Hazeltine Creek, but not in the reference areas.

Table 8. Independent wildlife detections* from large mammal cameras in study areas of Hazeltine Creek corridor and nearby reference areas.

Group	Species	Polley Flats	Upper Hazeltine	Lower Hazeltine-Cwd	Lower Hazeltine-Halo	Lower Hazeltine-Quesnel Lake	Hazeltine Total	Reference Young	Reference Mature	TOTAL (ALL AREAS)
Deer	Mule Deer	3	16	22	49	29	**119**	**16**	**8**	**143**
	Moose	3	33	6	6	1	**49**	**1**	**8**	**58**
	Deer, unidentified	---	---	---	---	2	**2**	**---**	**---**	**2**
Bears	Black Bear	7	16	3	5	2	**33**	**4**	**3**	**40**
	Grizzly Bear	---	1	---			**1**	**---**	**---**	**1**
Canines	Coyote	13	12	---	1	17	**43**	**8**	**0**	**51**
	Wolf	1	6	---	5		**12**	**---**	**1**	**13**
Felines	Lynx	12	1	---	---	---	**13**	**3**	**---**	**16**
Weasels	Otter	3	---	---	---	5	**8**	**---**	**---**	**8**
	Mink	---	---	---	---	1	**1**	**---**	**---**	**1**
Rodents	Red Squirrel	---	---	---	---	1	**1**	**---**	**45**	**46**
	Chipmunk	10	---	---	---		**10**	**---**	**---**	**10**
	Northern Flying Squirrel	---	---	---	---	---	---	**---**	**1**	**1**
	Beaver	2	---	---	---	---	**2**	**---**	**---**	**2**
	Rodent, unidentified	2	---	---	---	---	**2**	**---**	**---**	**2**
Lagomorph	Snowshoe Hare	---	0	---	1	---	**1**	**---**	**---**	**1**
Domestic	Cow	6	250	---	---	---	**256**	**10**	**4**	**270**
	Total (Excluding Cows)	56	85	31	67	58	**297**	**32**	**66**	**395**

* Sampling effort varies between study areas

3.2.2 Comparison with Reference Areas

Species composition was similar between Hazeltine Creek sites and reference areas. Three species that were only detected in Hazeltine Creek were otters, mink and grizzly bear. Otters and mink - both semi-aquatic weasels - were only detected in the Hazeltine Creek-Quesnel Lake study area (Table 8). There were no camera sites in the young or mature references areas that targeted large lakes or wetlands, which may explain the absence of these two species from reference area detections.

Among the four most frequently detected large mammal species, average detection rates for both mule deer and coyote were higher in the Hazeltine Creek and young forest reference areas, compared to mature reference areas (Figure 3; Table 9). In contrast, average detection rates for moose were higher in the Hazeltine Creek and mature reference areas compared to the young reference area. Black bear detection rates were similar between Hazeltine Creek and references areas, although detection rates were more variable between camera sites in Hazeltine Creek. None of the differences in mean capture rates were statistically significant for any species (Table 9).

Table 9. Results of one-way ANOVA or Kruskal-Wallis tests comparing mean Catch Per Unit Effort (CPUE) between Hazeline Creek and reference areas for four most frequently detected large mammal species in 2022. P-values in bold indicate a significant difference among areas at α = 0.05.

Species	Mean CPUE			$F_{-2, 11}$ (X^2)	P
	Hazeltine	Reference Young	Reference Mature		
Mule Deer	4.11 ± 4.14	2.86 ± 3.94	1.63 ± 0.70	0.486	0.628
Moose	1.84 ± 1.44	0.20 ± 0.35	1.63 ± 1.41	1.955	0.188
Black Bear*	1.11 ± 1.50	0.82 ± 0.35	0.61 ± 0.61	0.417	0.8116
Coyote	1.43 ± 1.96	1.64 ± 2.32	0	0.842	0.457

* Non-parametric Kruskal-Wallis test performed and X^2 test statistic reported instead of F-statistic (ANOVA).

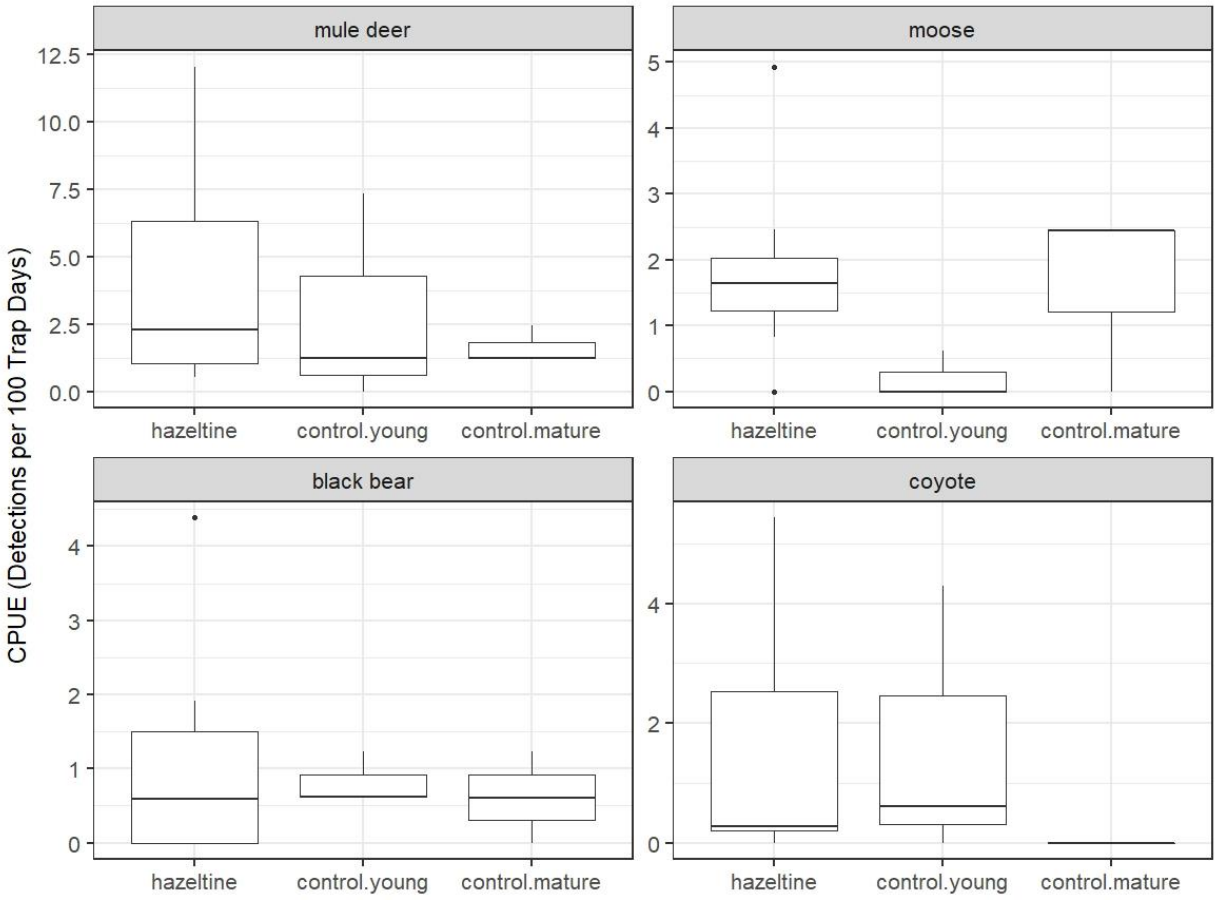

Figure 3. Comparison of mean capture rates (CPUE) between sites in Hazeltine Creek and nearby reference areas for the four most frequently detected large mammal species in 2022. Error bars represent ± standard deviation.

3.3 SMALL MAMMALS

3.3.1 Detection Summary

There was a total of 5963 independent wildlife detection events from small mammal cameras across all 33 small mammal cameras, with all target small mammal species detected on cameras (Table 10). Small mammals accounted for the majority of detections (5617 detections; 94.2%). The three most frequently detected small mammal species were deer mice, with 2400 independent detections, followed by voles and shrews, at 1979 and 725 independent detections, respectively (Table 10). Other common small mammal species detected included red squirrel (257), northern flying squirrel (127), yellow-pine chipmunk (116), and snowshoe hare (59). Jumping mice had the lowest number of detections, with 50 independent detections.

Several other non-target mammal and non-mammal species were detected on small mammal cameras. The four most common were birds (primarily passerines), coyote, black bears, short-tailed weasels and grouse. Black bears and coyotes were frequently observed investigating and often removing the bait from camera sites. Other species detected included domestic cows, deer (unknown species), moose, striped skunk, lynx, and American marten (Table 10). Species composition was identical between Hazeltine Creek and reference areas for target small mammal groups. For other species, striped skunk and American

marten were only detected in the Hazeltine Creek corridor, though detections were very low for both species.

Table 10. Summary of independent wildlife detections* for small mammal cameras in 2022.

Group	Species	Hazeltine Creek	Reference Young	Reference Mature	Total
Small Mammals	Deer Mouse	1458	169	730	2357
	Vole	493	704	742	1939
	Shrew	42	250	429	721
	Red Squirrel	8	18	224	250
	Northern Flying Squirrel	7	24	94	125
	Yellow-pine Chipmunk	90	22	4	116
	Jumping Mouse	39	6	5	50
	Snowshoe Hare	34	22	3	59
	Total	**2171**	**1215**	**2231**	**5617**
Large Mammals	Short-tailed Weasel	12	15	7	34
	Coyote	21	--	1	22
	Black Bear	9	4	1	14
	Deer, unidentified	4	2	1	7
	Moose	4	3	--	7
	Domestic Cow	1	1	3	5
	Striped Skunk	2	--	--	2
	American Marten	1	--	--	1
	Lynx	--	1	--	1
	Total	**54**	**25**	**13**	**92**
Birds	Songbirds (Passerines)	46	64	45	155
	Grouse, unidentified	17	6	6	29
	Total	**63**	**70**	**51**	**184**
Unknown	Unknown	21	16	32	69
	Total	**2302**	**1327**	**2334**	**5963**

* Sampling effort varied among study areas.

3.3.2 Comparison with Reference Areas

Mean captures rates for deer mice were twice as high in Hazeltine Creek sites and mature reference areas than in young reference areas, though the difference was not statistically significant (Table 11; Figure 4). There were, however, statistically significant differences between Hazeltine Creek and references areas for voles, shrews, red squirrels and northern flying squirrels (Table 11). For both voles and shrews, mean captures rates were significantly higher in both young and mature reference areas compared to Hazeltine Creek. For voles, capture rates were approximately three-times higher in mature and young references areas compared to Hazeltine Creek, while mean shrew capture rates were 12-15-times higher in young and mature reference areas (Table 11; Figure 4).

In contrast, mean capture rates for red squirrels and northern-flying squirrels – two predominantly arboreal species – were significantly higher in mature reference areas compared to Hazeltine Creek and young reference areas. For yellow-pine chipmunks, jumping mice and snowshoe hares, average capture rates were higher in Hazeltine Creek and young references areas, compared to mature sites. Differences in mean capture rates for were not statistically significant for jumping mouse and snowshoe hare were

not statistically significant. Differences were not significant for yellow-pine chipmunks, but only marginally (p=0.06; Table 11).

Table 11. Results of one-way ANOVA and Kruskal-Wallis tests comparing mean Catch Per Unit Effort (CPUE) between Hazeline Creek and reference areas for eight small mammal groups detected in 2022. P-values in bold indicate a significant difference among areas at α = 0.05.

Species	Hazeltine	Mean CPUE Reference Young	Reference Mature	$F_{-2, 29}$ (χ^2)	P
Deer Mouse	120.0 ± 99.1	46.5 ± 55.7	92.4 ± 101.9	1.754	0.191
Vole	37.2 ± 87.5	114.3 ± 88.4	98.1 ± 65.5	8.325	**<0.01**
Shrew*	3.55 ± 4.39	45.1 ± 47.24	55.0 ± 48.9	13.88	**<0.01**
Red Squirrel*	0.51 ± 1.13	2.64 ± 3.09	27.9. ± 17.4	57.23	**<0.01**
Northern Flying* Squirrel	0.46 ± 1.48	2.81 ± 4.81	11.9 ± 10.4	14.39	**<0.01**
Yellow-Pine* Chipmunk	6.32 ± 8.74	3.03 ± 5.86	0.48 ± 0.73	5.612	0.060
Jumping Mouse	3.92 ± 7.19	2.34 ± 5.77	0.61 ± 1.15	1.386	0.500
Snowshoe Hare	2.65 ± 4.86	2.75 ± 4.61	0.36 ± 0.71	0.631	0.729

* Non-parametric Kruskal-Wallis test performed and X^2 test statistic reported instead of F-statistic (ANOVA).

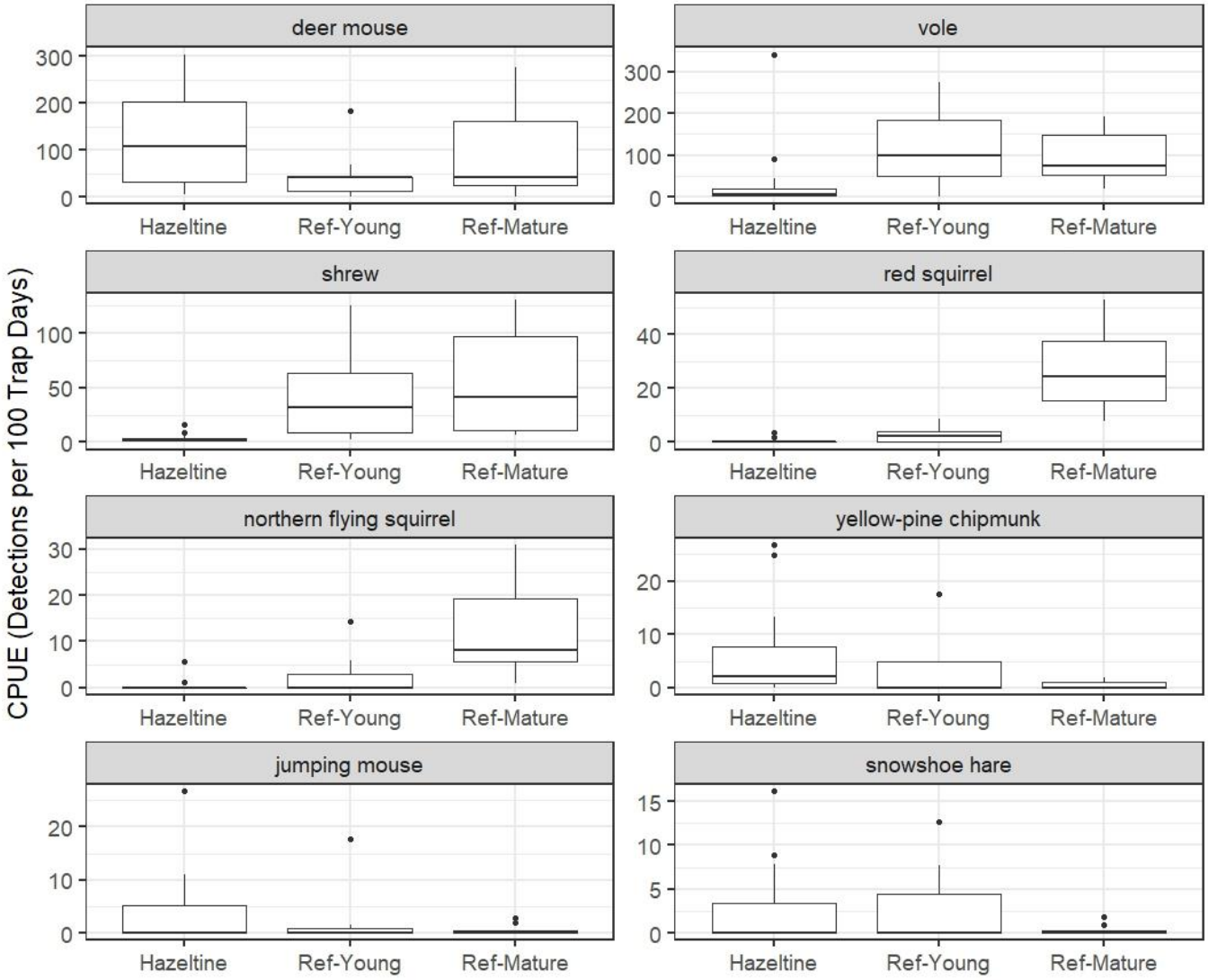

Figure 4. Comparison of mean capture rates (CPUE) between Hazeltine Creek Corridor (Hazeltine) and reference areas (Ref-Young and Ref-Mature) for eight small mammal species detected on wildlife cameras in 2022. Error bars represent ± standard deviation.

3.3.3 Hazeltine Creek Study Areas

There were no significant differences in mean capture rates among study areas of Hazeltine Creek for most small mammal species (Table 12). The one exception was jumping mice, where mean capture rates were significantly higher in Lower Hazeltine-Cwd compared to all other study areas (Figure 5; Table 12).

Mean capture rates for deer mice were relatively consistent across study areas, although slightly higher in Polley Flats, Upper Hazeltine, and Lower Hazeltine-Cwd (Figure 5; Table 12). Mean captures rates for voles, red squirrels and northern flying squirrels were all higher in the Lower Hazeltine-Quesnel Lake and Lower Hazeltine-Halo study areas, while capture rates for shrews were highest in Lower Hazeltine-Cwd, as well as the latter two study areas. There were no detections for red squirrels and northern flying squirrels in Polley Flats, Upper Hazeltine or Lower-Hazeltine-Cwd. Snowshoe hare and yellow-pine chipmunks both had the highest detection rates in the Lower-Hazeltine Halo study areas.

A table of independent detections across the Hazeltine Creek study areas for each species is provided in Appendix D.

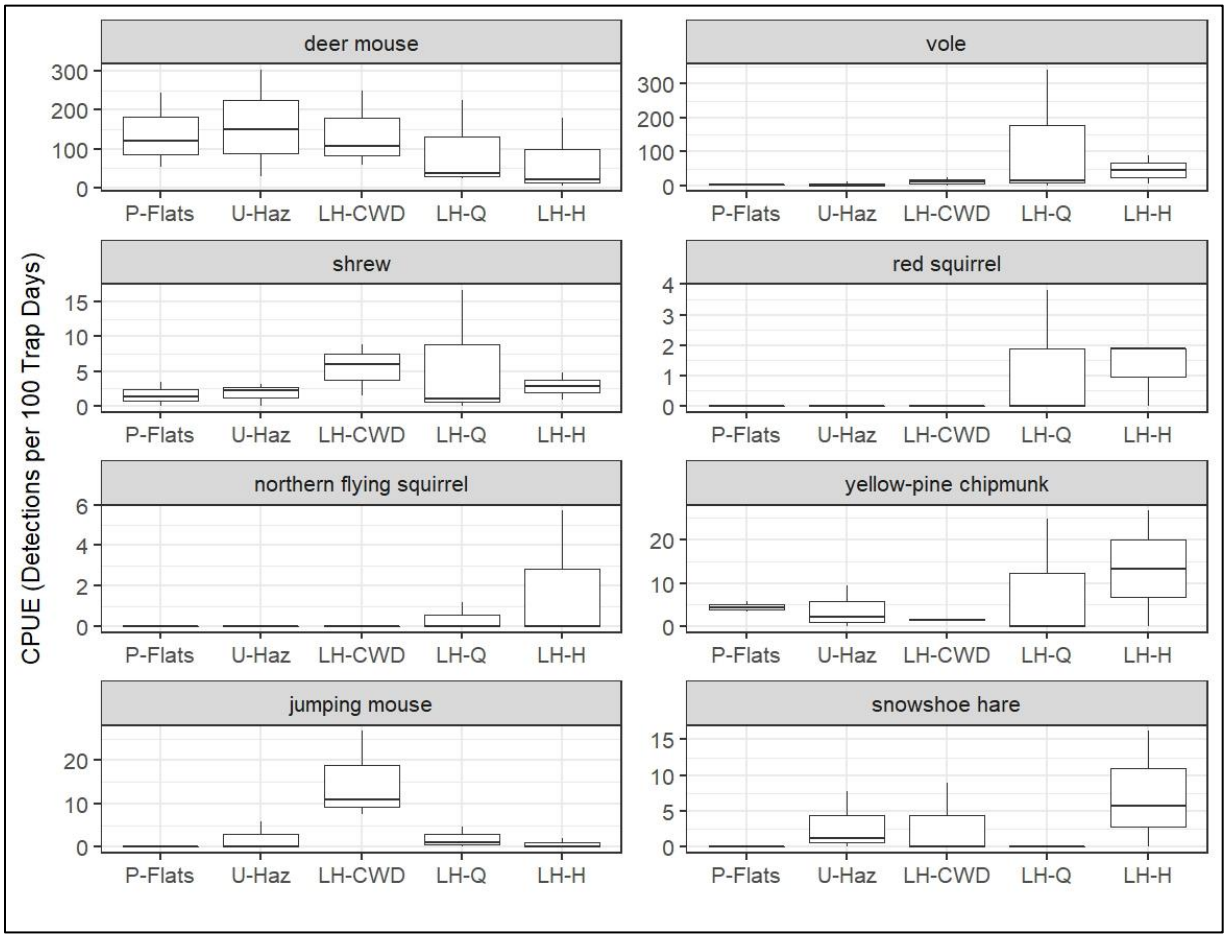

Figure 5. Mean capture rates of small mammal species among five study areas of the Hazeltine Creek corridor in 2022, including Polley Flats (P-Flats), Upper Hazeltine (U-Haz), Lower Hazeltine-Cwd (LH-CWD), Lower Hazeltine-Quesnel Lake (LH-Q) and Lower Hazeltine-Halo Zone (LH-H). Error bars represent ± standard deviation.

Table 12. Results of one-way ANOVA or Kruskal-Wallis tests comparing mean Catch Per Unit Effort (CPUE) between study areas in the Hazeltine Creek corridor for small mammal groups detected in 2022. P-values in bold indicate a significant difference among study areas at α = 0.05.

Species	Polley Flats	Upper Hazeltine	Lower Hazeltine-Cwd	Lower Hazeltine-Quesnel	Lower Hazeltine-Halo	$F_{4, 10}$	P
Deer Mouse	138.4 ± 96.4	160.0 ±138.0	138.0 ± 99.6	95.1 ± 113.4	68.2 ± 96.3	0.685	0.618
Vole	2.67 ± 1.40	4.96 ± 6.86	12.6 ± 12.7	119.0 ± 192.9	46.7 ± 41.9	1.19	0.373
Shrew	1.64 ± 1.76	1.82 ± 1.64	5.49 ± 3.71	5.93 ± 9.31	2.86 ± 1.90	0.523	0.721
Red Squirrel	0	0	0	1.27 ± 2.20	1.27 ± 1.09	1.259	0.348
Northern Flying Squirrel	0	0	0	0.40 ± 0.69	1.90 ± 3.30	3.238	0.518
Yellow-Pine* Chipmunk	4.55 ± 1.21	3.82 ± 4.91	1.61 ± 0.153	8.25 ± 14.3	13.3 ± 13.3	0.613	0.663
Jumping Mouse	0	1.94 ± 3.36	15.1 ± 10.3	1.96 ± 2.49	0.63 ± 1.10	**6.845**	**<0.01**
Snowshoe Hare**	0	2.99 ± 4.21	2.98 ± 5.15	0	7.30 ± 8.21	---	---

* Non-parametric Kruskal-Wallis test performed.
** Data insufficient to perform statistical comparison

3.4 Species at Risk

Mammal species were classified as a species at risk if they fell into one of the following three categories:

1. A species listed on Schedule 1 of Canada's *Species at Risk Act* (SARA) as 'Endangered', 'Threatened' or 'Special concern'. Prohibitions that protect these species under SARA will specifically apply to 'Endangered', 'Threatened', or 'Extirpated' species on federal lands, or lands under the authority of the Minister of Environment.
2. A species listed under Schedule 1 of the Category of Species at Risk, under the BC *Forest and Range Practices Act* (FRPA). Additional management strategies to protect the habitat of these species are required during forest and range activities on crown land. The list also includes species whose populations are not presently at peril but whose habitat may be at an increased risk of impact from harvesting activities (e.g., elk)
3. A species listed by the BC Conservation Data Centre (CDC) as Blue-listed (Special Concern) or Red-listed (Endangered/Threatened). The conservation status of species listed by the CDC are based on the consensus of the scientific community; however, not all of the species listed by CDC are protected under federal or provincial legislation.

In total, one species-at-risk was detected from remote wildlife cameras deployed in 2022 (Table 12). A single grizzly bear was detected in Upper Hazeltine on July 17, 2022.

Table 13. Species-at-risk observed at Mount Polley Mine in 2022 as detected from wildlife cameras.

Species	SARA[1]	BC CDC[2]	BC FRPA[3]	Detection Date(s)	Detection Time (24hr)	Study Area	Site ID
Grizzly Bear	Special Concern	Blue	Listed (2004)	17-Jul-2022	21:23	Upper Hazeltine	UH15

1- Canada's *Species at Risk Act* (SARA), where species may be categorized as Special Concern, Threatened, Endangered or Extirpated. Species with 'No Status' are not protected under the act.

2 - British Columbia Conservation Data Centre (BC CDC), where species are classified by the scientific community as either Yellow (secure), Blue (special concern), or Red (threatened/extirpated).

3 - British Columbia *Forest and Range Practices Act* (BC FRPA), where species are appended to a single species at risk list by the Minister of Environment. Species with 'No Status' are not on the list.

4.0 DISCUSSION

4.1 LARGE MAMMALS

4.1.1 Species Detections

A total of 395 independent wildlife detections were documented on large mammal cameras in 2024 across all deployment sites in the Hazeltine Creek corridor and the reference areas. Of these detections, 297 were from the Hazeltine Creek corridor, while 32 and 66 were detected in young and mature reference areas, respectively.

Large mammal detections consisted of 16 mammal species (not including domestic cows) in both the Hazeltine Creek corridor and reference areas in 2022. In comparison, 2021 saw a total of 383 independent detections of 14 mammal species (excluding cows) in the Hazeltine Creek corridor alone (DWB 2022). Species composition among large mammal detections was similar in the Hazeltine Creek corridor between 2021 and 2022; wolverine and cougar were the only large mammal species detected in Hazeltine Creek in 2021 that were absent from the 2022 detections. Wolves were a new species detected in 2022. Mule deer, moose, black bear and coyote were the four most frequently detected species in both years.

Reference areas were included for the first time as part of the mammal monitoring program in 2022, which allowed for a comparison of wildlife detections between sites in the Hazeltine Creek corridor that had been impacted by the 2014 tailings breach and reference areas off the mine site that were unimpacted. Overall, species composition was similar between Hazeltine creek and the reference areas. Only a few species, including river otter, mink and grizzly bear, were solely detected in the Hazeltine creek corridor and not the reference areas. Similarly, the same four species that made up the majority of the Hazeltine Creek corridor detections (mule deer, black bear, coyote and moose) were also the majority of detections in the reference areas.

Camera deployment locations targeted several habitat features that were part of reclamation efforts following the 2014 tailings breach event, including CWD piles and areas of planted vegetation. One of the objectives of the Mammal Monitoring Plan was to assess whether reclaimed features, such as reconstructed stream channels, CWD, and vegetation were used by resident mammal species for breeding, feeding, travel, and/or shelter. The range of mammal species and life stages observed across study areas and deployment locations, as well as many of the specific behaviours documented, suggest reclaimed features are supporting at least some of the life history requirements of resident mammal

populations. Some examples include observations of mule deer and moose feeding on native shrubs and grasses in many of the reclaimed areas, suggesting planted vegetation may be providing food for these species. Further, the observation of adults accompanied by young-of-the-year (e.g., bear cubs, deer and moose calves) in many areas suggests that these areas may be providing required resources (e.g., food, shelter) for both adults and their young. However, presence of specific wildlife at a location does not necessarily indicate that they are utilizing resources there. For example, some species may be using certain areas for foraging, but not breeding, while other individuals may just be passing through during seasonal migrations or daily movements.

4.1.2 Update to Sampling Approach

In 2021, large mammal cameras were rotated between multiple deployment sites in the Hazeltine Creek corridor with the goal to maximize the number of detections of as many mammal species as possible, and to identify areas with high wildlife activity (DWB 2022). In contrast, cameras deployed in 2022 remained stationary throughout the annual sampling period, aside from the large mammal camera in the Lower Hazeltine-Quesnel Lake study area, which was moved to an alternative location to avoid rising springtime water levels. It is recommended that in all subsequent years, cameras remain in the same deployment locations throughout the year to allow consistency in comparisons between locations within and among sampling years.

4.2 Small Mammals

4.2.1 Comparison with Reference Areas

The assemblage of small mammal species was identical between Hazeltine Creek corridor and both young and mature reference areas. However, there were distinct differences in relative abundance for several small mammal groups between these areas. While deer mouse capture rates were not significantly different between the Hazeltine Creek corridor and reference areas, they were twice as high in Hazeltine Creek and mature reference areas, compared to young forest reference sites. In contrast, voles, shews, red squirrels, and northern flying squirrels all showed significantly higher capture rates in one or both the reference areas compared to the Hazeltine Creek corridor. These patterns may highlight the variation in habtiat preferences and responses to disturbance displayed by these species.

Both deer mice (*Peromyscus maniculatus*) and red squirrels (*Neotamias amoenus*) are considered habtiat generalists, and are capable of occupying a variety of habitats in clearcut or disturbed environments (Sullivan and Sullivan 2018). Capture rates of deer mice were similar between Hazeltine Creek sites and mature reference areas, highlighting the versatility in habitat use by this species. Red squirrels, however, were more abundant in young and mature reference areas compared to Hazeltine Creek, which is consistent with this species' requirement for mature and immature trees for nesting and food (Nagorsen 2005). Though red squirrels are usually most abundant in mature spruce and pine forests, some studies in the BC Interior have found that managed and mature lodgepole pine forests supported similar densities (Sullivan and Moses 1986; Nagorsen 2005). Population fluctuations in this species are tightly associated with food availability, primarily conifer cone crops (Nagorsen 2005).

Northern flying squirrels - another arboreal species - demonstrated a similar pattern as red squirrels, with the exception that mean capture rates were significantly higher only in mature reference areas compared to the Hazeltine Creek corridor and young reference areas. This again, likely reflects this species' requirement for mature forest environments. Though often considered a mature forest-specialist, Northern flying squirrels have been known to inhabit both young and mature forests, depending on the

region (Nagorsen 2005). Northern flying squirrels have two essential habitat requirements: tree cavities for den sites and abundance of lichens and truffles for food (Nagorsen 2005).

Voles and shrews also had significantly higher capture rates in both young and mature reference areas compared to the Hazeltine Creek corridor. The vole and shrew species potentially present in the Mount Polley study areas all differ in their ecology, habtiat requirements and responses to habitat disturbance. Among these species, southern red-backed voles (*Clethrionomys gapperi*) - which are thought to make up the majority of vole detections in our study areas - are usually considered a closed-canopy, mature forest-dependant species, often associated with moist forest conditions, abundant shrub cover, and downed woody debris of varying levels of decay (Sullivan and Sullivan 2018; Nagorsen 2005). Previous studies have shown their abundance declines sharply immediately following timber harvesting, and may take several decades to return to pre-harvest (mature forest) levels (Sullivan et al. 2010; Fuller et al. 2004). However, populations may remain at 'mature forest levels' if microhabitat conditions are retained, such as woody debris cover and availability of food sources including fruit-bearing woody shrubs (Boonstra and Krebs 2012).

Shrews are primarily insectivores, and so population responses to forest cover loss or habtiat disturbance may be less pronounced than other herbivorous or omnivorous small mammal groups (Fisher and Wilkinson 2005). Most shrew species do, however, require hydric or mesic ground conditions and are typically associated with ground litter and shrub cover (Fisher and Wilkinson 2005). Cinerus shrews - one of the most common and widespread species in BC - are known to occupy a variety of terrestrial habitats, except areas with little to no vegetation cover. Thick leaf litter in damp forests may represent favored habitat for this species, although they appear to be adaptable to major successional disturbances (BC CDC 1996; Stevenson et al. 1998). Other shrew species of the genus *Sorex* occupy various habitats ranging from fields to moist conifer forests (Sullivan and Sullivan 1982).

4.2.2 Hazeltine Creek Study Areas

The observed patterns in relative abundance of small mammals among the study areas of the Hazeltine Creek corridor appeared to mirror those observed between the Hazeltine Creek corridor and reference areas. Mean capture rates for deer mice were relatively consistent across study areas, which reflects this species' role as a habitat generalist. The mean capture rates were higher for voles, shrews, red squirrels and northern flying squirrels in the lower Hazeltine - Quesnel Lake and Lower Hazeltine - Halo study areas. Shrew capture rates were also higher in Lower-Hazeltine-Cwd study area, in addition to Lower Hazeltine-Quesnel Lake and Lower Hazeltine-Halo. However, these results were not statistically significant; significant differences may be detected in future years for these species as the reclaimed sites continue to develop and mature.

The Lower Hazeltine-Halo study area represents the only area of the Hazeltine Creek corridor where forest vegetation was not lost during the breach in 2014. As such, this area like provides distinct forest habtiat conditions not found in the other four study areas and may explain the higher capture rates for voles, shrews, squirrels and northern flying squirrels. The Lower Hazeltine-Quesnel Lake area also had higher detections for these species, which may be due to the area's proximity to Quesnel Lake, wetlands present in the study area, or nearby forest cover in the Lower Hazeltine-Halo study area (see maps in Appendix A). Mean capture rates of some these species (vole, shrew, northern flying squirrel) in Lower Hazeltine-Quesnel were, however, marked by a high degree of variability; therefore, caution should be exercised when interpreting these results (see Section 4.3.3).

Jumping mice were the only small mammal species to show a significant difference among Hazeltine Creek study areas. Jumping mice captures rates were significantly higher in the Lower Hazeltine-Cwd, with this study area accounting for 27 of 39 (69.2%) jumping mouse detections in the Hazeltine Creek corridor. The reason for this difference is unknown. Jumping mice represented the least frequently detected small mammal in the 2022 study and is often rare in other small mammal trapping studies (Jung and Powell 2011). Both the western and meadow jumping mouse is associated with grassy habitats and dense riparian vegetation surrounding streams and wetlands (Nagorsen 2005). The most productive environments for western jumping mouse tend to be moist meadows with abundant forbs. Habitat features present in the Lower Hazeltine-Cwd study area may be particularly favourable for jumping mice; however, additional sampling years and further analysis are required to address this question (see Section 4.3.1)

4.3 LIMITATIONS

4.3.1 Habitat Relationships

The small mammal data in 2022 were treated at a relatively broad scale through comparisons of relative abundance (standardized capture rates) between the study areas of Hazeltine Creek corridor, as well as between the Hazeltine Creek corridor and nearby references areas. We were able to show that relative abundance of some small mammal groups (deer mice), was comparable between Hazeltine Creek corridor sites and the reference areas, while other species (voles, shrews, red squirrels, northern flying squirrels) displayed lower capture rates in Hazeltine Creek relative to the reference areas. Although the mechanisms underlying these patterns can be speculated from known habtiat requirements and previous research on target small mammal species, additional study and analysis is required to explore potential relationships between species relative abundance and habitat variables. For example, the inclusion of habitat data such as coarse woody debris (CWD), understory vegetation cover, and presence and abundance of food sources (vegetation, invertebrates), into single- and multi-year analyses may improve understanding of observed abundance patterns.

4.3.2 Abundance Indices

We used standardized capture rates ('catch per unit effort', CPUE) to compare relative abundance of small mammals among study areas. This allowed for a standardized comparison that accounted for unequal sampling effort across study area. The standardized measures of CPUE provide a proxy or surrogate for wildlife populations (Allen et al. 2020). These measures, however, should not be considered measures of true abundance or population size, which typically require the capture and recapture of marked (or identifiable) individuals over repeated sampling sessions to provide population estimates (Manning and Goldberg 2020). Other methods are also available that allow abundance estimates and detection probabilities to be estimated using repeated measures of unmarked individuals, such as N-mixture models (Dénes et al. 2015).

4.3.3 Imperfect Detection

It is important to recognize that not all species and life stages are detected with equal probability. Wildlife surveys, including those using remote cameras, experience imperfect detection when some species or life stages evade discovery despite being present in a study area (Anderson 2001, Mackenzie et al. 2005). Imperfect detection can occur at the scale of the individual deployment location or within the context of the larger study area that the deployment location is selected to represent (Burton et al. 2015). For example, species or individuals may not be detected when they move through a camera's detection zone, or they may be occupying a larger study area but not use or move through the camera deployment location. This phenomenon can hinder inferences (interpretations of data) regarding wildlife populations

and communities within study areas if appropriate sampling and analytical methods are not implemented (Burton et al. 2015).

4.3.4 Variabilities in Detections Among Camera Sites

Detection histories among cameras at deployment sites were marked by occasional outliers (sites with particularly high capture rates). For example, 287 of the 497 vole detections (57.8%), and 14 of 42 shrew detections (33.3%) in the Hazeltine Creek corridor came from a single camera site (LHQ3) in the Lower Hazeltine-Quesnel Lake study area (Table D4, Appendix D). Such 'hotspots' are not uncommon in small mammal live trapping and other wildlife count-based surveys. A few sites marked by very high captures have the potential to inflate the average capture or detection rates for an area. This effect becomes more pronounced in areas with small sample size (i.e., number of camera sites). For example, each study area of the Hazeltine Creek corridor had three small mammal cameras (sampling unit replicates), therefore a single "high capture" camera site may inflate the mean of this area considerably and may misrepresent the overall abundance of a species in area.

The reason for such spatial variation in wildlife detections is uncertain and may represent true ecological patterns (e.g., spatial heterogeneity of good habtiat, wildlife travel corridors). In this study, outliers were retained in analyses in order to maintain sample sizes within study areas. However mean capture rates with high variability (standard deviation), should be interpreted with caution. Additional years of sampling at the same sites will help determine if such hotspots experience the same repeated patterns.

4.3.5 Inter-annual Population Changes

Small mammal populations are expected to vary year-to-year (Nagorsen 2005), and many species even experience regular inter-annual population cycles. For this reason, it is essential to sample over multiple years to assess long-term trends. Meadow voles, for example, frequently show two-to-four-year population cycles; however, the presence of these cycles can vary geographically, with some populations only showing year-to-year variation in abundance (Nagorsen 2005). Southern red-backed voles are one of the few vole species that do not undergo regular population cycles in North America, though populations do vary year-to-year (Boonstra and Krebs 2006). The 2022 year was the first year of the small mammal study, which represents Year-3 of the wildlife monitoring timeline described in the *Updated Scope for the Terrestrial Wildlife Monitoring Plan for the Hazeltine Creek Corridor* (DWB 2021). Small mammal sampling is scheduled to occur in 2023, 2024, 2026 and 2029, which corresponds to Years-4, 5, 7 and 10, of the wildlife monitoring timeline, respectively.

4.4 Camera Deployment Methods

4.4.1 Positioning of Cameras

In 2022, the 'walk test' function was used on all wildlife cameras to ensure cameras were directed at the appropriate target. This feature uses a red light on the camera to indicate when the camera is triggered and to assist in aiming the camera at a target feature. Since small mammal cameras were positioned close to the ground, the bait holder was occasionally out of position (i.e., partially or fully out of frame). As a result, small mammals coming to the bait site would trigger the camera, but would result in images where the individual was only partially visible in the frame or not visible at all (Figure 6). Although images are often captured of the individual passing through the camera's field of view, many images are missed when the animal approaches the bait from the 'invisible' side, or when the animal is investigating or feeding at the bait holder. These image sets were subsequently excluded from later analyses since the data were not comparable to images where the bait was properly positioned.

Reconyx Hyperfire 2 cameras do not have a viewing screen to allow the user to see the exact field of view when they are deploying a camera. For standardized comparisons, it is essential that the field of view is consistent among camera sites, with the bait properly positioned near the center of the frame. An SD card reader will be used in future years to ensure the bait holder is correctly positioned at all camera sites during deployments.

Figure 6. Comparison good (A) and poor (B) positioning of the bait holder at small mammal camera sites.

5.0 CLOSURE AND RECOMMENDATIONS

Large mammal cameras in 2022 resulted in a similar number of detections as 2021, with species composition being similar between the Hazeltine Creek corridor and nearby reference areas. Though the large mammal program is not intended to provide population estimates for any species, 2022 data shows that some species are using reclaimed sites in the Hazeltine Creek corridor for travel and foraging, and that large mammal communities detected in Hazeltine Creek are similar in species composition to those detected at reference areas. Future years of sampling will benefit from maintaining the same deployment sites throughout the survey period.

Relative abundance of most small mammal groups was lower in the Hazeltine Creek corridor compared to reference areas, with significant differences observed for voles, shrews, red squirrels and northern flying squirrels. Further, many small mammals associated with intact forest and associated ground conditions (e.g., woody debris, shrubs, litter layer, ground moisture) were more abundant in the Lower Hazeltine-Halo and Lower Hazeltine-Quesnel Lake study areas, compared to Polley Flats, Upper Hazeltine and Lower Hazeltine-Cwd. Additional years of sampling are needed to examine long-terms trends in small mammal abundance, as well as analyses that incorporate habitat variables to explore potential relationships between species relative abundance and habitat features present in reclaimed sites of the Hazeltine Creek corridor and the reference areas.

Overall, remote cameras were effective at detecting target small mammal groups in the Mount Polley study areas. Due to the non-invasive and cost-effective nature of this sampling technique, the same design and procedures should continue in future years after incorporating the recommendations and lessons learned. Deer mice, voles, shrews red squirrels and northern flying squirrels have the potential to act as ‘index’ groups for long term monitoring of small mammals. The relatively high capture rates of these groups will permit statistically meaningful comparisons between the Hazeltine Creek corridor and reference areas in future years, as well comparisons of relative abundance between years. Deer mice are considered habitat generalists; however, voles, shrews, red squirrels and northern flying squirrels have more specialized habtiat requirements that are characteristic of early-successional or mature forest

environments and, therefore, may be good indicators of ecological succession and post-disturbance recovery.

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Appendix A
Camera Deployment Maps

Mammal Monitoring Program 2022

Overview Map

N

0 0.5 1 1.5 2

Kilometers

1:70,000

North American 1983 | NAD 1983 BC Environment Albers

- Mount Polley Mine
- Community
- Paved Road
- Gravel Road
- Stream
- Waterbody

Reference Site

- Jacobie Mature
- Jacobie Young
- Miles Mature
- Miles Young
- Moorehead Mature
- Warren Young

Study Area

- Polley Flats
- Upper Hazeltine Creek
- Lower Hazeltine - CWD
- Lower Hazeltine - Quesnel Lake
- Lower Hazeltine - Halo Zone

Service Layer Credits: Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS

PROJECT #:
IMC_24274-008

MAP NAME:
IMC_24274-008_MammalMonitoring_Overview

DATE:
2024/03/25

DWB Consulting Services Ltd.

Hydraulic
Likely
Mount Polley Mine
Warren Young
Jacobie Young
Jacobie Mature
Miles Young
Miles Mature
Moorehead Mature
Polley Flats
Upper Hazeltine Creek
Lower Hazeltine - Quesnel Lake
Lower Hazeltine - Halo Zone
Lower Hazeltine - CWD
Morehead Lake
Bootjack Lake
Polley Lake
Quesnel Lake
Dancing Bill Creek
Little Lake-Quesnel River Rd
Bullion Rd
Sharpe Rd
Prior Rd
Quesnel River
Quesnel Forks Rd
South Likely Rd
Spanish Lake Rd
Fisher Creek
Cedar Creek
Mart Creek
Dow Creek
Dag Creek
Cub Creek
Spectacle Lake Road FSR
2600 Rd
Jacobie Lake FSR
35 Mile Road FSR
S Jeffersons Road FSR
Horsefly-Likely FSR
Moorehead-Bootjack FSR
Miles Creek
Bootjack Creek
Hazeltine Creek
Raft Creek
Meadowy Creek
3 Mile Creek
Opheim Lake
Gavin Lake Rd
Gavin Creek
Honeybee Rd
Moorhouse Creek
Edney Lake Rd
Edney Creek
Jacobson Rd
Opheim Lake Rd
Beaver Creek
Beaver Lake
Beaver Valley Rd
Beaver Lake Rd
Watson Creek
Likely Rd
Fire Lake Rd
Cedar Rd
Teasdale Creek Rd
Jackpine Creek
Littlelake Creek
Morehead Creek
Sam Creek
Warren Creek
Jacobie Creek
Tho Creek
Drop Creek
Slum Gulch Creek
Bilboa Creek
Polley Creek
Kinglet Youngren Creek
Powerline Creek
Kennley Creek Rd
Spanish Creek
Grogan Creek
Winkley Creek Rd

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Polley Flats
- Gravel Road
- Stream

BRITISH COLUMBIA

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PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Polley Flats

Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 5

SCALE: **1:10,000**

0 50 100 200 m

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Upper Hazeltine Creek
- Gravel Road
- Stream

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PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Upper Hazeltine Creek

Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 6

SCALE: **1:20,000**

0 50100 200 300 400 500 m

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Lower Hazeltine - CWD
- Gravel Road
- Stream

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PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Lower Hazeltine - CWD

Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 7

SCALE: **1:10,000**

0 50 100 200 m

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Lower Hazeltine - Quesnel Lake
- Gravel Road
- Stream

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PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Lower Hazeltine - Quesnel Lake

Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 8

SCALE: **1:10,000**

0 50 100 200 m

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Small Mammal Camera Trap Location 2022
- Lower Hazeltine - Halo Zone
- Gravel Road
- Stream

BRITISH COLUMBIA

DWB Consulting Services Ltd.

PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Lower Hazeltine - Halo Zone

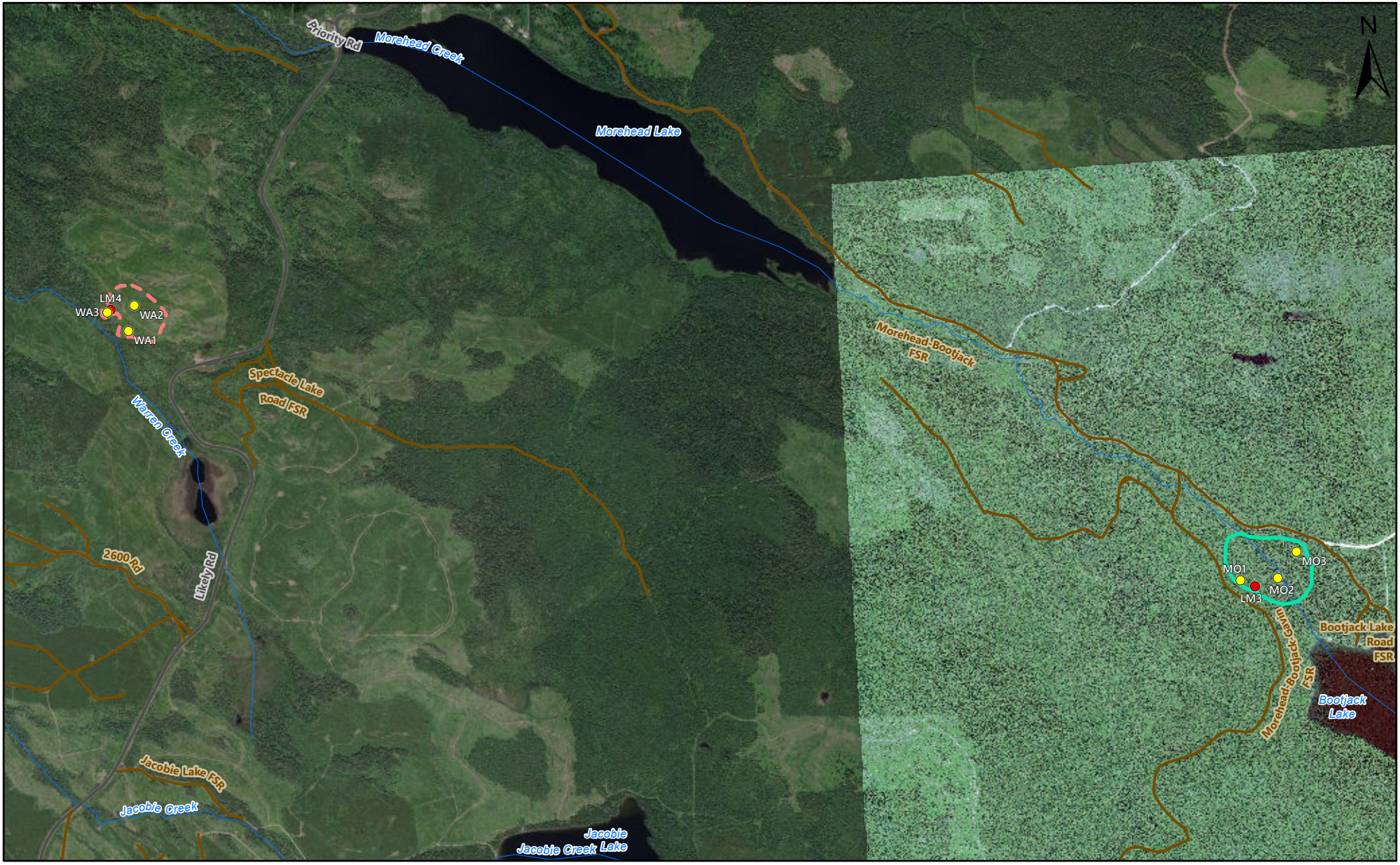
Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 9

SCALE: **1:10,000**

0 50 100 200 m



Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Moorehead - Mature
- Warren - Young
- Paved Road
- Gravel Road
- Stream

BRITISH COLUMBIA

DWB Consulting Services Ltd.

PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/22**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Reference Areas
Morehead Creek / Warren Creek

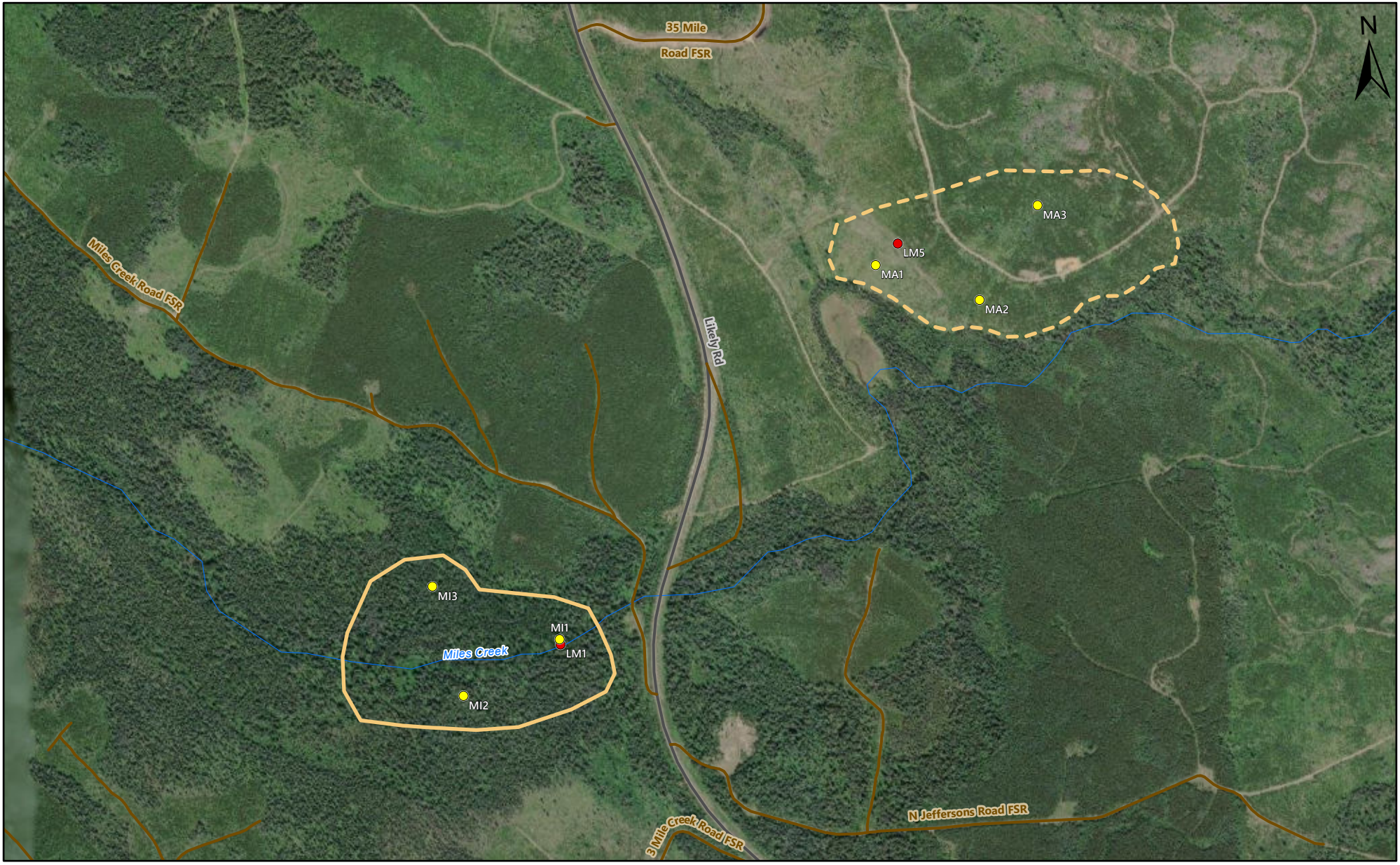
Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 2

SCALE: **1:40,000**

0 500 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 m



Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Miles - Mature
- Miles - Young
- Paved Road
- Gravel Road
- Stream

BRITISH COLUMBIA

DWB Consulting Services Ltd.

PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Reference Areas - Miles Creek

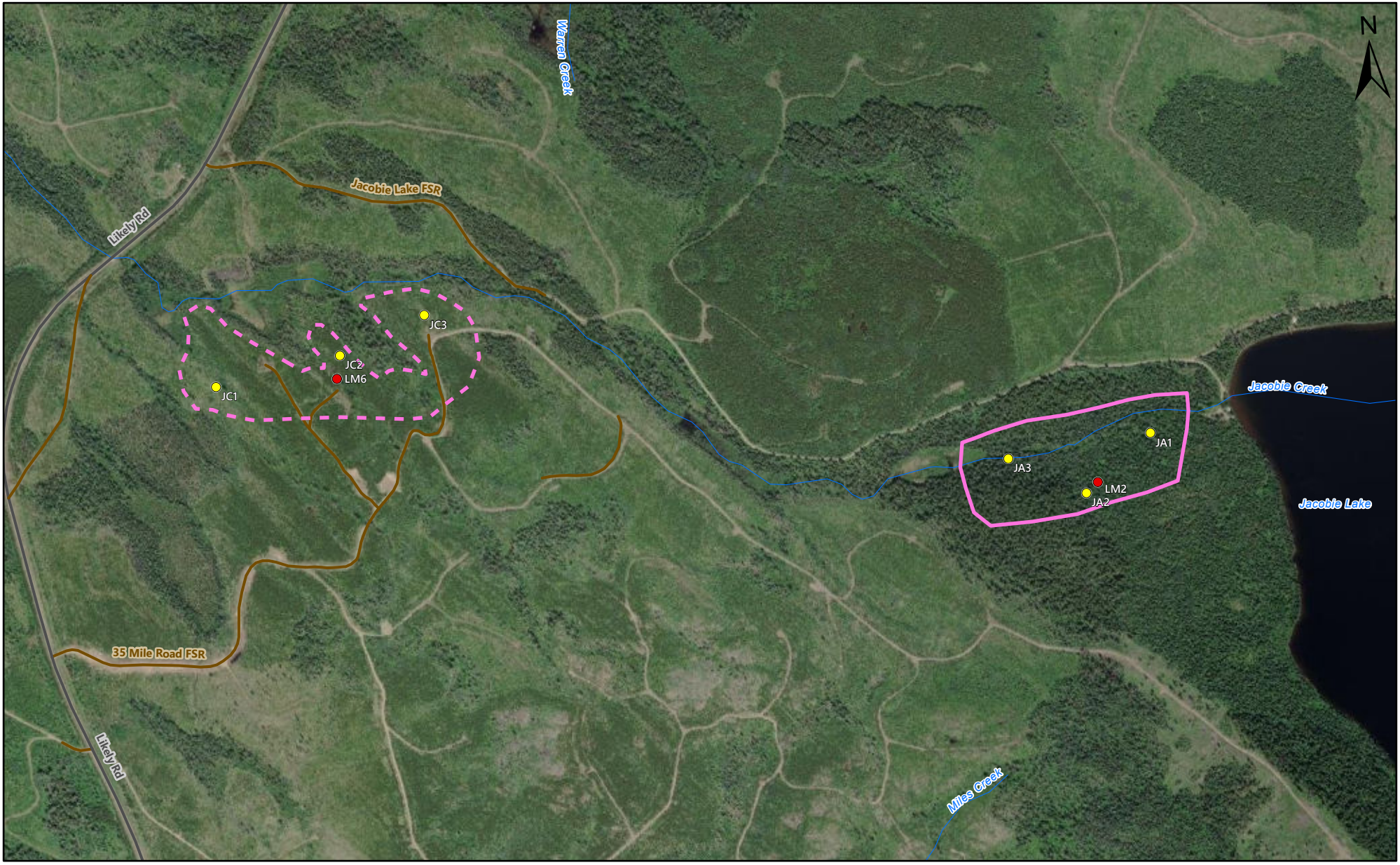
Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 4

SCALE: **1:15,000**

0 50 100 200 300 400 m



Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada, Esri, USGS, Maxar

LEGEND

- Large Mammal Camera Trap Location 2022
- Small Mammal Camera Trap Location 2022
- Jacobie - Mature
- Jacobie - Young
- Paved Road
- Gravel Road
- Stream

BRITISH COLUMBIA

DWB Consulting Services Ltd.

PROJECTION: **NAD 1983 BC Environment Albers**

DATE: **2024/03/21**

PREPARED BY: **DWB GIS**

Mammal Monitoring Program 2022

Reference Areas - Jacobie Creek

Site Location Map

FILE NAME: **IMC_24274-008_MammalMonitoring**

FIGURE 3

SCALE: **1:15,000**

0 50 100 200 300 400 m

Appendix B
Example Field Data Collection Form

Wildlife Camera Field Collection Form

Survey Name:	Small Mammals	**Crew:**	SS, MR
Study Area:	Lower Hazeltine - CWD		
Deployment Location ID:	LHC3	**Camera ID:**	LHC3
Date:	09-Aug-2022	**Deployment Time (24-HR):**	12:27
Station Coordinates:	Same as previous		
Station Features/ Habitat Type:	Thick grass and shrub habitat, forbs	**Purpose of Visit:** Select all that apply	☐ Camera Deployment ☑ Site Check/Maintenance ☑ Data Collection/Download ☐ Camera Removal ☐ Other (Describe below)
Target Habitat Feature(s)	☐ Game Trail ☐ Human Trail ☐ Road ☐ Feeding Area ☐ Rubbing Post ☐ Wetland ☐ Stream ☐ River ☐ Lake Shore ☐ Other (Describe Below) Reclaimed thick grass and shrub habitat, forbs **Distance from Target Feature (m)** 0.70m		
Station Photos Numbers: [minimum four photos – N, S, E, W]	Site- 3124 N- 3120 E -3121 S -3122 W -3123		
Visibility (m)	0.70 m	**Camera compass direction**	Same as Previous
Camera Make and Model:	Reconnyx Hyperfire 2	**SD Card ID:**	LHC3-A Swapped w/ LHC3-B

Camera Attached to: ☐ Tree ☑ Post ☐ Other
Security Box ☐ Y ☑ N
Security Cable ☐ Y ☑ N

Camera Settings:
☐ Video. Length of Video _____
☐ Time Lapse Photos Length of Interval _____
☑ Remote Photos # photos per burst 5

PIR Sensitivity ☐ Low ☐ Medium ☐ High ☑ Med-High

Time Lag Between Photo Burst
☐ No delay
☑ Delay. Give time length in seconds 30 sec

Walk Test Performed ☑ Y ☐ N

Camera Active When You Left? ☑ Y ☐ N

Additional Comments

Lot's of false detections despite vegetation being cleared prior, no log cover. Batteries full, PIR sensitivity changed to Med-High.
- bait refreshed

Appendix C
Camera Deployment History and Sampling Effort

Table C1. Site coordinates and deployment data for large mammal cameras in Hazeltine Creek corridor and nearby reference areas in 2022

Study Area Type	Study Area	Site ID	Latitude	Longitude	Bearing	Camera Height (m)	Target Feature
Hazeltine Creek	Polley Flats	PF04	52.527650	-121.587605	225	----	Creek/CWD
Hazeltine Creek	Upper Hazeltine	UH06	52.513325	-121.570925	277	----	Treeline/Wetland
Hazeltine Creek	Upper Hazeltine	UH07	52.508260	-121.563943	160	----	Creek/CWD
Hazeltine Creek	Upper Hazeltine	UH15	52.520045	-121.581630	223	----	Clearing/CWD
Hazeltine Creek	Lower Hazeltine-Cwd	LHC02	52.527651	-121.587605	230	----	CWD/Clearing
Hazeltine Creek	Lower Hazeltine-Quesnel	LHQ05-A	52.499519	-121.501454	203	----	Quesnel Lake/Beach
Hazeltine Creek	Lower Hazeltine-Quesnel	LHQ05-B	52.498924	-121.502049	**203**	----	Quesnel Lake Shore/CWD
Hazeltine Creek	Lower Hazeltine-halo	LHH03	52.496941	-121.499538	240	----	Clearing/Trailhead/Treeline
Reference - Mature	Miles Mature	LM1	52.526538	-121.818527	103	1.4	Stream (Miles Creek)
Reference - Mature	Jacobie Mature	LM2	52.544896	-121.772229	267	0.93	Game Trail
Reference - Mature	Morehead Mature	LM3	52.562069	-121.680444	358	1	Game Trail
Reference - Young	Warren Young	LM4	52.585408	-121.806106	35	0.8	Clearing
Reference - Young	Miles Young	LM5	52.536191	-121.803456	343	0.8	Old cutblock road
Reference - Young	Jacobie Young	LM6	52.548660	-121.803752	344	1.14	Small wetland

Table C2. Deployment histories and sampling effort for large mammal cameras in the Hazeltine Creek corridor and reference sites.

Study Area Type	Study Area	Site ID	Start Date	End Date	Survey Effort (days)	Total Effort (Days)
Hazeltine Creek Corridor	Polley Flats	PF04	2022-01-1	2022-12-31	364	364
	Upper Hazeltine	UH06	2022-01-1	2022-12-31	364	1092
		UH07	2022-01-1	2022-12-31	364	
		UH15	2022-01-1	2022-12-31	364	
	Lower Hazeltine-Cwd	LHC02	2022-01-01	2022-12-31	364	364
	Lower Hazeltine-Quesnel Lake	LHQ05-A	2022-11-09	2022-12-31	52	364
		LHQ05-B	2022-01-01	2022-11-09	312	
	Lower Hazeltine-Halo	LHH03	2022-01-01	2022-12-31	364	364
Reference - Young	Miles Mature	LM1	2022-07-21	2022-12-31	163	488
	Jacobie Mature	LM2	2022-07-21	2022-12-31	163	
	Morehead Mature	LM3	2022-07-22	2022-12-31	162	
Reference - Mature	Warren Young	LM4	2022-07-22	2022-12-31	162	486
	Miles Young	LM5	2022-07-22	2022-12-31	162	
	Jacobie Young	LM6	2022-07-22	2022-12-31	162	
	Total					**3,522**

Table C3. Site coordinates and deployment data for small mammal cameras deployed in Hazeltine Creek corridor and nearby reference areas in 2022.

Study Area	Area Type	Site ID	Latitude	Longitude	Bearing	Camera Height (m)	Distance to Target (m)	Site Description
Polley Flats	Hazeltine	PF-1	52.526706	-121.590545	6	0.5	0.7	Adjacent to piece of large woody debris, 18m from a wetland
Polley Flats	Hazeltine	PF-2	52.524583	-121.591564	6	0.46	0.7	Adjacent to pieces of large woody debris (dead logs)
Polley Flats	Hazeltine	PF-3	52.524469	-121.585959	6	0.4	0.7	Adjacent to pieces of large woody debris (dead logs).
Upper Hazeltine	Hazeltine	UH-1	52.514201	-121.573200	285	0.5	0.7	Immediately adjacent to woody debris piles
Upper Hazeltine	Hazeltine	UH-2	52.501725	-121.556028	348	0.5	0.7	Adjacent to piece of large woody debris. Pointed in direction of adjacent uphill slope
Upper Hazeltine	Hazeltine	UH-3	52.520407	-121.581862	352	0.5	0.65	Abundant high shrub cover in area
Lower Hazeltine-Cwd	Hazeltine	LHC-1	52.496666	-121.513502	358	0.5	0.7	Adjacent to pieces of large woody debris (dead logs).
Lower Hazeltine-Cwd	Hazeltine	LHC-2	52.496124	-121.510009	13	0.6	0.7	Vegetated slope, uphill of stream (Hazeltine Creek). Scattered woody debris nearby
Lower Hazeltine-Cwd	Hazeltine	LHC-3	52.494121	-121.513416	320	0.59	0.7	Vegetated upland area between Hazeltine and Edney Creeks. Thick shrub cover in surrounding area.
Lower Hazeltine-Quesnel	Hazeltine	LHQ-1	52.496826	-121.503370	356	0.5	0.7	Uphill of wetland on plateau with woody debris, small shrubs and exposed mineral soil and rock material
Lower Hazeltine-Quesnel	Hazeltine	LHQ-2	52.498457	-121.502818	347	0.5	0.75	Upslope from Quesnel Lake and site channel plateau. Vegetated with shrubs and covered in mulch and woody debris
Lower Hazeltine-Quesnel	Hazeltine	LHQ-3	52.497087	-121.500068	322	0.56	0.74	Upland from Edney Creek. Vegetated with grass and shrubs and some woody debris
Lower Hazeltine-Halo	Hazeltine	LHH-1	52.494934	-121.495686	334	0.55	0.7	Placed on old ditch road. Early (immature) forest with sparse understory vegetation and little woody debris
Lower Hazeltine-Halo	Hazeltine	LHH-2	52.495334	-121.493143	347	0.59	0.75	Mature forest with cedar, birch, and spruce. Sparse understory vegetation, some woody debris
Lower Hazeltine-Halo	Hazeltine	LHH-3	52.496527	-121.498187	22	0.62	0.7	Located on an old (grown-in) access road. Forest clearing with some mature shrubs and trees.
Jacobie-Young	Reference.Young	JC-1	52.548635	-121.808822	353	0.7	0.7	Young forest, lodgepole pine plantation. Bait attached opposite side of partially buried log.

Study Area	Area Type	Site ID	Latitude	Longitude	Bearing	Camera Height (m)	Distance to Target (m)	Site Description
Jacobie-Young	Reference.Young	JC-2	52.549244	-121.803572	13	0.4	0.66	Young forest, lodgepole pine plantation. Bait attached at base of stump.
Jacobie-Young	Reference.Young	JC-3	52.550145	-121.799949	292	0.5	0.7	Young forest, lodgepole pine plantation. Bait attached to partially buried log.
Miles-Young	Reference.Young	MA-1	52.535679	-121.804434	333	0.5	0.7	Young forest, lodgepole pine plantation.
Miles-Young	Reference.Young	MA-2	52.53464	-121.800180	36	0.22	0.7	Young forest, lodgepole pine plantation. Bait attached to log on ground.
Miles-Young	Reference.Young	MA-3	52.536951	-121.797527	22	0.35	0.67	Young forest, lodgepole pine plantation. Bait attached to log on ground.
Warren.Young	Reference.Young	WA-1	52.583902	-121.804272	323	0.3	0.5	Young forest, lodgepole pine plantation. Bait placed on top of decaying stump.
Warren.Young	Reference.Young	WA-2	52.585605	-121.803459	47	0.2	0.56	Young forest, lodgepole pine plantation. Lots of exposed sun. Lots of grasses removed.
Warren.Young	Reference.Young	WA-3	52.585238	-121.806510	1	0.3	0.7	Young forest, lodgepole pine plantation. Bait attached to log on ground.
Jacobie.Mature	Reference.Mature	JA-1	52.546064	-121.769913	342	0.4	0.6	Mature Forest upslope and south of Jacobie Creek
Jacobie.Mature	Reference.Mature	JA-2	52.544637	-121.772732	305	0.43	0.6	Mature Forest upslope and south to Jacobie Creek
Jacobie.Mature	Reference.Mature	JA-3	52.545624	-121.775911	336	0.34	0.65	Mature Forest north of Jacobie Creek. Approximately 60m east of wetland.
Miles. Mature	Reference.Mature	MI-1	52.526671	-121.818554	338	0.55	0.6	Mature forest adjacent to Miles Creek. Adjacent to potential game trail.
Miles. Mature	Reference.Mature	MI-2	52.525382	-121.822704	305	0.47	0.7	Mature forest, shaded canopy in trees. Minimal understory vegetation. Evidence of small mammal presence (burrows).
Miles. Mature	Reference.Mature	MI-3	52.528202	-121.823732	19	0.52	0.7	Mature forest, some woody debris on ground, camera between two trees
Morehead. Mature	Reference.Mature	MO-1	52.562533	-121.682029	16	0.4	0.65	Mature forest west of Morehead Creek
Morehead. Mature	Reference.Mature	MO-2	52.562536	-121.677857	294	0.4	0.7	Mature forest west of Morehead Creek. Large woody debris (blowdown) and wet area/ephemeral draw about 5 m from camera site.
Morehead. Mature	Reference.Mature	MO-3	52.564235	-121.675589	331	0.45	0.67	Mature forest northeast of Morehead Creek. Wet habtiat immediately south of camera site. Bait attached to well-decayed log.

Table C4. Deployment histories and sampling effort for small mammal cameras deployed in the Hazeltine Creek corridor and nearby reference areas. 'Check date' refers to date cameras were visited for maintenance during each deployment period. 'End date' refers to the actual deployment end date for each camera. 'End dates' in red font indicate where deployment periods were shortened (or dropped) due to bait being removed or camera being misdirected, removed or damaged by wildlife. 'Retain data' (yes/no) indicates which data were retained for final analyses. "Reason' indicates why data were excluded or deployment end date was modified.

Study Area	Area Type	Site ID	Deployment Period	Deployment ID	Start Date	Check Date	End Date	Days	Retain Data	Photos Processed	Reason
polley.flats	hazeltine	PF-1	D1_2022	D1_2022_PF-1	2022-07-18	2022-08-08	NA	0	no	no	PIR set to high; high false detections
polley.flats	hazeltine	PF-2	D1_2022	D1_2022_PF-2	2022-07-18	2022-08-08	2022-08-08	21	no	yes	PIR set to high
polley.flats	hazeltine	PF-3	D1_2022	D1_2022_PF-3	2022-07-18	2022-08-08	2022-08-08	21	no	yes	PIR set to high
upper.hazeltine	hazeltine	UH-1	D1_2022	D1_2022_UH-1	2022-07-18	2022-08-08	2022-08-08	21	no	yes	PIR set to high
upper.hazeltine	hazeltine	UH-2	D1_2022	D1_2022_UH-2	2022-07-18	2022-08-09	2022-07-19	1	no	yes	PIR set to high; bait stolen July 20
upper.hazeltine	hazeltine	UH-3	D1_2022	D1_2022_UH-3	2022-07-19	2022-08-08	NA	0	no	no	PIR set to high; poor bait position
lower.hazeltine.cwd	hazeltine	LHC-1	D1_2022	D1_2022_LHC-1	2022-07-19	2022-08-09	NA	0	no	no	PIR set to high; high false detections
lower.hazeltine.cwd	hazeltine	LHC-2	D1_2022	D1_2022_LHC-2	2022-07-19	2022-08-09	NA	0	no	no	PIR set to high; high false detections
lower.hazeltine.cwd	hazeltine	LHC-3	D1_2022	D1_2022_LHC-3	2022-07-19	2022-08-09	NA	0	no	no	PIR set to high; high false detections
lower.hazeltine.quesnel	hazeltine	LHQ-1	D1_2022	D1_2022_LHQ-1	2022-07-19	2022-08-09	2022-08-09	21	no	yes	PIR set to high
lower.hazeltine.quesnel	hazeltine	LHQ-2	D1_2022	D1_2022_LHQ-2	2022-07-19	2022-08-09	2022-08-09	21	no	yes	PIR set to high
lower.hazeltine.quesnel	hazeltine	LHQ-3	D1_2022	D1_2022_LHQ-3	2022-07-19	2022-08-09	NA	0	no	no	PIR set to high; high false detections
lower.hazeltine.halo	hazeltine	LHH-1	D1_2022	D1_2022_LHH-1	2022-07-19	2022-08-09	2022-08-09	21	no	yes	PIR set to high
lower.hazeltine.halo	hazeltine	LHH-2	D1_2022	D1_2022_LHH-2	2022-07-19	2022-08-09	2022-08-09	21	no	yes	PIR set to high
lower.hazeltine.halo	hazeltine	LHH-3	D1_2022	D1_2022_LHH-3	2022-07-19	2022-08-09	2022-08-09	21	no	yes	PIR set to high
warren.young	control.young	WA-1	D1_2022	D1_2022_WA-1	2022-07-22	2022-08-11	2022-08-11	20	no	yes	PIR set to high
warren.young	control.young	WA-2	D1_2022	D1_2022_WA-2	2022-07-22	2022-08-11	NA	0	no	no	PIR set to high; high false detections
warren.young	control.young	WA-3	D1_2022	D1_2022_WA-3	2022-07-22	2022-08-11	2022-08-11	20	no	yes	PIR set to high; poor bait position
miles.young	control.young	MA-1	D1_2022	D1_2022_MA1	2022-07-22	2022-08-11	NA	0	no	no	PIR set to high; high false detections
miles.young	control.young	MA-2	D1_2022	D1_2022_MA-2	2022-07-22	2022-08-11	2022-08-11	20	no	yes	PIR set to high
miles.young	control.young	MA-3	D1_2022	D1_2022_MA-3	2022-07-22	2022-08-11	2022-08-11	20	no	yes	PIR set to high
jacobie.young	control.young	JC-1	D1_2022	D1_2022_JC-1	2022-07-22	2022-08-11	2022-08-11	20	no	yes	PIR set to high
jacobie.young	control.young	JC-2	D1_2022	D1_2022_JC-2	2022-07-22	2022-08-11	2022-07-23	1	no	yes	PIR set to high; mis-directed July 24
jacobie.young	control.young	JC-3	D1_2022	D1_2022_JC-3	2022-07-22	2022-08-11	2022-08-11	20	no	yes	PIR set to high
miles.mature	control.mature	MI-1	D1_2022	D1_2022_MI-1	2022-07-21	2022-08-10	2022-08-06	16	no	yes	PIR set to high; bear stole bait Aug 7
miles.mature	control.mature	MI-2	D1_2022	D1_2022_MI-2	2022-07-21	2022-08-10	NA	0	no	no	PIR set to high; camera stolen by bear
miles.mature	control.mature	MI-3	D1_2022	D1_2022_MI-3	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high
jacobie.mature	control.mature	JA-1	D1_2022	D1_2022_JA-1	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high
jacobie.mature	control.mature	JA-2	D1_2022	D1_2022_JA-2	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high
jacobie.mature	control.mature	JA-3	D1_2022	D1_2022_JA-3	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high
morehead.mature	control.mature	MO-1	D1_2022	D1_2022_MO-1	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high

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morehead.mature	control.mature	MO-2	D1_2022	D1_2022_MO-2	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high
morehead.mature	control.mature	MO-3	D1_2022	D1_2022_MO-3	2022-07-21	2022-08-10	2022-08-10	20	no	yes	PIR set to high
polley.flats	hazeltine	PF-1	D2_2022	D2_2022_PF-1	2022-08-08	2022-08-29	2022-08-09	1	no	yes	poor bait position; mis-directed Aug 10
polley.flats	hazeltine	PF-2	D2_2022	D2_2022_PF-2	2022-08-08	2022-08-29	2022-08-29	21	yes	yes	
polley.flats	hazeltine	PF-3	D2_2022	D2_2022_PF-3	2022-08-08	2022-08-29	2022-08-12	4	yes	yes	mis-directed Aug 13
upper.hazeltine	hazeltine	UH-1	D2_2022	D2_2022_UH-1	2022-08-08	2022-08-29	2022-08-29	21	yes	yes	
upper.hazeltine	hazeltine	UH-2	D2_2022	D2_2022_UH-2	2022-08-09	2022-08-29	2022-08-29	20	no	yes	poor bait position
upper.hazeltine	hazeltine	UH-3	D2_2022	D2_2022_UH-3	2022-08-08	2022-08-29	NA	0	no	yes	mis-directed Aug 8
lower.hazeltine.cwd	hazeltine	LHC-1	D2_2022	D2_2022_LHC-1	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
lower.hazeltine.cwd	hazeltine	LHC-2	D2_2022	D2_2022_LHC-2	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
lower.hazeltine.cwd	hazeltine	LHC-3	D2_2022	D2_2022_LHC-3	2022-08-09	2022-08-30	2022-08-22	13	yes	yes	Bait stolen, mis-directed Aug 23
lower.hazeltine.quesnel	hazeltine	LHQ-1	D2_2022	D2_2022_LHQ-1	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-2	D2_2022	D2_2022_LHQ-2	2022-08-09	2022-08-30	2022-08-30	21	no	yes	poor bait position
lower.hazeltine.quesnel	hazeltine	LHQ-3	D2_2022	D2_2022_LHQ-3	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-1	D2_2022	D2_2022_LHH-1	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-2	D2_2022	D2_2022_LHH-2	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-3	D2_2022	D2_2022_LHH-3	2022-08-09	2022-08-30	2022-08-30	21	yes	yes	
warren.young	control.young	WA-1	D2_2022	D2_2022_WA-1	2022-08-11	2022-08-31	2022-08-31	20	no	yes	poor bait position
warren.young	control.young	WA-2	D2_2022	D2_2022_WA-2	2022-08-11	2022-08-31	2022-08-14	3	no	yes	poor bait position; bait stolen Aug 15
warren.young	control.young	WA-3	D2_2022	D2_2022_WA-3	2022-08-11	2022-08-31	2022-08-31	20	no	yes	poor bait position
miles.young	control.young	MA-1	D2_2022	D2_2022_MA-1	2022-08-11	2022-09-01	2022-08-22	11	yes	yes	Bait stolen, mis-aligned Aug 23
miles.young	control.young	MA-2	D2_2022	D2_2022_MA-2	2022-08-11	2022-09-01	2022-09-01	21	yes	yes	
miles.young	control.young	MA-3	D2_2022	D2_2022_MA-3	2022-08-11	2022-09-01	2022-08-12	1	yes	yes	Bait stolen, mis-aligned Aug 13
jacobie.young	control.young	JC-1	D2_2022	D2_2022_JC-1	2022-08-11	2022-08-31	2022-08-31	20	yes	yes	
jacobie.young	control.young	JC-2	D2_2022	D2_2022_JC-2	2022-08-11	2022-08-31	2022-08-25	14	yes	yes	Bait stolen, mis-aligned Aug 26
jacobie.young	control.young	JC-3	D2_2022	D2_2022_JC-3	2022-08-11	2022-08-31	2022-08-21	10	yes	yes	Bait stolen, mis-aligned Aug 22
miles.mature	control.mature	MI-1	D2_2022	D2_2022_MI-1	2022-08-10	2022-09-01	2022-09-01	22	yes	yes	
miles.mature	control.mature	MI-2	D2_2022	D2_2022_MI-2	2022-08-10	2022-09-01	NA	0	no	no	camera removed by bear
miles.mature	control.mature	MI-3	D2_2022	D2_2022_MI-3	2022-08-10	2022-09-01	2022-09-01	22	yes	yes	
jacobie.mature	control.mature	JA-1	D2_2022	D2_2022_JA-1	2022-08-10	2022-09-01	2022-09-01	22	yes	yes	
jacobie.mature	control.mature	JA-2	D2_2022	D2_2022_JA-2	2022-08-10	2022-09-01	2022-09-01	22	yes	yes	
jacobie.mature	control.mature	JA-3	D2_2022	D2_2022_JA-3	2022-08-10	2022-09-01	2022-09-01	22	yes	yes	
moorehead.mature	control.mature	MO-1	D2_2022	D2_2022_MO-1	2022-08-10	2022-08-31	2022-08-31	21	no	yes	poor bait position
moorehead.mature	control.mature	MO-2	D2_2022	D2_2022_MO-2	2022-08-10	2022-08-31	2022-08-31	21	yes	yes	
moorehead.mature	control.mature	MO-3	D2_2022	D2_2022_MO-3	2022-08-10	2022-08-31	2022-08-31	21	yes	yes	
polley.flats	hazeltine	PF-1	D3_2022	D3_2022_PF-1	2022-08-29	2022-09-19	2022-09-19	21	yes	yes	

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polley.flats	hazeltine	PF-2	D3_2022	D3_2022_PF-2	2022-08-29	2022-09-19	2022-09-14	16	yes	yes	Mis-directed by bear Sept 15
polley.flats	hazeltine	PF-3	D3_2022	D3_2022_PF-3	2022-08-29	2022-09-19	2022-09-05	7	yes	yes	Mis-directed by bear Sept 6
upper.hazeltine	hazeltine	UH-1	D3_2022	D3_2022_UH-1	2022-08-29	2022-09-19	2022-09-07	9	yes	yes	Mis-directed by cow Sept 8
upper.hazeltine	hazeltine	UH-2	D3_2022	D3_2022_UH-2	2022-08-29	2022-09-19	2022-09-19	21	yes	yes	
upper.hazeltine	hazeltine	UH-3	D3_2022	D3_2022_UH-3	2022-08-29	2022-09-19	2022-09-19	21	no	yes	
lower.hazeltine.cwd	hazeltine	LHC-1	D3_2022	D3_2022_LHC-1	2022-08-30	2022-09-19	2022-09-09	10	yes	yes	Bear stole bait Sept 10
lower.hazeltine.cwd	hazeltine	LHC-2	D3_2022	D3_2022_LHC-2	2022-08-30	2022-09-20	2022-09-17	18	yes	yes	Bait stolen, mis-directed Sept 18
lower.hazeltine.cwd	hazeltine	LHC-3	D3_2022	D3_2022_LHC-3	2022-08-30	2022-09-19	2022-09-19	20	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-1	D3_2022	D3_2022_LHQ-1	2022-08-30	2022-09-20	2022-09-20	21	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-2	D3_2022	D3_2022_LHQ-2	2022-08-30	2022-09-20	2022-09-20	21	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-3	D3_2022	D3_2022_LHQ-3	2022-08-30	2022-09-20	2022-09-20	21	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-1	D3_2022	D3_2022_LHH-1	2022-08-30	2022-09-20	2022-09-20	21	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-2	D3_2022	D3_2022_LHH-2	2022-08-30	2022-09-20	2022-09-21	22	no	yes	poor bait position
lower.hazeltine.halo	hazeltine	LHH-3	D3_2022	D3_2022_LHH-3	2022-08-30	2022-09-20	2022-09-20	21	yes	yes	
warren.young	control.young	WA-1	D3_2022	D3_2022_WA-1	2022-08-31	2022-09-21	NA	2	no	no	Bait out of frame; not processed
warren.young	control.young	WA-2	D3_2022	D3_2022_WA-2	2022-08-31	2022-09-21	2022-09-21	21	yes	yes	
warren.young	control.young	WA-3	D3_2022	D3_2022_WA-3	2022-08-31	2022-09-21	2022-09-21	21	yes	yes	
miles.young	control.young	MA-1	D3_2022	D3_2022_MA-1	2022-09-01	NA	NA	0	no	no	camera destroyed by bear
miles.young	control.young	MA-2	D3_2022	D3_2022_MA-2	2022-09-01	2022-09-22	2022-09-22	21	yes	yes	
miles.young	control.young	MA-3	D3_2022	D3_2022_MA-3	2022-09-01	NA	NA	0	no	no	camera destroyed by bear
jacobie.young	control.young	JC-1	D3_2022	D3_2022_JC-1	2022-08-31	2022-09-21	2022-09-21	21	yes	yes	
jacobie.young	control.young	JC-2	D3_2022	D3_2022_JC-2	2022-08-31	2022-09-21	NA	0	no	no	camera destroyed by bear
jacobie.young	control.young	JC-3	D3_2022	D3_2022_JC-3	2022-08-31	2022-09-21	2022-09-04	4	yes	yes	
miles.mature	control.mature	MI-1	D3_2022	D3_2022_MI-1	2022-09-01	2022-09-22	2022-09-22	21	yes	yes	
miles.mature	control.mature	MI-2	D3_2022	D3_2022_MI-2	NA	NA	NA	0	no	no	camera destroyed by bear
miles.mature	control.mature	MI-3	D3_2022	D3_2022_MI-3	2022-09-01	2022-09-22	2022-09-22	21	yes	yes	
jacobie.mature	control.mature	JA-1	D3_2022	D3_2022_JA-1	2022-09-01	2022-09-22	2022-09-22	21	yes	yes	
jacobie.mature	control.mature	JA-2	D3_2022	D3_2022_JA-2	2022-09-01	2022-09-22	2022-09-14	13	yes	yes	mis-directed Sept 15
jacobie.mature	control.mature	JA-3	D3_2022	D3_2022_JA-3	2022-09-01	2022-09-22	2022-09-05	4	yes	yes	mis-directed Sept 6
morehead.mature	control.mature	MO-1	D3_2022	D3_2022_MO-1	2022-08-31	2022-09-21	2022-09-21	21	yes	yes	
morehead.mature	control.mature	MO-2	D3_2022	D3_2022_MO-2	2022-08-31	2022-09-21	2022-09-21	21	yes	yes	
morehead.mature	control.mature	MO-3	D3_2022	D3_2022_MO-3	2022-08-31	2022-09-20	2022-09-20	20	yes	yes	
polley.flats	hazeltine	PF-1	D4_2022	D4_2022_PF-1	2022-09-19	2022-10-11	2022-10-11	22	yes	yes	
polley.flats	hazeltine	PF-2	D4_2022	D4_2022_PF-2	2022-09-19	2022-10-11	2022-10-11	22	yes	yes	
polley.flats	hazeltine	PF-3	D4_2022	D4_2022_PF-3	2022-09-19	2022-10-11	2022-10-03	14	yes	yes	
upper.hazeltine	hazeltine	UH-1	D4_2022	D4_2022_UH-1	2022-09-19	2022-10-11	2022-10-11	22	yes	yes	

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upper.hazeltine	hazeltine	UH-2	D4_2022	D4_2022_UH-2	2022-09-19	2022-10-11	2022-10-11	22	yes	yes	
upper.hazeltine	hazeltine	UH-3	D4_2022	D4_2022_UH-3	2022-09-19	2022-10-11	2022-10-11	22	yes	yes	
lower.hazeltine.cwd	hazeltine	LHC-1	D4_2022	D4_2022_LHC-1	2022-09-19	2022-10-11	2022-10-02	13	yes	yes	mis-directed by bear Oct 3
lower.hazeltine.cwd	hazeltine	LHC-2	D4_2022	D4_2022_LHC-2	2022-09-20	2022-10-12	2022-09-23	3	yes	yes	Bait stolen; mis-directed Sept 24
lower.hazeltine.cwd	hazeltine	LHC-3	D4_2022	D4_2022_LHC-3	2022-09-19	2022-10-11	NA	0	no	yes	mis-directed at start of deployment
lower.hazeltine.quesnel	hazeltine	LHQ-1	D4_2022	D4_2022_LHQ-1	2022-09-20	2022-10-12	2022-09-25	5	yes	yes	Bait stolen Sept 26
lower.hazeltine.quesnel	hazeltine	LHQ-2	D4_2022	D4_2022_LHQ-2	2022-09-20	2022-10-12	2022-10-12	22	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-3	D4_2022	D4_2022_LHQ-3	2022-09-20	2022-10-12	2022-10-12	22	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-1	D4_2022	D4_2022_LHH-1	2022-09-20	2022-10-12	2022-10-12	22	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-2	D4_2022	D4_2022_LHH-2	2022-09-20	2022-10-12	2022-10-12	22	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-3	D4_2022	D4_2022_LHH-3	2022-09-20	2022-10-12	2022-10-12	22	yes	yes	
warren.young	control.young	WA-1	D4_2022	D4_2022_WA-1	2022-09-21	2022-10-13	2022-10-13	22	yes	yes	
warren.young	control.young	WA-2	D4_2022	D4_2022_WA-2	2022-09-21	2022-10-13	2022-10-13	22	yes	yes	
warren.young	control.young	WA-3	D4_2022	D4_2022_WA-3	2022-09-21	2022-10-13	2022-10-13	22	yes	yes	
miles.young	control.young	MA-1	D4_2022	D4_2022_MA-1	NA	NA	NA	0	no	no	camera destroyed by bear
miles.young	control.young	MA-2	D4_2022	D4_2022_MA-2	2022-09-22	2022-10-13	2022-10-13	21	no	yes	poor bait position
miles.young	control.young	MA-3	D4_2022	D4_2022_MA-3	NA	NA	NA	0	no	no	camera destroyed by bear
jacobie.young	control.young	JC-1	D4_2022	D4_2022_JC-1	2022-09-21	2022-10-13	2022-10-13	22	yes	yes	
jacobie.young	control.young	JC-2	D4_2022	D4_2022_JC-2	2022-09-21	NA	NA	0	no	no	camera destroyed by bear
jacobie.young	control.young	JC-3	D4_2022	D4_2022_JC-3	2022-09-21	2022-10-13	2022-10-13	22	yes	yes	
miles.mature	control.mature	MI-1	D4_2022	D4_2022_MI-1	2022-09-22	2022-10-17	2022-10-17	25	yes	yes	
miles.mature	control.mature	MI-2	D4_2022	D4_2022_MI-2	2022-09-22	NA	NA	0	no	no	camera destroyed by bear
miles.mature	control.mature	MI-3	D4_2022	D4_2022_MI-3	2022-09-22	2022-10-17	2022-10-17	25	yes	yes	
jacobie.mature	control.mature	JA-1	D4_2022	D4_2022_JA-1	2022-09-22	2022-10-13	2022-10-13	21	yes	yes	
jacobie.mature	control.mature	JA-2	D4_2022	D4_2022_JA-2	2022-09-22	2022-10-17	2022-10-17	25	yes	yes	
jacobie.mature	control.mature	JA-3	D4_2022	D4_2022_JA-3	2022-09-22	2022-10-17	2022-10-17	25	no	yes	poor bait position; only handle showing
morehead.mature	control.mature	MO-1	D4_2022	D4_2022_MO-1	2022-09-21	2022-10-12	2022-10-02	11	yes	yes	Coyote stole bait Oct 3
morehead.mature	control.mature	MO-2	D4_2022	D4_2022_MO-2	2022-09-21	2022-10-13	2022-10-13	22	yes	yes	
morehead.mature	control.mature	MO-3	D4_2022	D4_2022_MO-3	2022-09-20	2022-10-12	2022-10-12	22	yes	yes	
polley.flats	hazeltine	PF-1	D5_2022	D5_2022_PF-1	2022-10-11	2022-10-31	2022-10-22	11	yes	yes	Mis-directed by bear Oct 23
polley.flats	hazeltine	PF-2	D5_2022	D5_2022_PF-2	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	
polley.flats	hazeltine	PF-3	D5_2022	D5_2022_PF-3	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	
upper.hazeltine	hazeltine	UH-1	D5_2022	D5_2022_UH-1	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	
upper.hazeltine	hazeltine	UH-2	D5_2022	D5_2022_UH-2	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	
upper.hazeltine	hazeltine	UH-3	D5_2022	D5_2022_UH-3	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	
lower.hazeltine.cwd	hazeltine	LHC-1	D5_2022	D5_2022_LHC-1	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	

Study Area	Area Type	Site ID	Deployment Period	Deployment ID	Start Date	Check Date	End Date	Days	Retain Data	Photos Processed	Reason
lower.hazeltine.cwd	hazeltine	LHC-2	D5_2022	D5_2022_LHC-2	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
lower.hazeltine.cwd	hazeltine	LHC-3	D5_2022	D5_2022_LHC-3	2022-10-11	2022-10-31	2022-10-31	20	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-1	D5_2022	D5_2022_LHQ-1	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-2	D5_2022	D5_2022_LHQ-2	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
lower.hazeltine.quesnel	hazeltine	LHQ-3	D5_2022	D5_2022_LHQ-3	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-1	D5_2022	D5_2022_LHH-1	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-2	D5_2022	D5_2022_LHH-2	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
lower.hazeltine.halo	hazeltine	LHH-3	D5_2022	D5_2022_LHH-3	2022-10-12	2022-10-31	2022-10-31	19	yes	yes	
warren.young	control.young	WA-1	D5_2022	D5_2022_WA-1	2022-10-13	2022-11-02	2022-11-02	20	yes	yes	
warren.young	control.young	WA-2	D5_2022	D5_2022_WA-2	2022-10-13	2022-11-02	2022-11-02	20	yes	yes	
warren.young	control.young	WA-3	D5_2022	D5_2022_WA-3	2022-10-13	2022-11-02	2022-11-02	20	yes	yes	
miles.young	control.young	MA-1	D5_2022	D5_2022_MA-1	NA	NA	NA	0	no	no	camera destroyed by bear
miles.young	control.young	MA-2	D5_2022	D5_2022_MA-2	2022-10-13	2022-11-01	2022-11-01	19	yes	yes	
miles.young	control.young	MA-3	D5_2022	D5_2022_MA-3	NA	NA	NA	0	no	no	camera destroyed by bear
jacobie.young	control.young	JC-1	D5_2022	D5_2022_JC-1	2022-10-13	2022-11-01	2022-11-01	19	yes	yes	
jacobie.young	control.young	JC-2	D5_2022	D5_2022_JC-2	NA	NA	NA	0	no	no	camera destroyed by bear
jacobie.young	control.young	JC-3	D5_2022	D5_2022_JC-3	2022-10-13	2022-11-01	2022-11-01	19	yes	yes	
miles.mature	control.mature	MI-1	D5_2022	D5_2022_MI-1	2022-10-17	2022-11-01	2022-11-01	15	yes	yes	
miles.mature	control.mature	MI-2	D5_2022	D5_2022_MI-2	NA	NA	NA	0	no	No	camera removed by bear
miles.mature	control.mature	MI-3	D5_2022	D5_2022_MI-3	2022-10-17	2022-11-01	NA	0	no	no	SD card error - no photos
jacobie.mature	control.mature	JA-1	D5_2022	D5_2022_JA-1	2022-10-13	2022-11-01	2022-11-01	19	yes	yes	
jacobie.mature	control.mature	JA-2	D5_2022	D5_2022_JA-2	2022-10-17	2022-11-01	2022-11-01	15	yes	yes	
jacobie.mature	control.mature	JA-3	D5_2022	D5_2022_JA-3	2022-10-17	2022-11-01	2022-11-01	15	yes	yes	
morehead.mature	control.mature	MO-1	D5_2022	D5_2022_MO-1	2022-10-12	2022-11-02	2022-11-02	21	yes	yes	
morehead.mature	control.mature	MO-2	D5_2022	D5_2022_MO-2	2022-10-13	2022-11-02	2022-11-02	20	yes	yes	
morehead.mature	control.mature	MO-3	D5_2022	D5_2022_MO-3	2022-10-12	2022-11-02	2022-11-02	21	yes	yes	

Appendix D
Summary of Wildlife Detections

Table D1. Summary of independent wildlife detections for large mammal cameras deployed in study areas of the Hazeltine Creek corridor in 2022. One camera was deployed in each study area, except Upper Hazeltine (three cameras deployed). Camera site IDs are listed below study area names in brackets

Species	Polley Flats (PF04)	Upper Hazeltine (UH06	UH07	UH15)	Lower Hazeltine-Cwd (LHC02)	Lower Hazeltine - Quesnel Lake (LHQ05-A	LHQ05-B)	Lower Hazeltine-Halo (LHH03)	Total
Beaver	2	---	---	---	---	---	---	---	2
Black Bear	7	---	---	16	3	---	2	5	33
Chipmunk	10	---	---		---	---	---	---	10
Cow	6	32	98	120	---	---	---	---	256
Coyote	13	1	1	10	---	---	17	1	43
Deer, unidentified	---	---	---		---	---	2	---	2
Grizzly Bear	---	---	---	1	---	---	---	---	1
Lynx	12	---	---	1	---	---	---	---	13
Mink	---	---	---		---	---	1		1
Moose	3	9	5	19	6	1	---	6	49
Unidentified Rodent	2	---	---	---	---	---	---	---	2
Mule Deer	3	4	2	10	22	1	28	49	119
Otter	3	---	---	---	---		5	---	8
Red Squirrel	---	---	---	---	---	---	1	---	1
Snowshoe Hare	---	---	---	---	---	---		1	1
Wolf	1	6	---	---	---	---	---	5	12
Total	**62**	**52**	**106**	**177**	**31**	**2**	**56**	**67**	**553**

Table D2. Summary of independent wildlife detections for large mammal cameras deployed in reference areas in 2022. One camera was deployed in each study area (Site ID is shown in brackets). One large camera was deployed per reference area.

	Reference Young			Reference Mature			
Species	Warren Young (LM1)	Miles Young (LM2)	Jacobie Young (LM3)	Jacobie Mature (LM4)	Miles Mature (LM5)	Moorehead Mature (LM6)	Total
Black Bear	2	1	1	---	1	2	7
Cow	---	10	---	---	4	---	14
Coyote	1	7	---	---	---	---	8
Moose	---	---	1	---	4	4	9
Mule Deer	---	2	14	4	2	2	24
Northern Flying Squirrel	---	---	---	1	---	---	1
Red Squirrel	---	---	---	45	---	---	45
Wolf	---	---	---	---	---	1	1
Total	**3**	**23**	**16**	**50**	**11**	**9**	**112**

Table D3. Summary of independent wildlife detections for small mammal cameras deployed in study areas of the Hazeltine Creek corridor in 2022 (summarized by study area). Three cameras were deployed in each study area. See Table D4 for summary of detections at each camera deployment site.

	Species	Polley Flats	Upper Hazeltine	Lower Hazeltine-Cwd	Lower Hazeltine-Halo	Lower Hazeltine-Quesnel	Total
Small Mammals	deer mouse	292	420	268	215	256	**1451**
	vole	6	13	24	147	303	**493**
	shrew	3	5	10	9	15	**42**
	red squirrel	--	--	--	4	4	**8**
	northern flying squirrel	--	--	--	6	1	**7**
	yellow-pine chipmunk	11	8	3	42	26	**90**
	jumping mouse	--	5	27	2	5	**39**
	snowshoe hare	--	6	5	23	--	34
	Total	**312**	**457**	**337**	**448**	**610**	**2164**
Large Mammals	short-tailed weasel	7	3	2			12
	coyote	10		3	5	3	21
	black bear	1	3	2	1	2	9
	deer	--	1	1	1	1	4
	cow	3	1	--	--	--	4
	moose	1	--	--	--	--	1
	striped skunk	--	--	1	1	--	2
	American marten	--	--		1	--	1
	Total	**22**	**8**	**9**	**9**	**6**	**54**
Birds	song birds	5	11	4	20	6	46
	grouse				17		17
	Total	**5**	**11**	**4**	**37**	**6**	**63**
Unknown	Unknown	3	5	3	5	5	21
	Total	342	481	353	499	627	2302

Table D4. Summary of independent wildlife detections for small mammal cameras deployed in study areas of the Hazeltine Creek corridor in 2022 (summarized by camera site ID). Camera sites IDs are listed below study area label. Three cameras were deployed in each study area.

		Polley Flats			Upper Hazeltine			Lower Hazeltine-Cwd			Lower Hazeltine-Quesnel Lake			Lower Hazeltine-Halo			
Group	**Species**	**PF1**	**PF2**	**PF3**	**UH1**	**UH2**	**UH3**	**LHC1**	**LHC2**	**LHC3**	**LHQ1**	**LHQ2**	**LHQ3**	**LHH1**	**LHH2**	**LHH3**	**Total**
Small Mammals	deer mouse	68	54	170	141	261	18	167	69	32	201	25	30	188	5	22	1451
	vole	1	2	3	2	11	--	17	--	7	1	15	287	47	94	6	493
	shrew	2	--	1	3	2	--	4	1	5	1	--	14	3	5	1	42
	red squirrel	--	--	--	--	--	--	--	--	--	--	4	--	2	--	2	8
	northern flying squirrel	--	--	--	--	--	--	--	--	--	--	--	1	--	6	--	7
	yellow-pine chipmunk	2	6	3	2	--	6	1	1	1	--	26	--	28	--	14	90
	jumping mouse	--	--	--	--	5		5	7	15	1	--	4	2	--	--	39
	snowshoe hare	--	--	--	--	1	5	--	--	5	--	--	--	17	--	6	34
	Total	**73**	**62**	**177**	**148**	**280**	**29**	**194**	**78**	**65**	**204**	**70**	**336**	**287**	**110**	**51**	**2164**
Large Mammals	short-tailed weasel	--	6	1	1	1	1	--	2	--	--	--	--	--	--	--	12
	coyote	--	10	--	--	--	--	2	1	--	--	2	1	1	3	1	21
	black bear	1	--	--	1	--	2	2	--	--	--	--	2	--	--	1	9
	deer	--	--	--	--	1	--	--	--	1	--	--	1	1	--	--	4
	cow	1	1	1	1	--	--	--	--	--	--	--	--	--	--	--	4
	moose	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	striped skunk	--	--	--	--	--	--	1	--	--	--	--	--	1	--	--	2
	American marten	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
	Total	**2**	**18**	**2**	**3**	**2**	**3**	**5**	**3**	**1**	**0**	**2**	**4**	**3**	**4**	**2**	**54**
Birds	song birds	1	3	1	10	--	1	--	1	3	1	3	2	11	--	9	46
	grouse	--	--	--	--	--	--	--	--	--	--	--	--	8	--	9	17
	Total	1	3	1	10	0	1	0	1	3	1	3	2	19	0	18	63
Unknown	Unknown	1	1	1	--	4	1	3	--	--	--	3	2	3	1	1	21
	Total	**77**	**84**	**181**	**161**	**286**	**34**	**202**	**82**	**69**	**205**	**78**	**344**	**312**	**115**	**72**	**2302**

Table D5. Summary of independent wildlife detections for small mammal cameras deployed in study areas of the Hazeltine Creek corridor in 2022 (summarized by camera site ID). Camera sites IDs are listed below study area label. Three cameras were deployed in each study area.

		Reference - Young									Reference-Mature									
		Warren-Young			Jacobie-Young			Miles-Young			Miles-Mature			Jacobie-Mature			Moorehead-Mature			
Group	Species	WA1	WA2	WA3	JC1	JC2	JC3	MA1	MA2	MA3	MI1	MI2	MI3	JA1	JA2	JA3	MO1	MO2	MO3	Total
Small Mammals	deer mouse	1	47	29	42	7	9	22	3	9	279	--	--	154	190	43	31	6	34	**906**
	vole	90	187	199	50	17	143	12	1	5	96	--	171	50	133	161	53	58	20	**1446**
	shrew	2	85	11	65	20	25	1	39	2	11	--	116	26	7	50	10	100	109	**679**
	red squirrel	2	2	9	--	1	--	--	4	--	31	--	11	55	51	7	16	19	34	**242**
	northern flying squirrel	5	2	15	--	--	--	--	2	--	1	--	17	32	7	1	19	8	9	**118**
	yellow-pine chipmunk	--	12	5	5	--	--	--	--	--	1	--	--	2	--	--	--	--	1	**26**
	jumping mouse	--	1	1	1	3	--	--	--	--	2	--	--	3	--	--	--	--		**11**
	snowshoe hare	--	3	--	--	--	6	--	13	--	1	--	--	--	--	--	--	--	2	**25**
	Total	**100**	**339**	**269**	**163**	**48**	**183**	**35**	**62**	**16**	**422**	**0**	**315**	**322**	**388**	**262**	**129**	**191**	**209**	**3453**
Large Mammals	short-tailed weasel	--	2	3	8	--	--	--	2	--	--	--	--	2	1	--	--	--	4	**22**
	coyote	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	**1**
	black bear	--	3	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	**5**
	deer	--	--	--	1	--	1	--	--	--	--	--	--	1	--	--	--	--	--	**3**
	cow	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**3**
	moose	--	--	1		--	--	--	--	--	1	--	1	--	--	--	--	1	--	**4**
	lynx	--	--	--	--	--	1	--	--	--		--		--	--	--	--	--	--	**1**
	Total	**0**	**5**	**5**	**12**	**0**	**2**	**0**	**2**	**0**	**1**	**0**	**1**	**3**	**1**	**1**	**0**	**1**	**5**	**39**
Birds	song birds	3	2	1	13	2	10	--	33		6	--	3	17	2	5	2	5	5	**109**
	grouse	--	--	--	1	--	--	--	5	--	--	--	--	2	--	3	--	--	1	**12**
	Total	**3**	**2**	**1**	**14**	**2**	**10**	**0**	**38**	**0**	**6**	--	**3**	**19**	**2**	**8**	**2**	**5**	**6**	**121**
Unknown	Unknown	1	2	1	1		3	1	7		3	--	4	11	6	1	1	4	2	48
	Total	**104**	**348**	**276**	**190**	**50**	**198**	**36**	**109**	**16**	**432**	--	**323**	**355**	**397**	**272**	**132**	**201**	**222**	**3661**

Appendix E
Example Photos
(Some photos from 2023 deployments)


2022-07-19 21:22:22 M 5/5 11°C
Deer Mouse
Upper Hazeltine
UH2
RECONYX


2023-07-02 01:57:29 M 1/3 3°C
Deer Mouse
Lower Hazeltine-Cwd
LHC2
RECONYX


2022-07-22 14:16:13 M 4/5 24°C
Southern Red-backed Vole
Miles-Mature Reference Area
MI3
RECONYX


2022-07-30 00:02:39 M 2/5 17°C
Vole (species uncertain)
Miles-Mature Reference Area
MI 1
RECONYX


2022-07-23 02:32:10 M 3/5 9°C
Shrew (*Sorex* sp.)
Miles-Young Reference Area
MA3
RECONYX


2023-07-04 03:31:16 M 3/3 10°C
Shrew (*Sorex* sp.)
Jacobie-Mature Reference Area
JA2
RECONYX


2023-07-03 23:23:23 M 1/3 5°C
Jumping Mouse (*Zapus sp.*)
Lower Hazeltine-Cwd
LHC3
RECONYX


2022-08-05 01:03:29
M 2/5
7°C
Jumping Mouse (*Zapus sp.*)
Miles-Mature Reference Area
MI 1
RECONYX


2023-07-18 18:28:03 M 1/3 23°C
Red Squirrel
Jacobie-Young Reference Area
JC3
RECONYX


2023-07-02 03:07:16 M 3/3 3°C
Northern Flying Squirrel
Jacobie-Mature Reference Area
JA1
RECONYX


2023-07-03 10:46:51 M 2/3 16°C
Yellow-pine chipmunk
Lower Hazeltine-Halo
LHH3
RECONYX


2023-07-17 23:47:33 M 1/3 6°C
Snowshoe Hare
Jacobie Young-Reference Area
JC1
RECONYX

Appendix O

2023 Water Quality Comparison and Water Balance Calibration (WSP)

(Electronic format only)

TECHNICAL MEMORANDUM

DATE March 25, 2024 **Reference No.** CA002057.4505-030-TM-Rev0-31241

TO Mount Polley Mining Corporation

FROM Steve Mitchell, Alison Snow, and Lee Nikl **EMAIL steve.mitchell@wsp.com; alison.snow@wsp.com; lee.nikl@wsp.com**

COMPARISON OF WATER QUALITY MODEL PREDICTIONS AND 2023 MEASURED CONCENTRATIONS – MOUNT POLLEY MINE

1.0 INTRODUCTION

This technical memorandum presents a comparison of water quality data from monitoring programs that were conducted at the Mount Polley Mine (Mine) in 2023 to the water quality model predictions from the Water Management Plan Report (Golder 2020). The Water Management Plan Report was required as part of the *Environmental Management Act* (EMA) Permit 11678 dated April 7, 2017 (the Permit).

The site wide water quality model (SWWQM) was updated as part of the most recent Springer Pit Expansion Length of Mine Water Management Plan (WMP) that was submitted to Mount Polley Mining Corporation (MPMC) in November 2023 (WSP 2023a). However, the 2023 WMP was still in the review process at the time of the submission of this technical memorandum. Therefore, the water quality results from the 2023 WMP were not used as the model predictions that were compared to monitoring data in this technical memorandum. Instead, predicted concentrations from the 2020 WMP were compared to monitoring data (Golder 2020). Future annual comparisons to measured concentrations will use most recent WMP water quality predictions.

The site wide water balance model is updated annually to reflect minor changes to site conditions, as part of the annual water balance calibration exercise (WSP 2024). Because the water balance updates are minor, it is considered appropriate to compare water quality data from monitoring programs in 2023 to the 2020 WMP Report model predictions to validate the model.

Concentrations are measured at several locations throughout the mine site and in the receiving environment by Mount Polley staff according to the Permit (MPMC 2019). The three locations that are relevant to verifying predictions and permit compliance are:

- E1a, the TSF supernatant pond.
- E19, the Perimeter Embankment Till Borrow Pond (PETBP) which is upstream of the WTP.
- HAD-3, the outlet from the WTP (i.e., end-of-pipe).

Concentrations measured at E1a and E19 were compared to water quality model predictions during the operations period. Future annual concentrations measured at HAD-3 were compared to Permit limits.

The purpose of this technical memorandum is to complete a post-audit or validation of the water quality model results from the 2020 WMP Report (Golder 2020), and to evaluate whether the model predictions were:

a) underestimates

b) accurate

c) overestimates (conservative)

In general, a consistent underestimate would indicate a need to re-calibrate the model before further use. Accurate results indicate no need for further model calibration. Overestimates with regards to a given water quality constituent indicate that the model is adequate for risk assessment, but mine water management decisions based on these results should consider the conservative nature of the model. Previous validation of the water quality modelling predictions against the 2022 monitoring data determined that no model re-calibration was required in 2023 (WSP 2023b).

2.0 COMPARISON OF MODELLED AND MEASURED CONCENTRATIONS

Measured concentrations of the eighteen water quality constituents that have characteristic limits in Section 1.2.3 of the Permit are plotted in Figures 1 to 18. Each of these plots shows the following information on a logarithmic scale (base = 10):

- **Box and whisker plots:** the range of measured concentrations in 2023, the median concentration, and the 5th and 95th percentile concentrations.
- **Model predictions:** median and 95th percentile water quality model predictions at E1a and E19 during the operations period (2023 to 2030).
- **Permit limits**: the limits that apply to HAD-3.

The comparisons (Tables 1, 2, and 3) show that measured concentrations are below model predictions and Permit limits, with the exceptions noted below.

- At the TSF supernatant pond (E1a), measured concentrations were below the predicted concentrations for most of the parameters except for total arsenic (median and 95th percentile) and sulphate, nitrite and total phosphorus (95th percentile) (Table 1).
- At the PETBP upstream of the WTP (E19), measured concentrations were below the predicted concentrations for most of the parameters except for sulphate, total iron and total zinc (95th percentile) (Table 2).

For the instances where the measured values were higher than model results (sulphate, nitrite, total phosphorus, total arsenic, total iron and total zinc), the measured values were within about 20% of the model results (except for sulphate, total arsenic and total zinc), which is reasonably accurate for a water quality model post-audit and within the relative percent difference (RPD) that is commonly used for analytical duplicate acceptability. The model is likely predicting future concentrations as well as can be expected, given the inherent uncertainty involved in measuring water concentrations and predicting future water management conditions. Further calibration is therefore not warranted at this time.

The 95th percentile of sulphate in monitoring data at E1a from 2023 was more than 20% greater than the maximum predicted concentration during operations in the TSF due to higher measured concentrations from October to November 2023 (Table 1). The median of sulphate concentrations in monitoring data at E1a was lower than the maximum of predicted concentrations. Measured sulphate concentrations were also below effluent limits at HAD-3 (Table 3). Therefore, recalibration of the model is not warranted at this time.

The 95th percentile of total arsenic in monitoring data at E1a from 2023 was more than 20% greater than the maximum predicted concentration during operations due to higher measured concentrations from October to November 2023 (Table 1). The median of total arsenic concentrations in monitoring data at E1a was within 20% of the maximum of the median predicted concentrations. Measured total arsenic concentrations were also below effluent limits at HAD-3 (Table 3). Therefore, recalibration of the model is not warranted at this time.

The 95th percentile of total zinc in monitoring data at E19 from 2023 was more than 20% greater than the maximum predicted concentration during operations in the PETBP (Table 2). The higher 95th percentile of measured total zinc concentrations was due to a single sample taken on June 13 with an elevated total zinc concentration of 0.033 mg/L. All other measured total zinc concentrations in 2023 were less than 0.022 mg/L. The median of total zinc concentrations in monitoring data at E19 was within 20% of the maximum of the median predicted concentrations. Measured total zinc concentrations were also below effluent limits at HAD-3 (Table 3). Therefore, recalibration of the model is not warranted at this time.

Table 1: Predicted and Measured Concentrations in the Tailings Storage Facility Supernatant Pond

Parameter	Units	Operations		E1a	
		Maximum of Median Predicted Concentrations	Maximum of 95th Percentile Predicted Concentrations	Median	95th Percentile
Major Ions					
Fluoride	mg/L	1.3	1.4	0.68	0.92
Sulphate	mg/L	669	691	512	**858**
Nutrients					
Ammonia	mg/L (as N)	0.65	0.65	0.26	0.45
Nitrate	mg/L (as N)	13	20	3.3	4.4
Nitrite	mg/L (as N)	0.21	0.23	0.14	**0.25**
Total Phosphorus	mg/L	0.031	0.034	0.014	**0.038**
Total Metals					
Arsenic	mg/L	0.0024	0.0025	**0.0026**	**0.0037**
Chromium	mg/L	0.00076	0.00082	<0.0005	0.0006
Copper	mg/L	0.022	0.2	0.0043	0.014
Iron	mg/L	0.52	0.56	0.14	0.52
Manganese	mg/L	0.16	0.6	0.019	0.095
Molybdenum	mg/L	0.28	0.32	0.21	0.24
Selenium	mg/L	0.042	0.081	0.028	0.032
Silver	mg/L	0.000012	0.000023	<0.00001	<0.00001
Zinc	mg/L	0.0083	0.012	0.0015	0.003

Table 1: Predicted and Measured Concentrations in the Tailings Storage Facility Supernatant Pond

Parameter	Units	Operations		E1a	
		Maximum of Median Predicted Concentrations	Maximum of 95th Percentile Predicted Concentrations	Median	95th Percentile
Dissolved Metals					
Aluminum	mg/L	0.055	0.08	0.022	0.046
Cadmium	mg/L	0.00013	0.00022	0.00002	0.000038
Iron	mg/L	0.035	0.069	<0.03	<0.03

Note: Bold font indicates monitored concentration is higher than predicted concentrations; mg/L = milligrams per litre; N = nitrogen.

Table 2: Predicted and Measured Concentrations in the Perimeter Embankment Till Borrow Pond Upstream of the Water Treatment Plant

Parameter	Units	Operations		E19	
		Maximum of Median Predicted Concentrations	Maximum of 95th Percentile Predicted Concentrations	Median	95th Percentile
Major Ions					
Fluoride	mg/L	0.88	1.0	0.49	0.61
Sulphate	mg/L	765	873	527	**923**
Nutrients					
Ammonia	mg/L (as N)	0.2	0.38	0.025	0.18
Nitrate	mg/L (as N)	18	29	3.6	5.4
Nitrite	mg/L (as N)	0.08	0.19	0.018	0.079
Total Phosphorus	mg/L	0.033	0.039	0.0099	0.032
Total Metals					
Arsenic	mg/L	0.0019	0.0021	0.0011	0.0018
Chromium	mg/L	0.00085	0.00093	<0.0005	0.0007
Copper	mg/L	0.025	0.21	0.0084	0.023
Iron	mg/L	0.53	0.6	0.081	**0.62**
Manganese	mg/L	0.18	0.86	0.09	0.22
Molybdenum	mg/L	0.2	0.24	0.18	0.22
Selenium	mg/L	0.057	0.11	0.041	0.047
Silver	mg/L	0.000018	0.000029	<0.00001	0.00001
Zinc	mg/L	0.01	0.015	0.0036	**0.02**
Dissolved Metals					
Aluminum	mg/L	0.084	0.12	0.012	0.052
Cadmium	mg/L	0.00018	0.00031	0.00004	0.00021
Iron	mg/L	0.046	0.11	<0.03	0.039

Note: Bold font indicates monitored concentration is higher than predicted concentrations; mg/L = milligrams per litre; N = nitrogen.

Table 3: Permit Limits and Measured Concentrations at the Outlet of the Water Treatment Plant (End-of-Pipe)

Parameter	Units	Limit	HAD-3	
			Median	95th Percentile
Major Ions				
Fluoride	mg/L	17	0.47	0.57
Sulphate	mg/L	1,100	519	865
Nutrients				
Ammonia	mg/L (as N)	1.2	0.026	0.19
Nitrate	mg/L (as N)	34	3.6	5.3
Nitrite	mg/L (as N)	0.78	0.018	0.077
Total Phosphorus	mg/L	0.09	0.0087	0.018
Total Metals				
Arsenic	mg/L	0.028	0.0011	0.0017
Chromium	mg/L	0.004	<0.0005	<0.0005
Copper	mg/L	0.033	0.0082	0.018
Iron	mg/L	1.0	0.066	0.18
Manganese	mg/L	3.4	0.083	0.14
Molybdenum	mg/L	0.36	0.18	0.22
Selenium	mg/L	0.075	0.041	0.046
Silver	mg/L	0.00024	<0.00001	0.00001
Zinc	mg/L	0.059	0.0032	0.011
Dissolved Metals				
Aluminum	mg/L	0.75	0.14	0.22
Cadmium	mg/L	0.00034	0.00004	0.000073
Iron	mg/L	0.35	<0.03	<0.03

Note: mg/L = milligrams per litre; N = nitrogen.

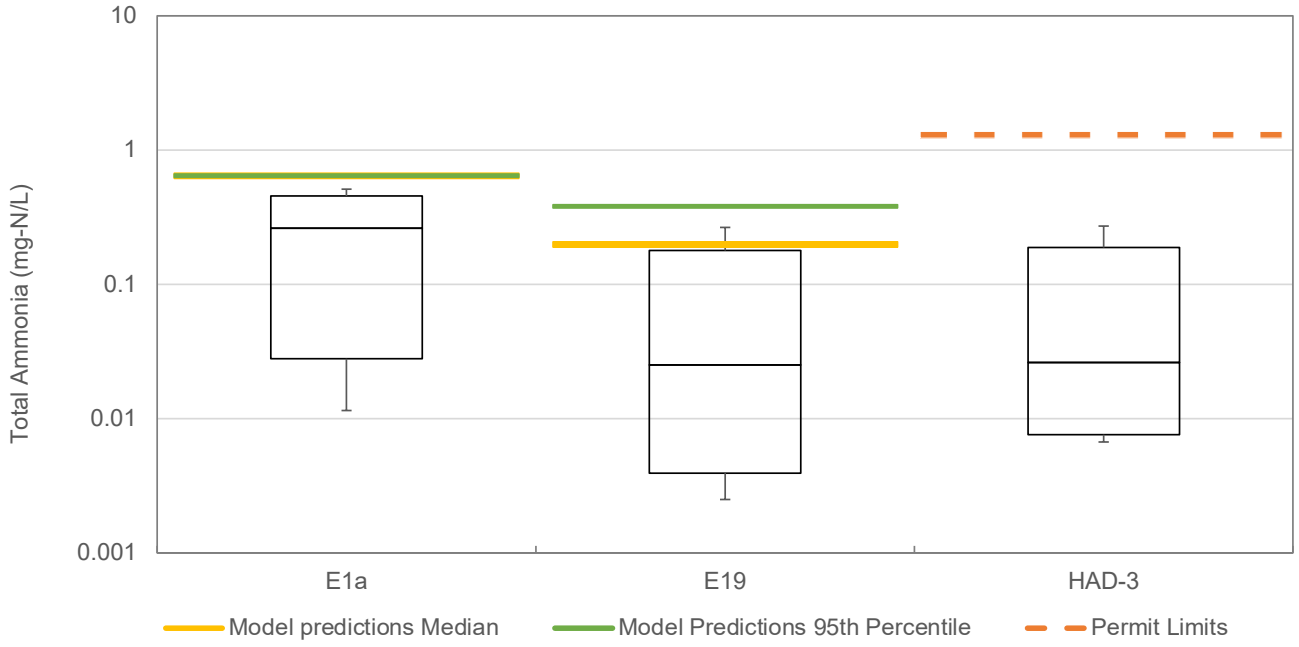


Figure 1: Observed (box plots) and Predicted (lines) Concentrations of Total Ammonia

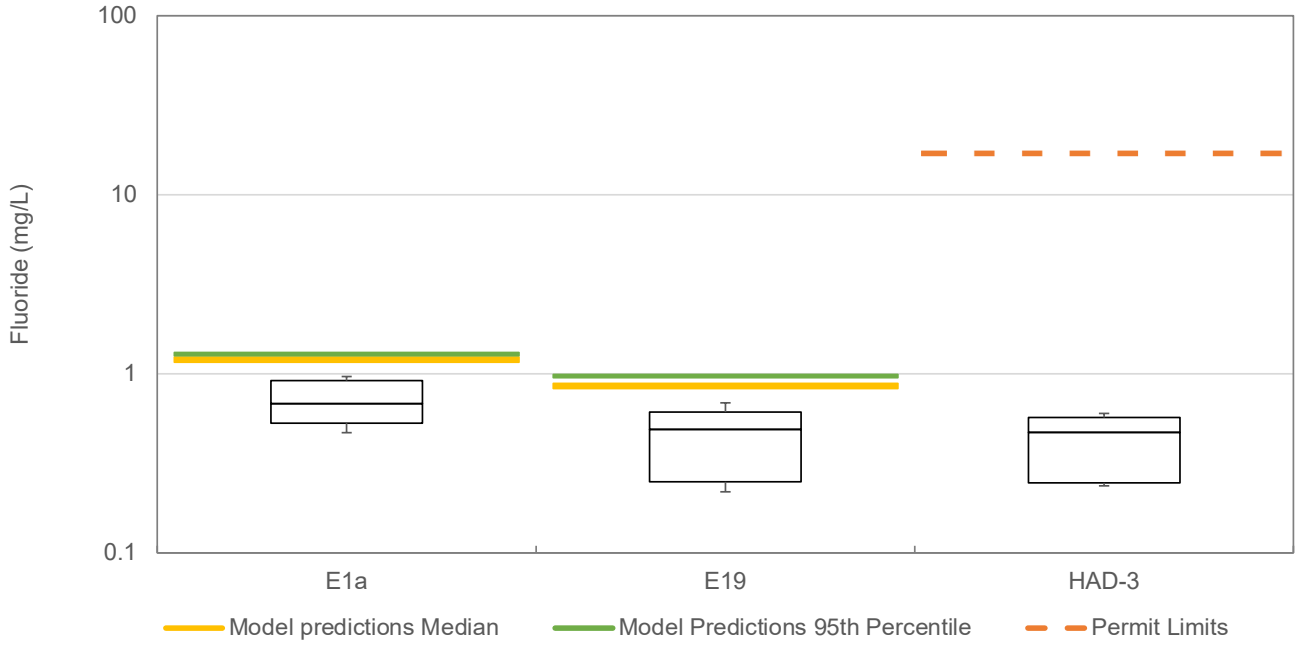


Figure 2: Observed (box plots) and Predicted (lines) Concentrations of Fluoride

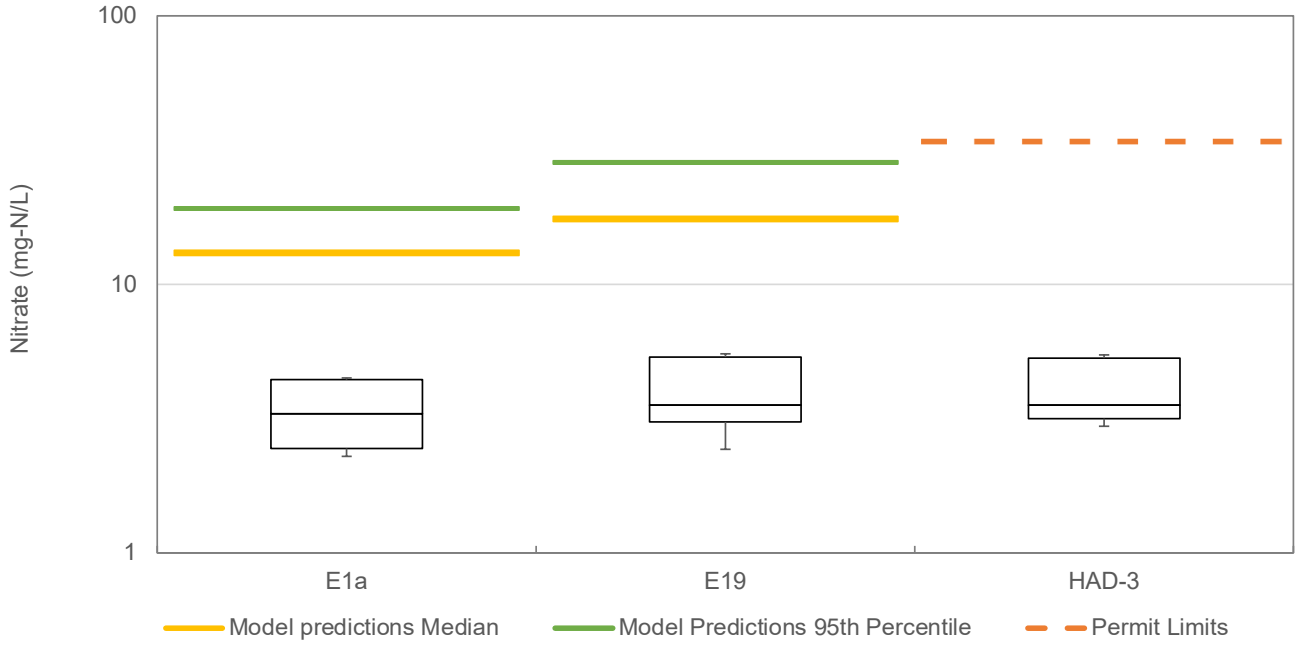


Figure 3: Observed (box plots) and Predicted (lines) Concentrations of Nitrate

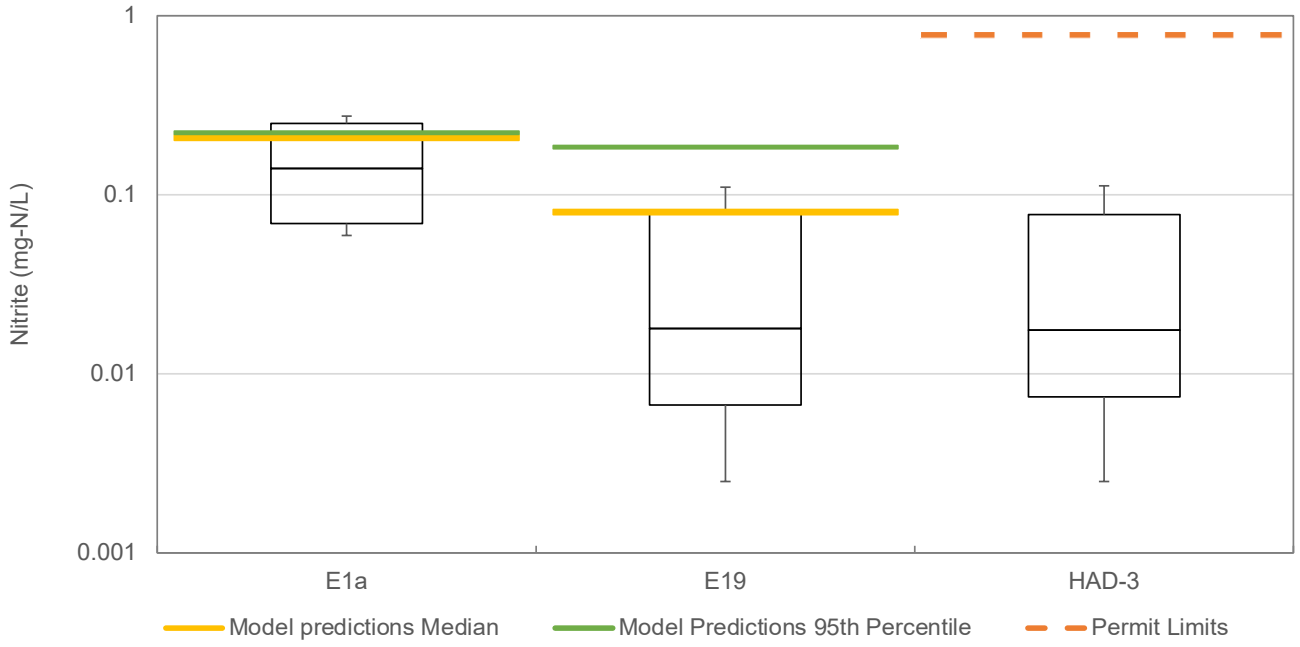


Figure 4: Observed (box plots) and Predicted (lines) Concentrations of Nitrite

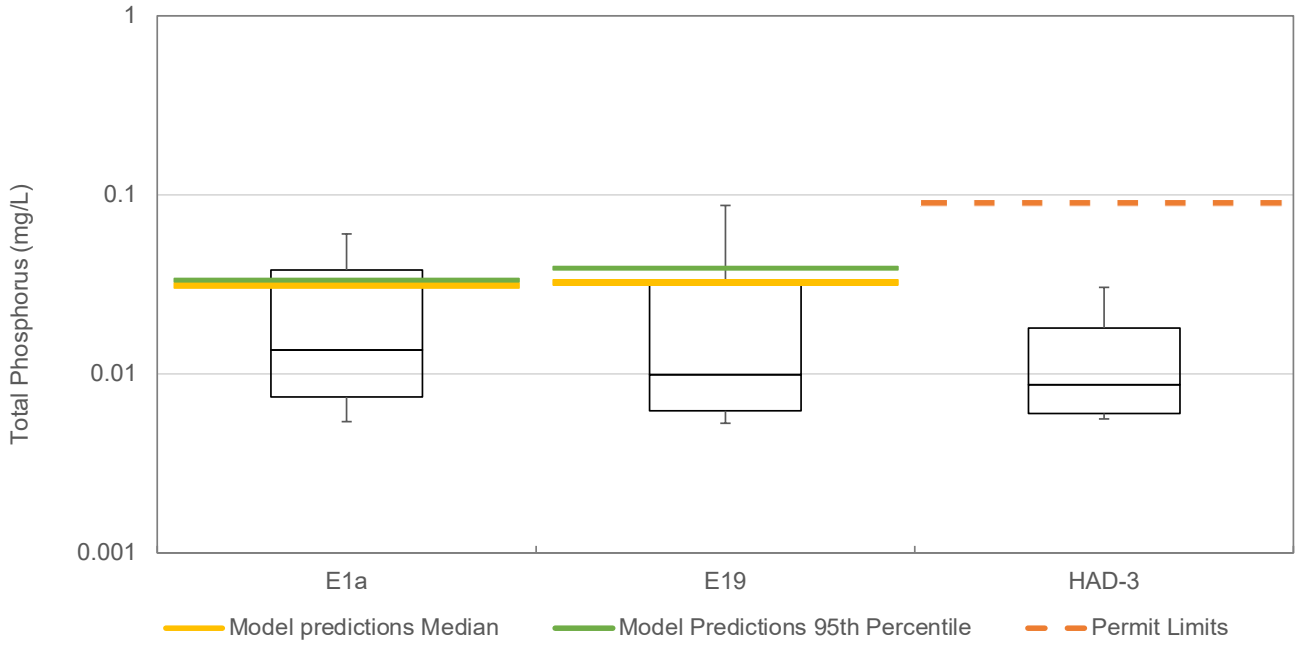


Figure 5: Observed (box plots) and Predicted (lines) Concentrations of Total Phosphorus

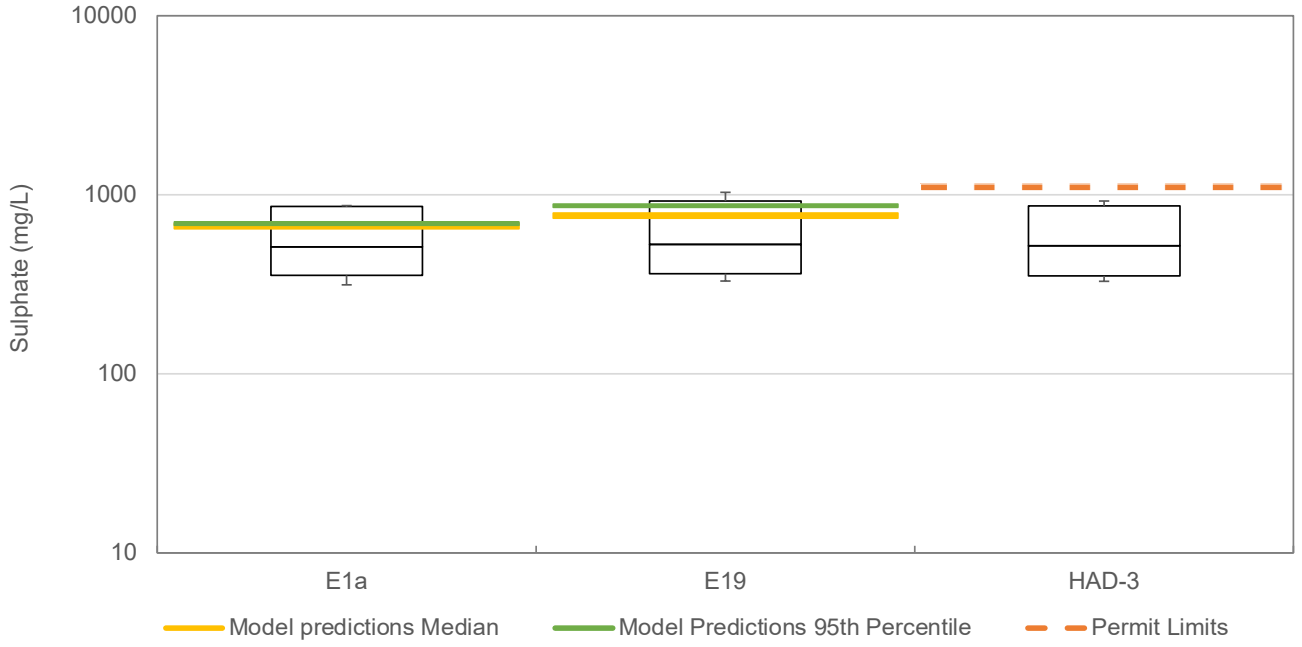


Figure 6: Observed (box plots) and Predicted (lines) Concentrations of Sulphate

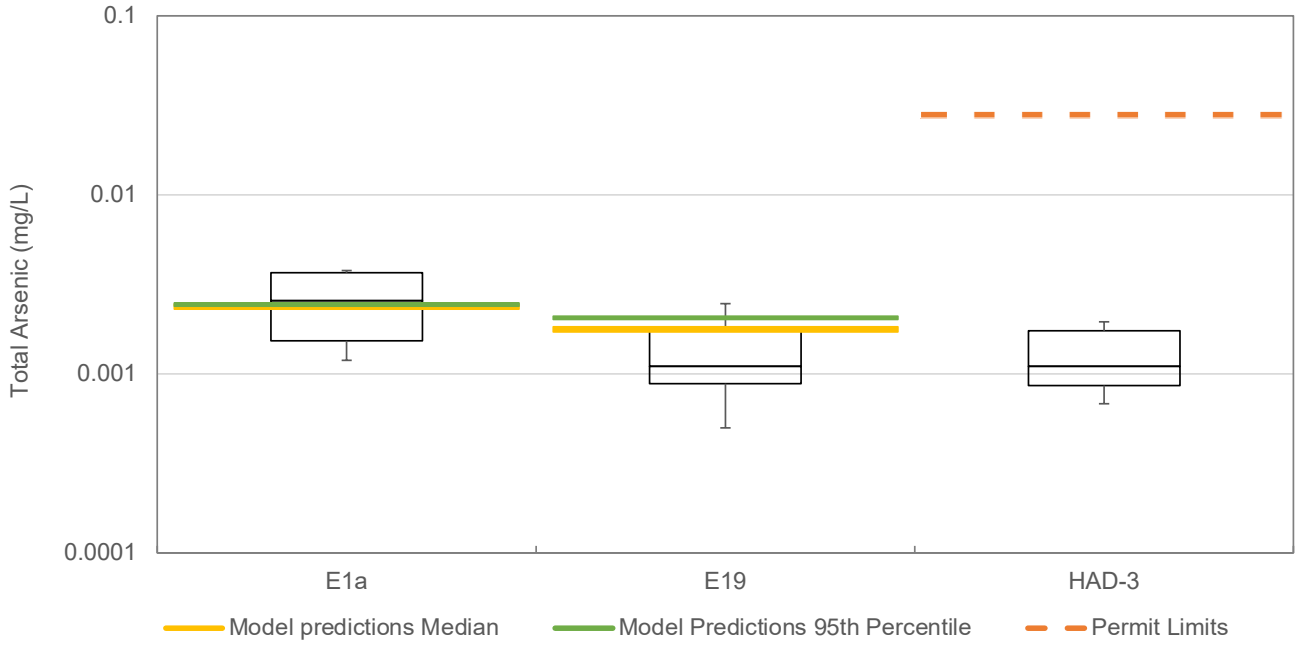
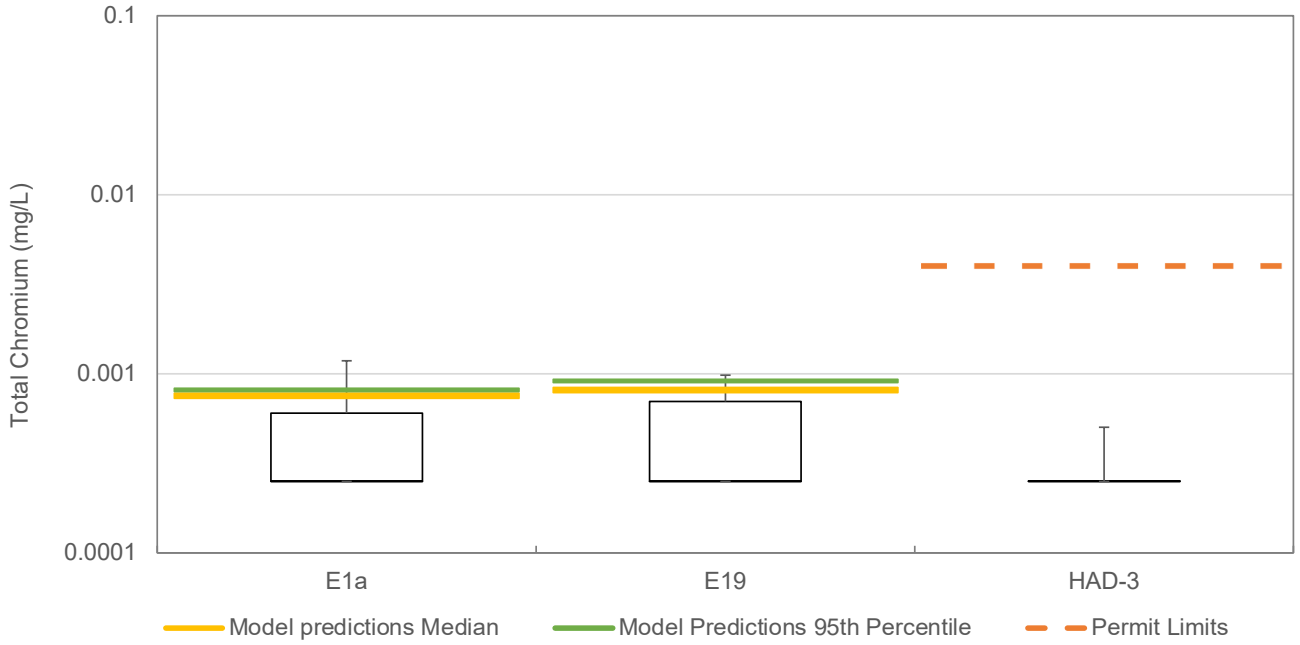


Figure 7: Observed (box plots) and Predicted (lines) Concentrations of Total Arsenic



Note: Most of the concentrations of total chromium were below detection limits.

Figure 8: Observed (box plots) and Predicted (lines) Concentrations of Total Chromium

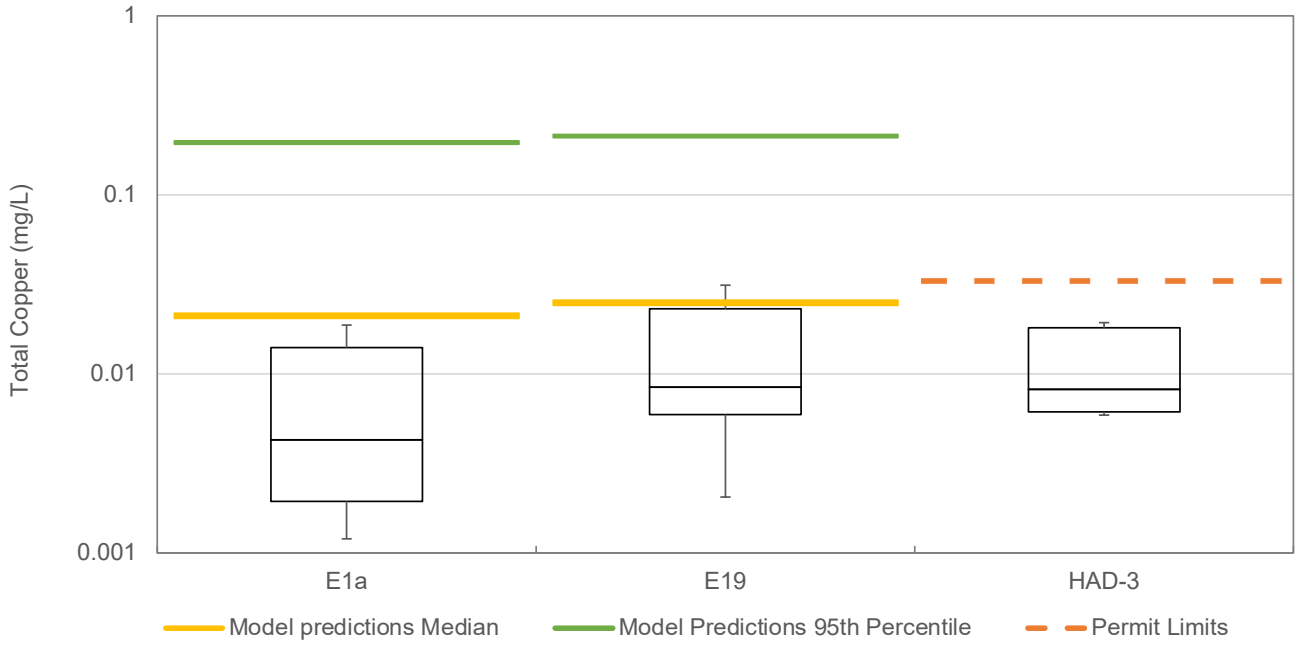
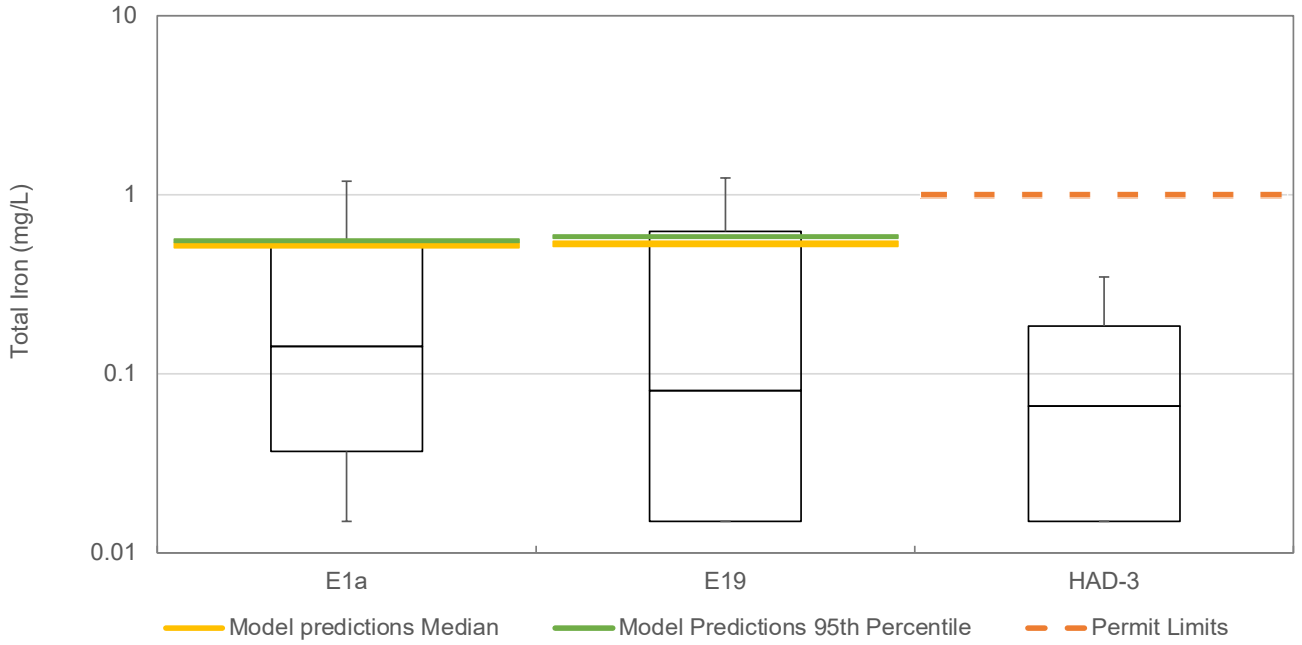


Figure 9: Observed (box plots) and Predicted (lines) Concentrations of Total Copper



Note: The minimum and 5th percentile concentrations of total iron at E19 and HAD-3 were below detection limits.

Figure 10: Observed (box plots) and Predicted (lines) Concentrations of Total Iron

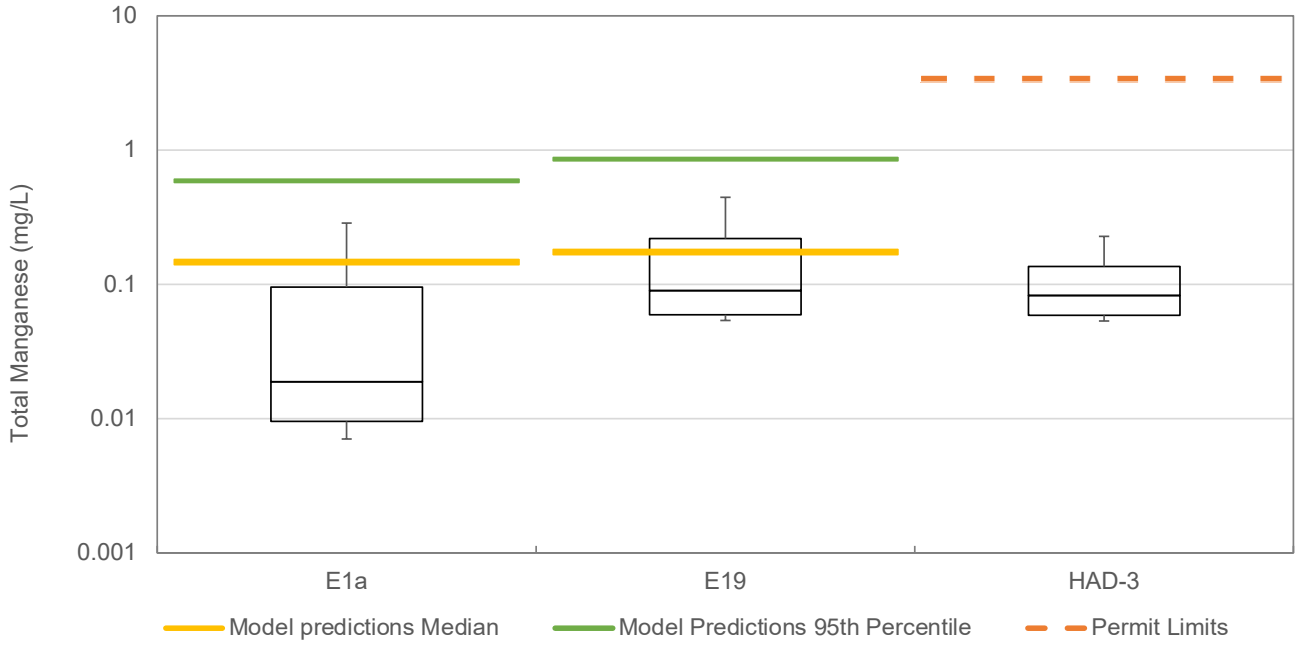


Figure 11: Observed (box plots) and Predicted (lines) Concentrations of Total Manganese

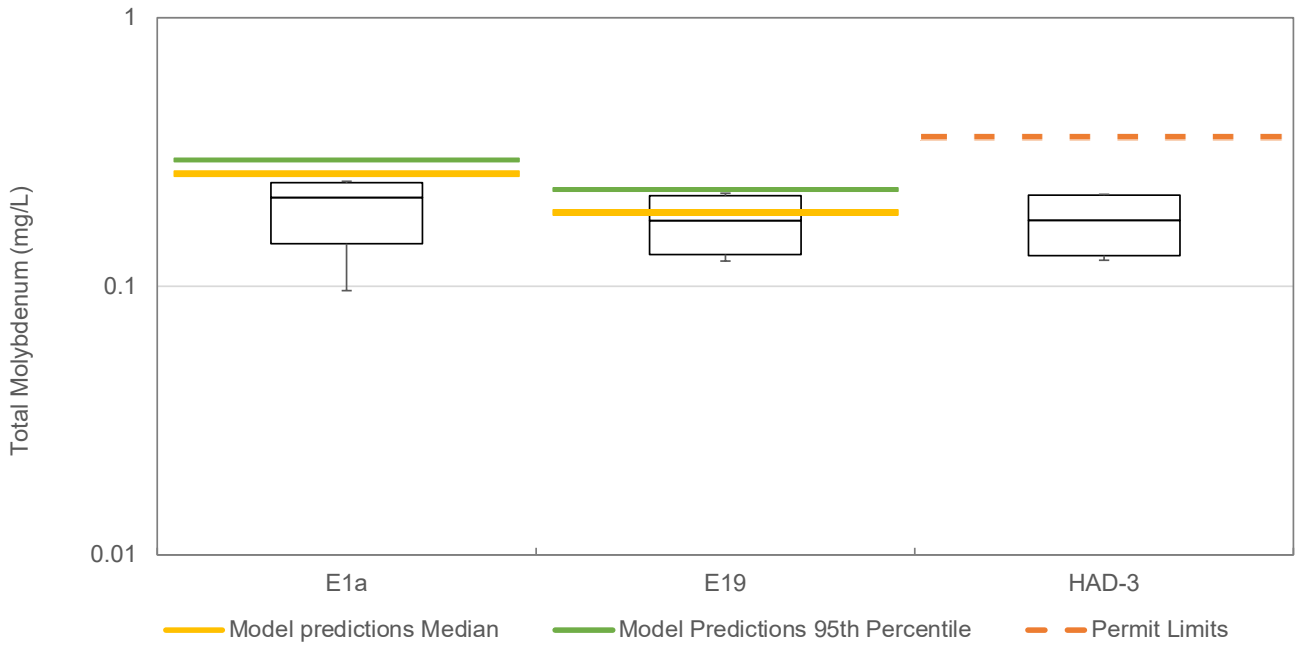


Figure 12: Observed (box plots) and Predicted (lines) Concentrations of Total Molybdenum

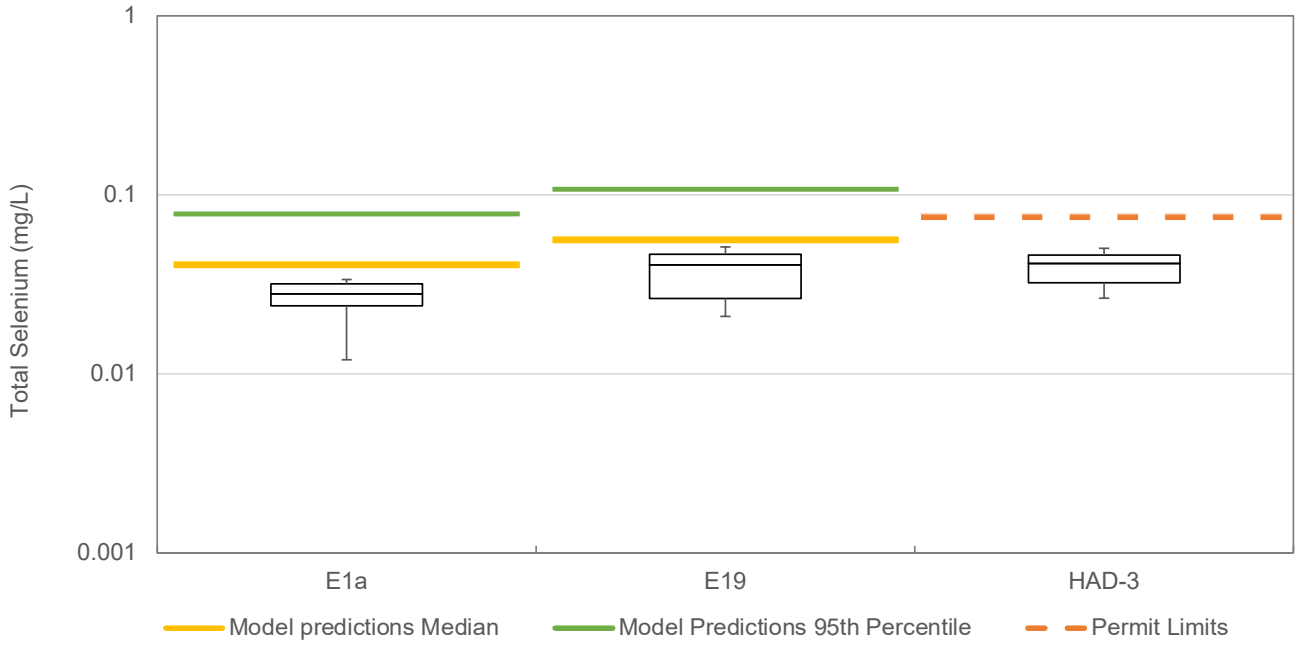
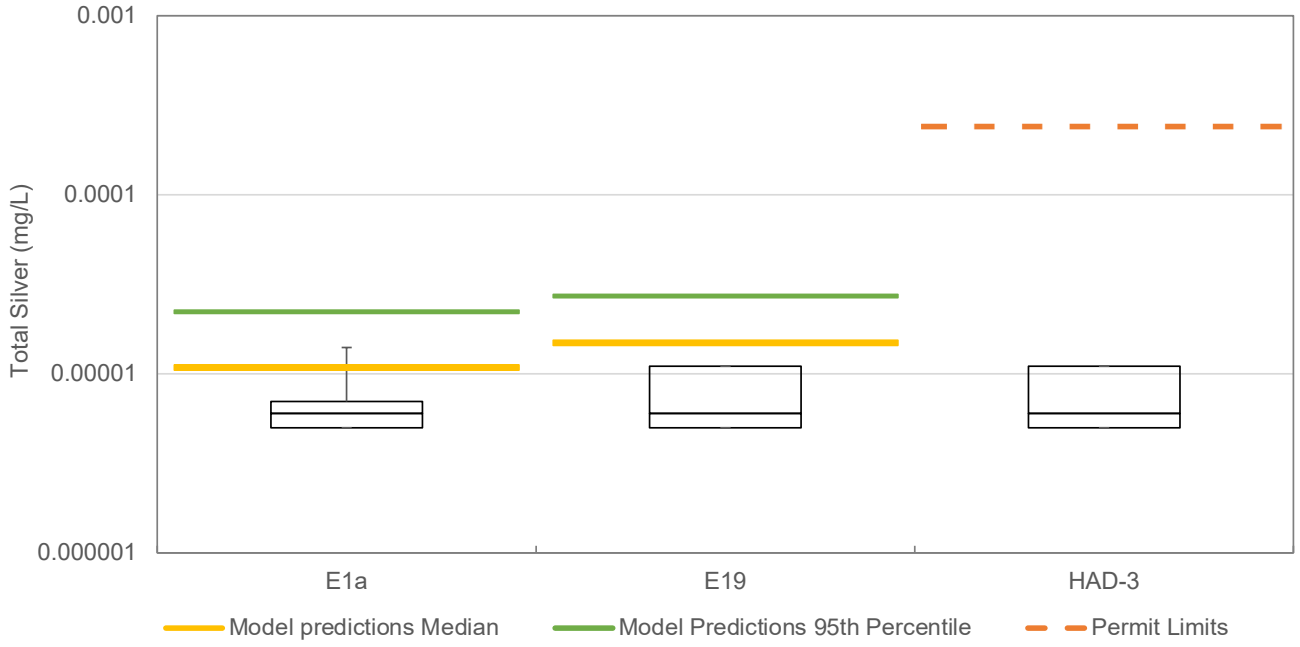
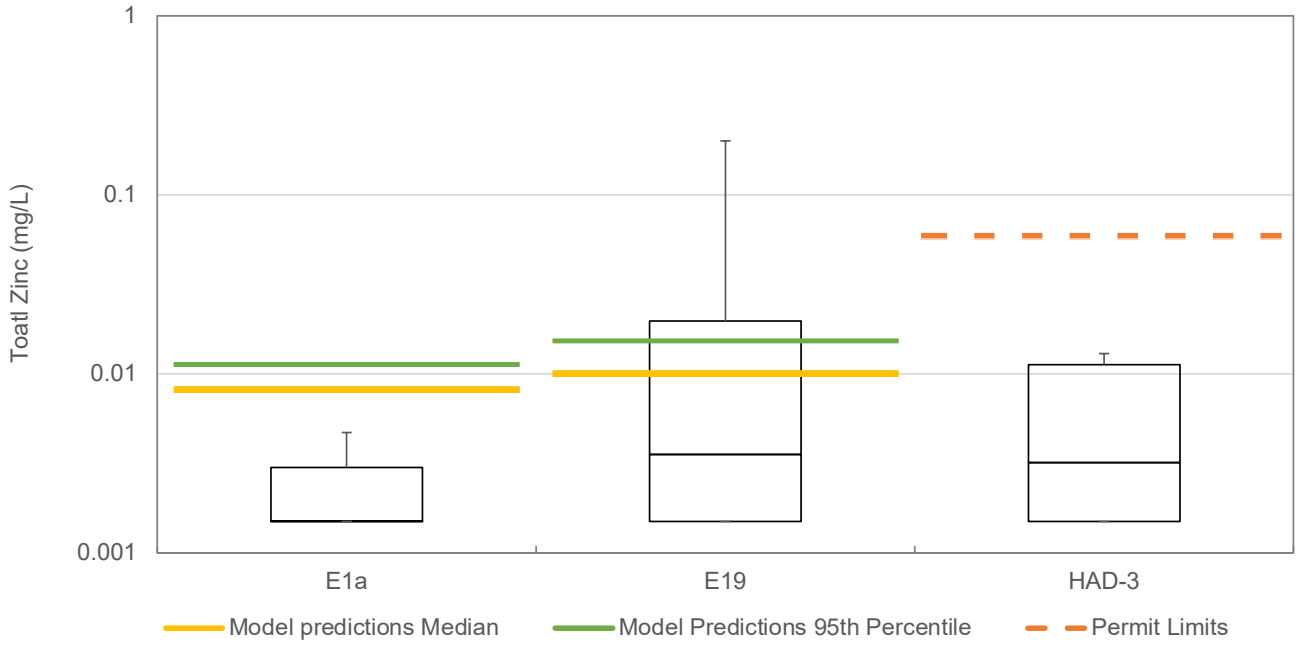


Figure 13: Observed (box plots) and Predicted (lines) Concentrations of Total Selenium



Note: The minimum and 5th percentile concentrations at E1a, E19 and HAD-3 were below detection limits.

Figure 14: Observed (box plots) and Predicted (lines) Concentrations of Total Silver



Note: The minimum and 5th percentile concentrations of total zinc at E1a, E19 and HAD-3 were below detection limits.

Figure 15: Observed (box plots) and Predicted (lines) Concentrations of Total Zinc

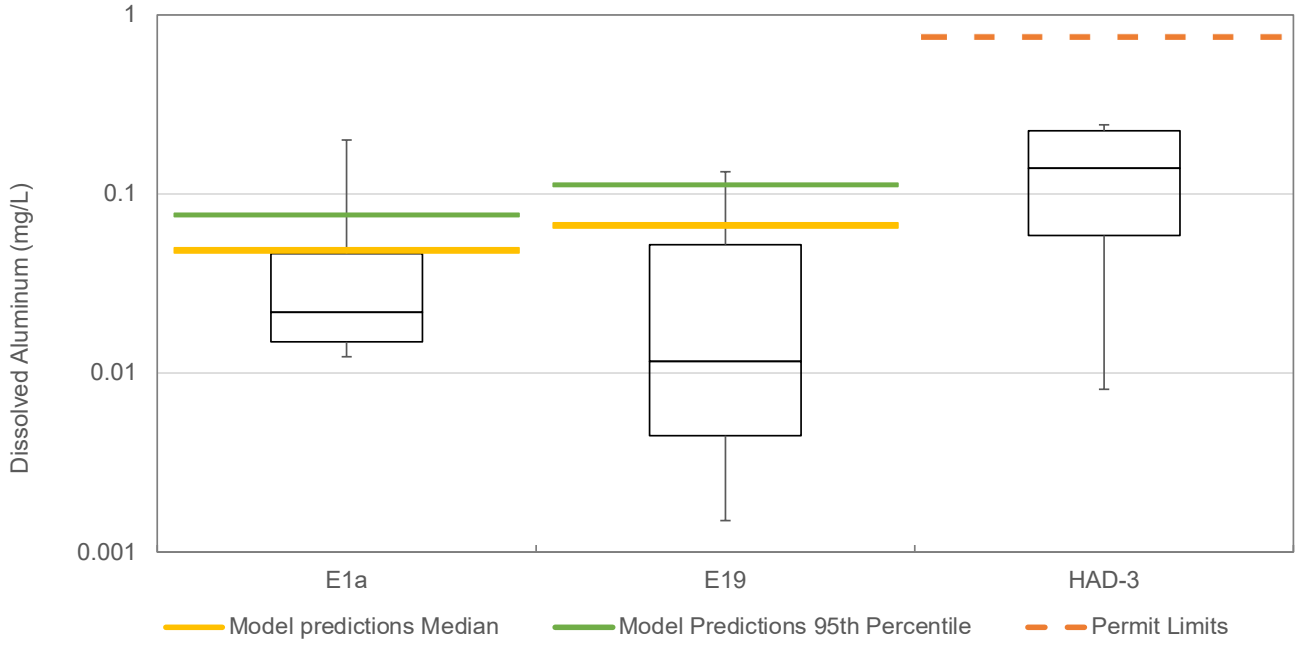


Figure 16: Observed (box plots) and Predicted (lines) Concentrations of Dissolved Aluminum

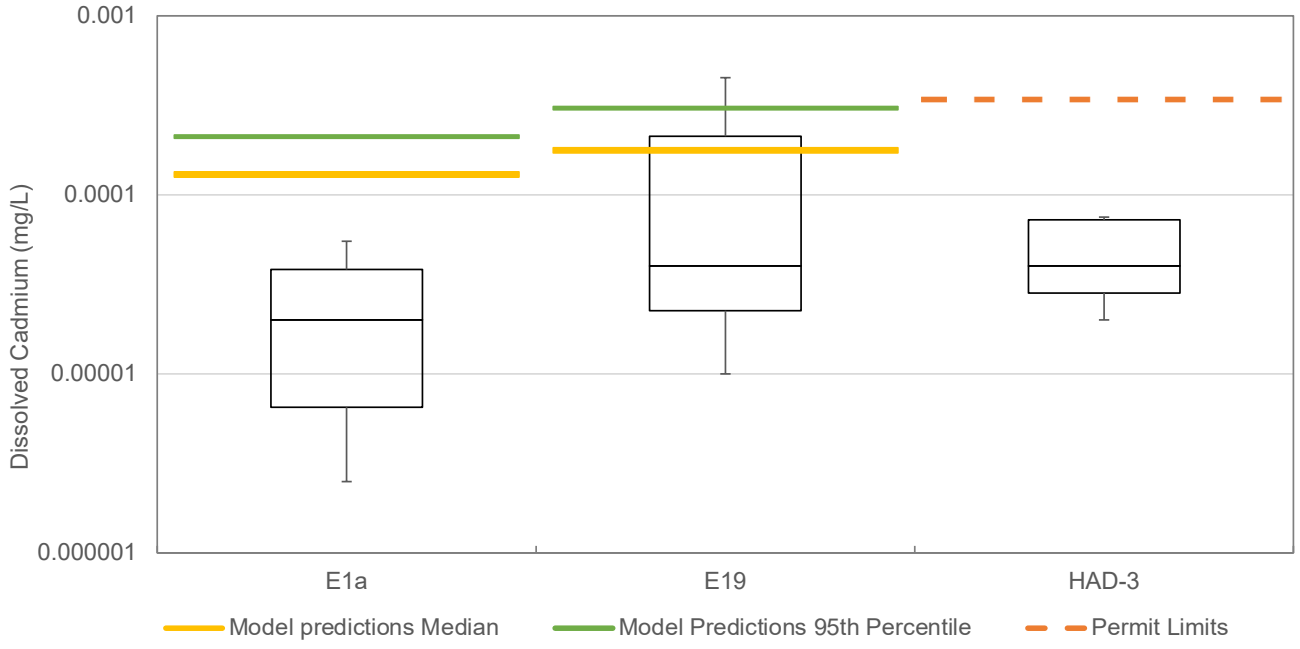
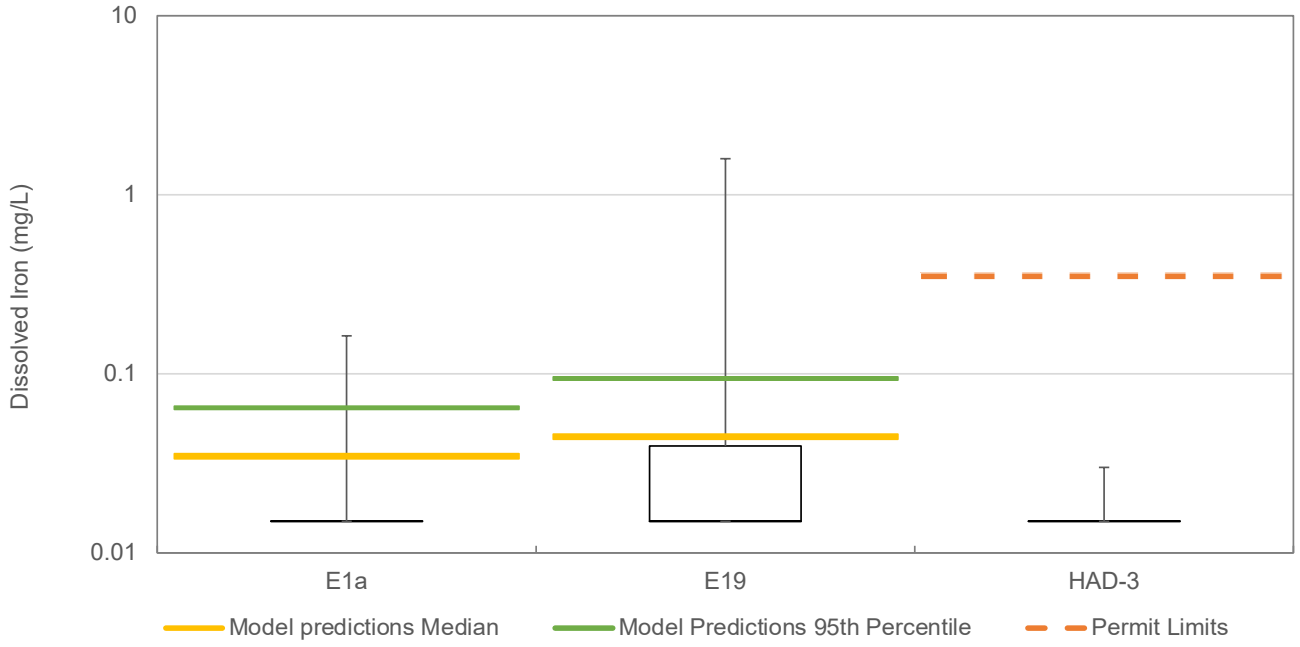


Figure 17: Observed (box plots) and Predicted (lines) Concentrations of Dissolved Cadmium



Note: Most of the concentrations of dissolved iron were below detection limits.

Figure 18: Observed (box plots) and Predicted (lines) Concentrations of Dissolved Iron

3.0 CLOSURE

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this technical memorandum.

We trust the above meets your present requirements. If you have any questions or require additional information, please contact the undersigned.

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https://golderassociates.sharepoint.com/sites/10023g/ca00205274505 deliverables/002_issued/030-tm-31241-wq comparison model/rev0/ca0020527.4505-030-tm-rev0-31241-wq comparison model 25mar_24.docx

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WSP. 2024. Mount Polley Mine – 2023 Site Wide Water Balance Model Update and Calibration. Prepared for Mount Polley Mining Corporation. No. CA0020527.4505-xxx-TM-RevA-31141. March 2024.

STUDY LIMITATIONS

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TECHNICAL MEMORANDUM

DATE March 21, 2024 **Reference No.** CA0020527.4505-026-TM-Rev0-31141

TO Matt O'Leary
Mount Polley Mining Corporation

FROM Stella Cheng, Gonzalo Donoso, and Peter Morgan **EMAIL stella.cheng@wsp.com; gonzalo.donoso@wsp.com; peter.morgan@wsp.com**

2023 SITE WIDE WATER BALANCE MODEL UPDATE AND CALIBRATION – MOUNT POLLEY MINE

1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) retained WSP Canada Inc. (WSP) to provide water balance modelling services to update and calibrate the Site Wide Water Balance Model (SWWBM) in support of MPMC's 2023 Annual Report. This exercise is a requirement of Section 4.2.1 (f) of MPMC's Discharge Permit 11678, issued under the *Environmental Management Act* and most recently amended through a Consent Order on December 31, 2020 (BC ENV 2020).

The SWWBM was developed using GoldSim™, a highly graphical software package for carrying out dynamic, probabilistic simulations to support decision-making (GoldSim 2018). GoldSim™ is frequently used to evaluate water management alternatives, perform sensitivity analyses, and conduct mass balance simulations.

The SWWBM was developed as part of the Mount Polley Mine Resumed Operations and Closure Water Management Plan Permit Amendment Application and Technical Assessment Report (Golder 2016a) to model water management across the site (e.g., runoff, water transfers, and storage). The details of the SWWBM were first presented in the Mount Polley Mine Water Balance report (Golder 2016b).

On May 26, 2019, Mount Polley Mine (the Mine) entered a care and maintenance phase. On June 1, 2022, the Mine resumed operations under the current EMA Permit 11678. Mining and tailings deposition occurred throughout 2023.

WSP updated the SWWBM in March 2023 to calibrate water volumes, water levels and discharges in the Tailings Storage Facility (TSF) for the period from January 1, 2022 to December 31, 2022 (WSP 2023a). An updated Water Balance Report was presented in 2023 (WSP 2023b) as part of the Water Management Plan for the Springer Expansion Life-of-Mine update (WSP 2023c).

This technical memorandum describes updates to the SWWBM to reflect site conditions in 2023, and calibration to measured water levels in the TSF for the period from January 1, 2023 to December 31, 2023. A summary of the model updates, the assumptions made in the calibration process, a discussion of the calibration results, and the end-of-year water balance for the Mine, is included in this document.

2.0 MODEL UPDATE

2.1 Data Received

MPMC provided WSP with measured data from site (MPMC 2024a). The following data were received from MPMC (2024a):

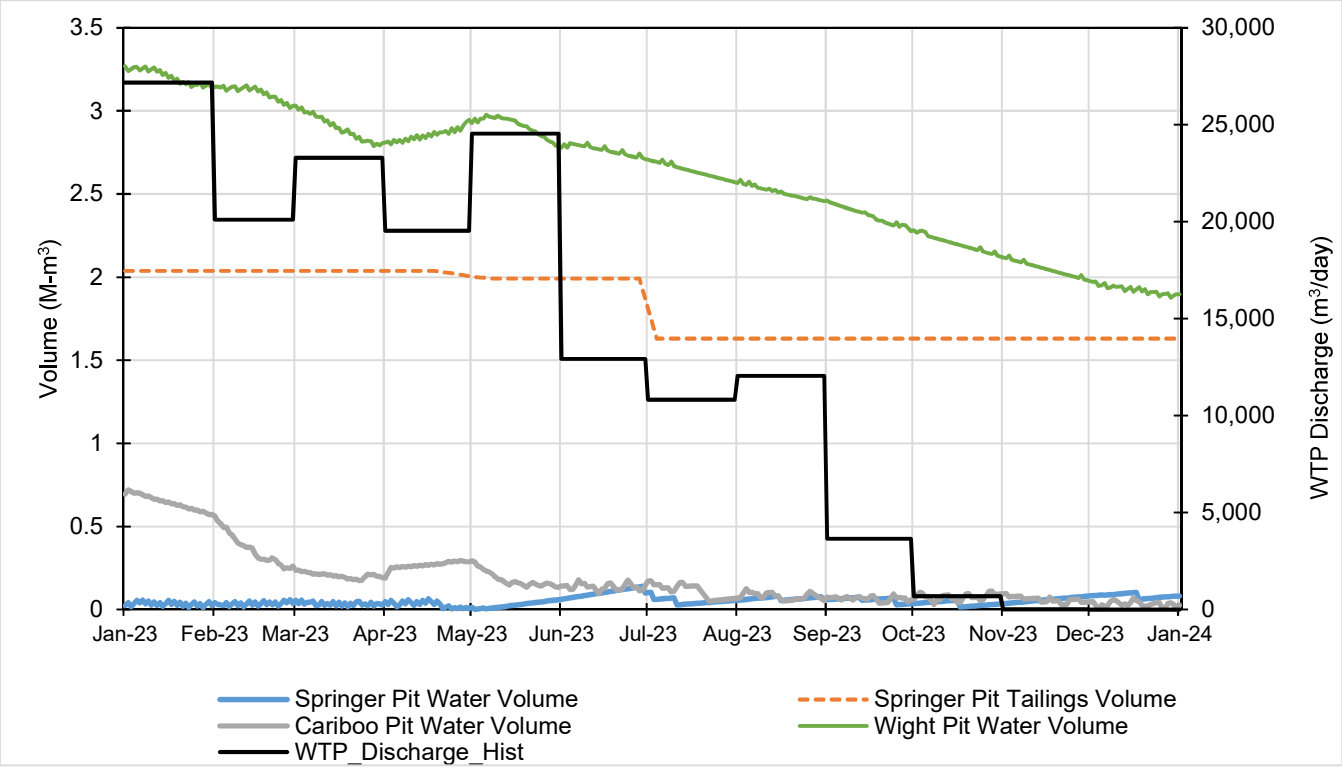
- "Snow Pack 2023.xlsx" Periodic snowpack measurements (snow water equivalent [SWE] in cm).
- "TSF Water Balance Jan 24, 2023 v3.xlsx" Periodic Springer Pit, Cariboo Pit and Wight Pit water level measurements in 2023 (m, mine grid).
- "2023 all weather station data.xlsx" Q1 to Q4 2023 climate data from site – including rainfall (mm), daily temperature (ºC) and evaporation (mm).
- "HMI WTP 2023 Total.xlsx" Monthly discharge of treated water (m^3) through the water treatment plant (WTP).
- "Weekly TSF Reports.pdf" TSF reclaim pond water level measurements (m, tailings grid) and Springer Pit remaining tailings (M-m^3) throughout 2023
- "2023 DSI Report Data Request.msg" Tailings deposited in the TSF throughout 2023 (tonnes).

2.2 Summary of Model Updates

Through discussions with MPMC, the SWWBM was updated to reflect site water management operations for the period of January 1, 2023 to December 31, 2023. The model updates were as follows:

- Tailings discharge from the ore processing plant to the TSF throughout 2023.
- Discharge to the environment through the WTP was updated. The volume of WTP discharge saw a significant decline beginning in September 2023. This decrease occurred because the WTP has been offline since September 13, 2023, as water has been redirected from Wight Pit to TSF (MPMC 2024a). Monthly discharge volumes through the WTP are shown on Figure 1.
- Water from Wight Pit was transferred to the WTP via Long Ditch for treatment and discharge in 2023. A time series plot of the modelled total water volume in Wight Pit is shown in Figure 1.
- Water from Springer Pit was transferred to the WTP via West Ditch for treatment and discharge throughout 2023. A time series plot of the modeled total water volume in Springer Pit is shown in Figure 1.
- Water from Cariboo Pit was transferred to the WTP via West Ditch for treatment and discharge throughout 2023. A time series plot of the modeled total water volume in Cariboo Pit is shown in Figure 1.

Additional details related to use of available surveys are provided in the following section.



Note: The primary y-axis unit (M-m3) denotes millions of cubic meters.

Stored water volume = surface water volume + voids water volume

Figure 1: Springer, Cariboo, Wight Pits Volumes and WTP Discharge Flow Rate

2.3 Site Surveys

2.3.1 TSF

Topographic surveys of the TSF were conducted by MPMC on October 30, 2023. A bathymetric survey within the TSF was conducted on August 25, 2023. The storage-elevation curve was developed using the combined bathymetry and topography, and it is used in the SWWBM to infer the TSF free water volume from measured water level data, recognizing that the surfaces described are a triangulation of a bathymetry survey (tailings surface under water) and a topographic survey (tailings surface above water). The triangulation of survey points near the transition between water and land, as well as the use of different dates for the Topographic and Bathymetric Surveys, introduce uncertainty into the resulting storage-elevation curves. However, the accuracy is considered acceptable for the required resolution of the model results.

Storage-elevation curves for the TSF up to a dam crest elevation of 974 m developed from the August 25, 2023 TSF survey were used in support of the free water volumes projection affected by tailings deposition after the survey date of October 30, 2023. Storage-elevation curves were used to model the facilities with linear interpolation throughout 2023.

2.3.2 Springer-Cariboo

A bathymetric and topographic survey of Springer-Cariboo Pit was conducted by MPMC on January 25, 2024, indicating that the Springer and Cariboo pits were divided up to the saddle level (approximate elevation of 964 m), and then combined from that level upward. Based on the recorded pit elevation data from MPMC (MPMC 2024a) and the fact that the Springer Pit was completely dewatered as of April 18, 2023 (MPMC 2024b), the Springer Pit and Cariboo Pit should be considered as separate reservoirs for modeling purposes in 2023. Storage-elevation curves for Springer Pit and Cariboo Pit were generated individually to infer the free water volumes within the pits from measured water level data in the SWWBM.

Springer Pit storage-elevation curves based on the bathymetric and topographic survey on November 7, 2019 were utilized in the model until April 18, 2023. These were then projected to the Springer Pit storage-elevation curve based on the January 25, 2024 survey. Projected storage-elevation curves were used to model the facilities with linear interpolation. Tailings were excavated during the calibration period, it is assumed that the excavation is reflected in the survey data. Figure 1 shows a time series plot of Springer Pit tailings volume.

Cariboo Pit storage-elevation curves (dated January 30, 2023, refer to MPMC 2023) were utilized until the end of 2022. These were then projected to the Cariboo Pit storage-elevation curve based on the January 25, 2024 survey. Projected storage-elevation curves were used to model the facilities with a daily linear interpolation between dates, throughout 2023.

2.3.3 Wight Pit

Wight Pit storage-elevation curves (dated March 1, 2022; MPMC 2022) were provided by MPMC. The curves include underground workings and pore space assumptions. Measured water level data from MPMC were used to infer the water volumes in the pit based on the storage-elevation curves provided.

3.0 MODEL CALIBRATION

3.1 Overview

The SWWBM was calibrated by adjusting outflows of the reservoirs and comparing modelled water levels to measured water levels recorded at the TSF. The TSF temporarily retains high runoff inflows experienced during freshet and storm events. The resulting modelled water levels in the TSF are the balance of site-wide inflows and outflows, including pumping to and from the pits and the booster station, which are temporary storage locations for surplus water on site.

An input climate dataset was generated (Section 3.2) and seasonal runoff coefficients were used during freshet (Section 3.3) to better represent measured site runoff conditions (i.e., reduction in measured snowpack depth) in 2023 and to facilitate the calibration.

3.2 Climate Data

A climate dataset at the Mine for 2023 was generated and used to represent site climatic conditions for the calibration.

The dataset consisted of the following:

- January through December rainfall data from MPMC.

- Freshet (March through April) snowmelt as determined from decreases in snowpack SWE depth recorded at the Mine.

3.3 Runoff Coefficients

Runoff coefficients in the SWWMB are adjustable loss parameters that translate measured climate trends and ground conditions into estimates of modelled runoff. Model performance from historical climate data for the year 2023 supported the delineation of runoff coefficients into two distinct seasonal climate periods:

- Freshet (March to June; inclusive) – Highest runoff coefficients to represent expected higher soil moisture content, and therefore greater runoff.
- General (January to February; inclusive and July to December; inclusive) – Mid range coefficients to represent soil moisture contents for intermittent runoff events. A 30% increase to the general coefficients is applied to the subsequent month if the previous month had a cumulative rainfall plus snowmelt depth greater than 50 mm.

The seasonal runoff coefficients defined for the catchment types remained unchanged from those used in the 2022 SWWBM calibration and are listed in Table 1.

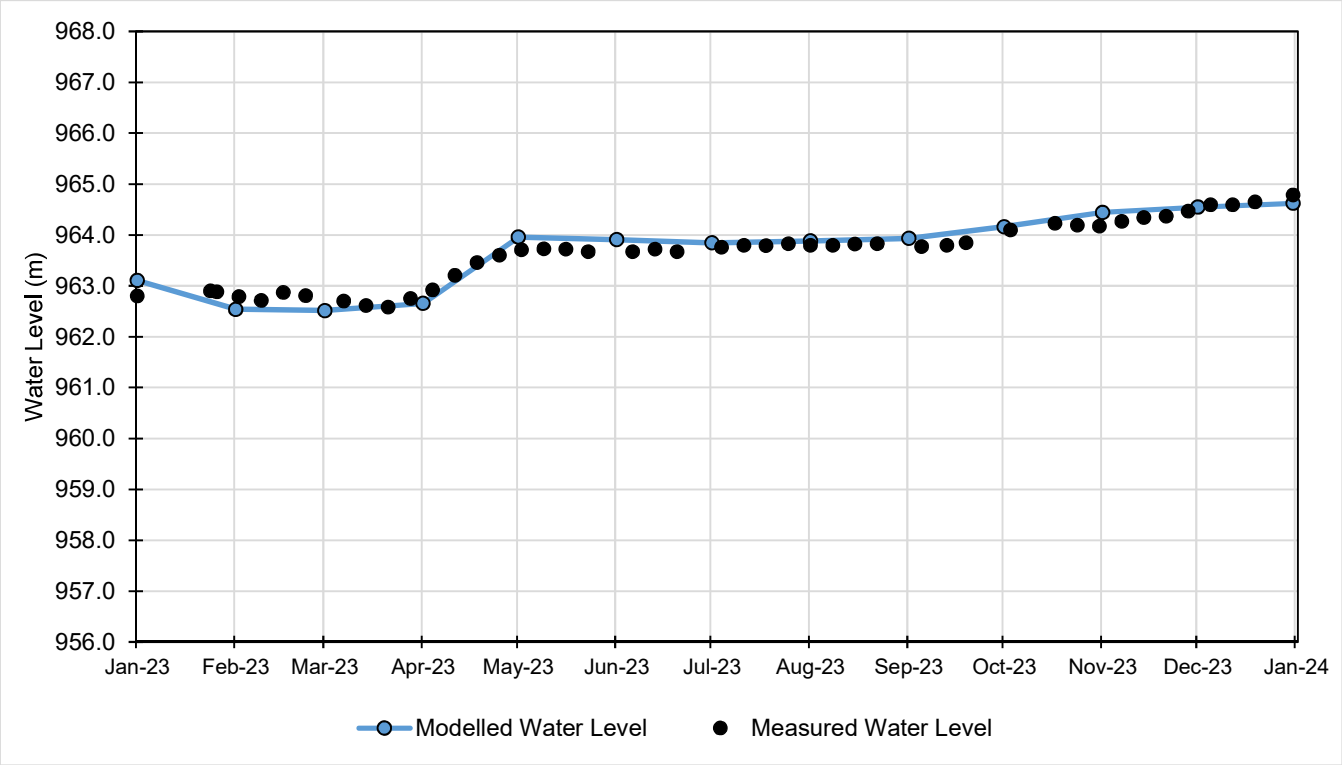
Table 1: Seasonal Runoff Coefficients

Catchment Type	General	Freshet
Exposed tailings	0.6	0.9
Disturbed areas	0.3	0.9
Rock disposal site areas	0.1	0.6
Open pits	0.75	0.9
Undisturbed catchments	0.4	0.42
Haul roads and access roads	0.15	0.9
Mill site area	0.1	0.1

Source: Golder 2020

4.0 CALIBRATION RESULTS

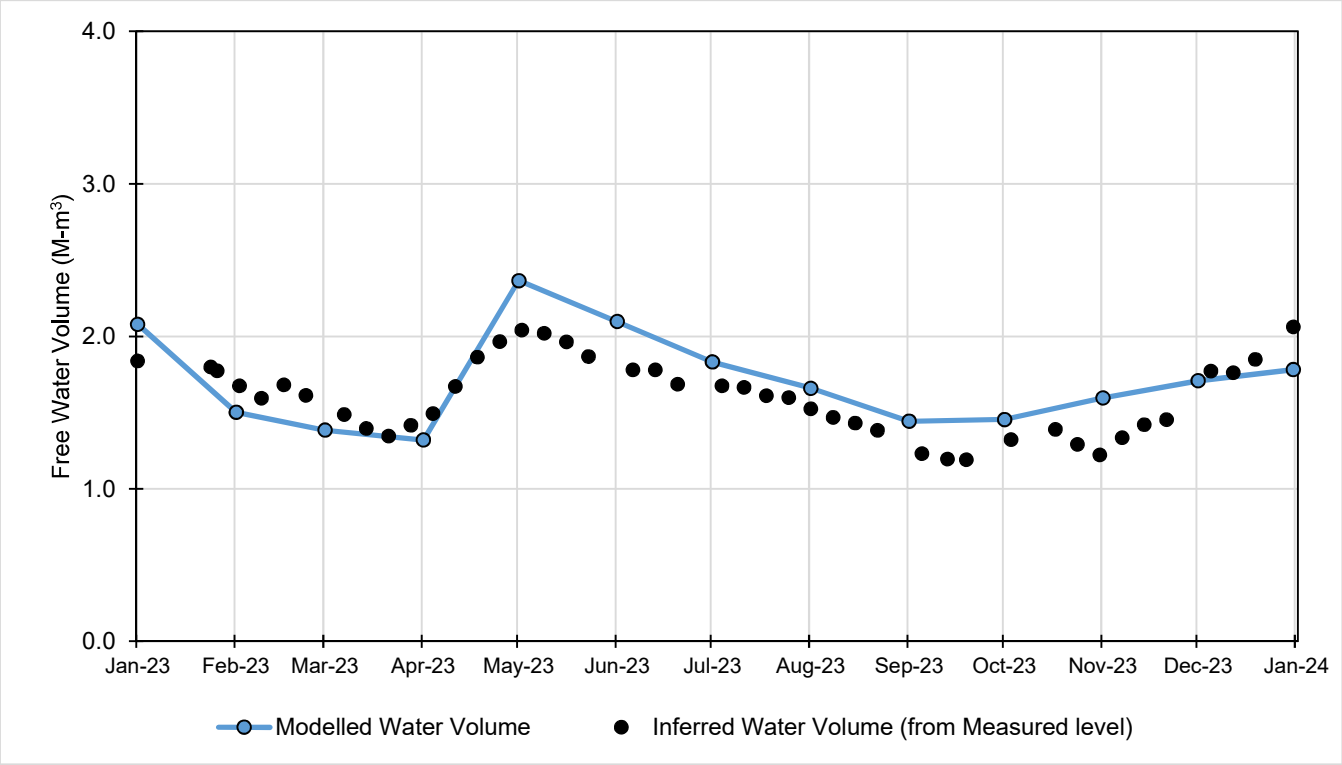
Figure 2 shows the modelled and measured water levels within the TSF for the 2023 calibration period. The modeled water levels were estimated from the modeled volume estimated using the storage-elevation storage curves. The average difference between modelled and measured water levels is approximately 0.14 m, which is considered acceptable for the purposes of the calibration exercise.



Note: Last measured water level occurred on 31 December 2023.

Figure 2: Water Levels in the TSF

Figure 3 shows the modelled free water volume in the TSF along with the inferred free water volume from measured water levels. The measured water levels were converted to an inferred water volume using the storage-elevation curves described in Section 2.3.



Note: Last measured water level occurred on December 31, 2023. The y-axis unit (M-m^3) denotes million cubic meters.

Figure 3: Free Water Volume in the TSF

Figure 2 and Figure 3 indicate that the model is reasonably calibrated and there is general alignment between measured free water levels and the inferred free water volume in the TSF. Differences between modelled and measured values may have several explanations:

- Variability in runoff coefficient throughout the year.
- Uncertainties in the climate data (e.g., snowpack surveys can miss intermittent snowmelt if conducted infrequently and the use of composite datasets may over or under-estimate actual conditions).
- Uncertainties in the TSF bathymetric survey (e.g., the transition between exposed tailings surface [i.e., beach] and free water can be complex).
- Uncertainties associated with the tie-in of the October 30, 2023 TSF storage curve with those utilized in the 2022 calibration, specifically referring to the projected storage curves from the 2020 TSF survey to the 987 m dam crest elevation.
- Uncertainties related to the projection of the Cariboo Pit storage curve from 2022 Calibration to the January 25, 2024 survey could lead to a situation where less storage capacity is modeled for the Cariboo Pit. Consequently, the volumes for the TSF and other pits may over estimated.
- Potential inaccuracies in water level measurements.

- Potential inaccuracies and/or missing WTP discharge data. The TSF weekly report noted that WTP ceased operations after September 13, 2023. However, there were still low volumes of WTP discharge recorded in October and November 2023. Additionally, the WTP discharge data are available for only 6 days in December 2023 (MPMC 2024a).
- Potential differences between modeled water transfer rates and actual transfers on site.
- There were minor discrepancies in the tailings deposition data between TSF Water Balance Spreadsheet and 2023 DSI Report data request (MPMC 2024a). WSP proceeded with tailings production umbers from the 2023 DSI Report data request to ensure consistency with the data used in the DSI.

The modelled results for the 2023 SWWBM calibration provide a reasonable approximation of site conditions and are considered suitable for water management planning.

5.0 END-OF-YEAR WATER BALANCE

Table 1 presents End of Year (EoY) modelled site water balance from 2017 through 2023. The modelled balance is the net storage of free water volume (total water) on site and net annual inflow. Storage locations include the TSF, pits, sumps, and ponds.

Table 2: EoY Modelled Site Water Balance Volume

Date	Total Water on Site[(a)(b)] (M-m^3)	Annual Water Net Inflow[(c)] (M-m^3)
December 31, 2017	6.0	4.6
December 31, 2018	3.9	5.3
December 31, 2019	3.8	6.4
December 31, 2020	8.2	9.5
December 31, 2021	7.5	6.1
December 31, 2022	6.0	6.4
December 31 ,2023	4.0	5.6

(a) End of year sum of water in TSF, pits, sumps, and ponds.
(b) Includes Wight Pit stored water volume.
(c) Net Inflows = Direct Precipitation + Runoff + Baseflows + Groundwater Inflow - Evaporation - Groundwater Outflow (for calendar year).

6.0 RECOMMENDATIONS

Based on the results of the 2023 SWWBM calibration, the following recommendations are provided to enable more robust water balance modelling:

- Increase the frequency of periodic snowpack measurements in the spring and fall seasons to generate more representative snowmelt data (e.g., in case mid-season snowmelt occurs outside of the freshet period).
- Record both snowfall and rainfall data measurements in the winter to produce more representative climate data (only rainfall and snowpack is recorded currently).

- Conduct both topographic and bathymetric surveys in spring and fall annually to achieve a more precise TSF storage curve progression.
- Review and validate available flow data on site to supplement the calibration of the SWWBM.
- Refine the runoff coefficients as part of future model updates.
- Refine the catchment areas to confirm various land types annually, thereby enhancing the precision of runoff estimations in the model through future updates.

7.0 CLOSURE

This technical memorandum summarizes the SWWBM calibration and end-of-year water balance for the model run period January 1, 2023 to December 31, 2023 (inclusive). The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this memorandum.

We trust that this technical memorandum satisfies your current requirements. Please contact the undersigned should you have any questions.

WSP Canada Inc.

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2024-03-21

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Fellow, Mine Water

SC/GD/PWM/ar/ca/anr

https://golderassociates.sharepoint.com/sites/10023g/ca00205274505 deliverables/002_issued/026-tm-31141-2023 site wide water balance model update and calibration/rev0/ca0020527.4505-026-tm-rev0-31141-2023 wb calibration 21mar_24.docx

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WSP. 2023c. Mount Polley Mine Water Management Plan – Springer Expansion Life-of-Mine. Prepared for Mount Polley Mining Corporation. No. 23590671-091-TM-Rev0-31191. December 4, 2023.

STUDY LIMITATIONS

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Appendix P

Archaeological Report (WSP)

(Electronic format only)

Disclaimer: Artifact in photo found on Cariboo Island; not part of the Archaeological study

TECHNICAL MEMORANDUM

DATE November 3, 2023 **Reference No.** 23590671-093-TM-Rev0-81100

TO Don Parsons
Mount Polley Mining Corporation

FROM Chris Dodd and Andrew Mason **EMAIL chris.dodd@wsp.com; andrew.mason2@wsp.com**

PRELIMINARY FIELD RECONNAISSANCE OF THE SPRINGER PIT EXPANSION AND TAILINGS STORAGE FACILITY FOUNDATION AREA

1.0 INTRODUCTION

At the request of the Mount Polley Mining Corporation (Mount Polley), WSP Canada Inc. (WSP) conducted a preliminary field reconnaissance (PFR) of the Springer Pit Expansion and Tailings Storage Facility (TSF) Foundation Preparation area within the Mount Polley mine site, near Likely, BC (the Project area).

The Springer Pit Expansion consists of the proposed extension to the existing Springer Pit itself, north and northwest of the existing pit, a Potentially Acid Generating rock (PAG) Stockpile to the northwest of the pit, and a Rock Disposal area (with associated haul road) in the south portion of the expansion area. The TSF Foundation Preparation area involves the raising of interim buttress' along the northeast and southeast sides of the tailings pond. The PFR was undertaken to refine our understanding of archaeological potential within the overall Project area, focussing on the specific areas to be developed for both the Springer Pit Expansion and TSF Foundation Preparation area, and to inform future archaeological work.

The PFR was conducted on October 5 and 6, 2023 by Chris Dodd (WSP), Glen Dixon (Xatśūll First Nation), and Demetrius George (Williams Lake First Nation), during which portions of the Project area were subject to pedestrian survey and ground surface inspection. One area of high archaeological potential (AOP) was recorded during the PFR along Bootjack Creek in the Rock Disposal area. Additional archaeological survey along Bootjack Creek and south from Bootjack Creek is also required to determine if further AOPs are present (see Section 4.0). Areas subject to PFR were prioritized based on those portions of the Project area that were to be developed soonest, including the location immediately north of the existing Springer Pit as well as the TSF Foundation Preparation area.

2.0 BACKGROUND

2.1 Previously Registered Archaeological Sites

There are no registered archaeological sites within the Project area, however three are located within 5 km, including: FdRj-4, an isolated stone artifact identified on the north bank of Bootjack Creek, approximately 450 m east and downstream from Bootjack Lake and 540 m southwest of the Springer Pit Expansion area; FdRj-5, a subsurface stone artifact scatter on the north bank of Bootjack Creek approximately 50 m east and downstream from Bootjack Lake and 620 m southwest of the Springer Pit Expansion area; and archaeological site FdRk-2, a buried stone artifact scatter on a terrace overlooking a small pond, approximately 3.3 km northwest of the Springer Pit Expansion area.

2.2 Previous Archaeological Assessments

Five archaeological assessments have previously been conducted at the Mount Polley mine site, three of which directly overlap or bound the Springer Pit Expansion area, as described below.

Points West Heritage Consulting first conducted a heritage resource overview assessment (HROA) in 1989 at the mine site (Points West 1989). The HROA focused on the proposed impacts at the time, which partially overlap the Project area. PFR was conducted during the HROA but was limited to the east and south edges of Bootjack Lake, as well as the access road connecting the mine to Likely Road. The majority of the 1989 study area was classified as having low archaeological potential, with some areas classified as having low-moderate archaeological potential (along the access road but outside the Project area) and one area classified as having moderate archaeological potential at the south end of Bootjack Lake (also outside the Project area).

I.R. Wilson Consultants Ltd. (I.R. Wilson) conducted an AIA in 1996 for a proposed pump station and water pipeline (I.R. Wilson 1996). The pump station is located on the west shore of Polley Lake and the water pipeline extends southwest from the lake, then south along the east edge of the Springer Pit Expansion area until intersecting with the TSF Foundation Preparation area. Subsurface testing was undertaken at the substation location, however no archaeological materials were identified. The water pipeline crossing at Bootjack Creek was described as another area that may have archaeological potential. However, upon inspection the site was found to be hummocky and ultimately not requiring further archaeological assessment. No archaeological sites were identified along the water pipeline route.

I.R. Wilson conducted a PFR in 2004 for newly proposed developments at the mine site, including what is described as the northeast zone, an access road leading south from this area, and a proposed dump location at the south end (I.R. Wilson 2004). These areas are located along the west side of Polley Lake along its northern half, with the proposed dump area entering the Springer Creek Expansion area. No areas of archaeological potential or archaeological sites were identified during the PFR.

3.0 PRELIMINARY FIELD RECONNAISSANCE METHODS

PFR was conducted using both pedestrian and vehicular survey and focussed both on landforms that typically correlate with archaeological site locations and those areas deemed to be least disturbed. Pedestrian survey was conducted at intervals of 5 m to 50 m, searching for surface expressions of archaeological sites (e.g., artifacts and features), culturally modified trees (CMTs) and landforms with potential for the presence of buried archaeological materials (i.e., AOPs). Survey coverage was recorded using a recreational grade GPS with accuracy of ±4 m. Features such as terrain, forest cover, hydrology, and previous disturbance were documented and photographed.

4.0 RESULTS

4.1 Springer Pit Expansion Area

The northwest portion of the Project area, where the PAG stockpile is proposed, is characterized by an existing rock disposal area with moderate to steeply sloping terrain leading northwest and west down from the base of the existing stockpile. A large, levelled landing has been built into this slope at the extreme northwest corner (Attachment 1: Photo 1). Within the Springer Pit expansion area, terrain is undulating and rocky with a rocky hill and ridge that extends south between the proposed PAG stockpile and existing Springer Pit (Attachment 1: Photo 2). This undulating rocky terrain has very limited soil development and has been subject to previous disturbance, either from mining exploration activities or previous logging. As a result, all treed areas are second growth and largely comprised of spruce and subalpine fir. These areas are all considered to have low archaeological potential given the sloping and rocky terrain and no immediately available water sources.

The southern rock disposal area extends south from an existing rock disposal area through moderately sloping terrain with a south aspect leading towards Bootjack Creek, with the eastern edge within gently to moderately sloping terrain leading towards Polley Lake. This area north of Bootjack Creek has been heavily disturbed from past mining activities and is considered to have low archaeological potential given the sloping terrain.

The Bootjack Creek ravine leads east through the southern portion of the proposed rock disposal area with gently sloping to level terrain located between the ravine and the existing tailings pond to the south (Attachment 1: Photo 3). A secondary, shallower drainage channel was observed in this area south of Bootjack Creek. The majority of this portion of the rock disposal area has also been previously logged and largely consists of second growth spruce, subalpine fir, trembling aspen, alder, and cottonwood with the areas immediately adjacent to the ravine having some larger old-growth tree pockets present, including western redcedar. One area of high archaeological potential (AOP), consisting of a 20 × 8 m level bench, was observed along the north edge of the Bootjack Creek ravine (Attachment 1: Photo 4); additional AOPs may be present along the edge of the ravine. The area south of Bootjack Creek may is also considered to have archaeological potential given the presence of a secondary drainage. Both areas require additional archaeological survey to confirm if additional AOPs, surface expressions of archaeological sites, or CMTs are present.

4.2 TSF Foundation Preparation Area

The proposed interim raised buttress' along the northeast and southeast edges of the existing tailings storage facility were subject to PFR. The entirety of these areas are heavily disturbed. The southeast buttress' are located between the existing TSF foundation and Gavin Lake Road in undifferentiated terrain with large artificial berms throughout (Attachment 1: Photo 5). The northeast buttress' are located adjacent the existing TSF foundation within undifferentiated and low-lying poorly drained terrain, in the south, and artificially built-up areas to the north (Attachment 1: Photo 6). No evidence of previously existing landforms that may have once contained archaeological potential were observed and the entire area is considered to have low archaeological potential given the generally undifferentiated or low-lying terrain and extent and degree of previous disturbance.

5.0 RECOMMENDATIONS

Further archaeological assessment is recommended along and south of the Bootjack Creek ravine within the southern rock disposal location in the Springer Pit Expansion area. This additional assessment should consist of a systematic survey of this area and be conducted under a *Heritage Conservation Act* Section 12.2 Inspection Permit which will allow for subsurface testing of any identified AOPs and recording of any archaeological sites that might be identified. No further archaeological assessment is recommended for the remainder of the proposed southern rock disposal area, the PAG stockpile, or the Springer Pit expansion itself.

No further archaeological assessment is recommended within the TSF Foundation Preparation area.

6.0 CLOSURE

We trust this technical memorandum provides you with the information you require at this time. Should you have any questions regarding the contents of this document, or require any further information, please do not hesitate to contact the undersigned.

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this memorandum.

WSP Canada Inc.

Chris Dodd
Lead Archaeologist

Andrew Mason
Senior Principal Archaeologist

CD/ARM/sw

Attachments: Figures 1 and 2
Attachment 1: Select Photos

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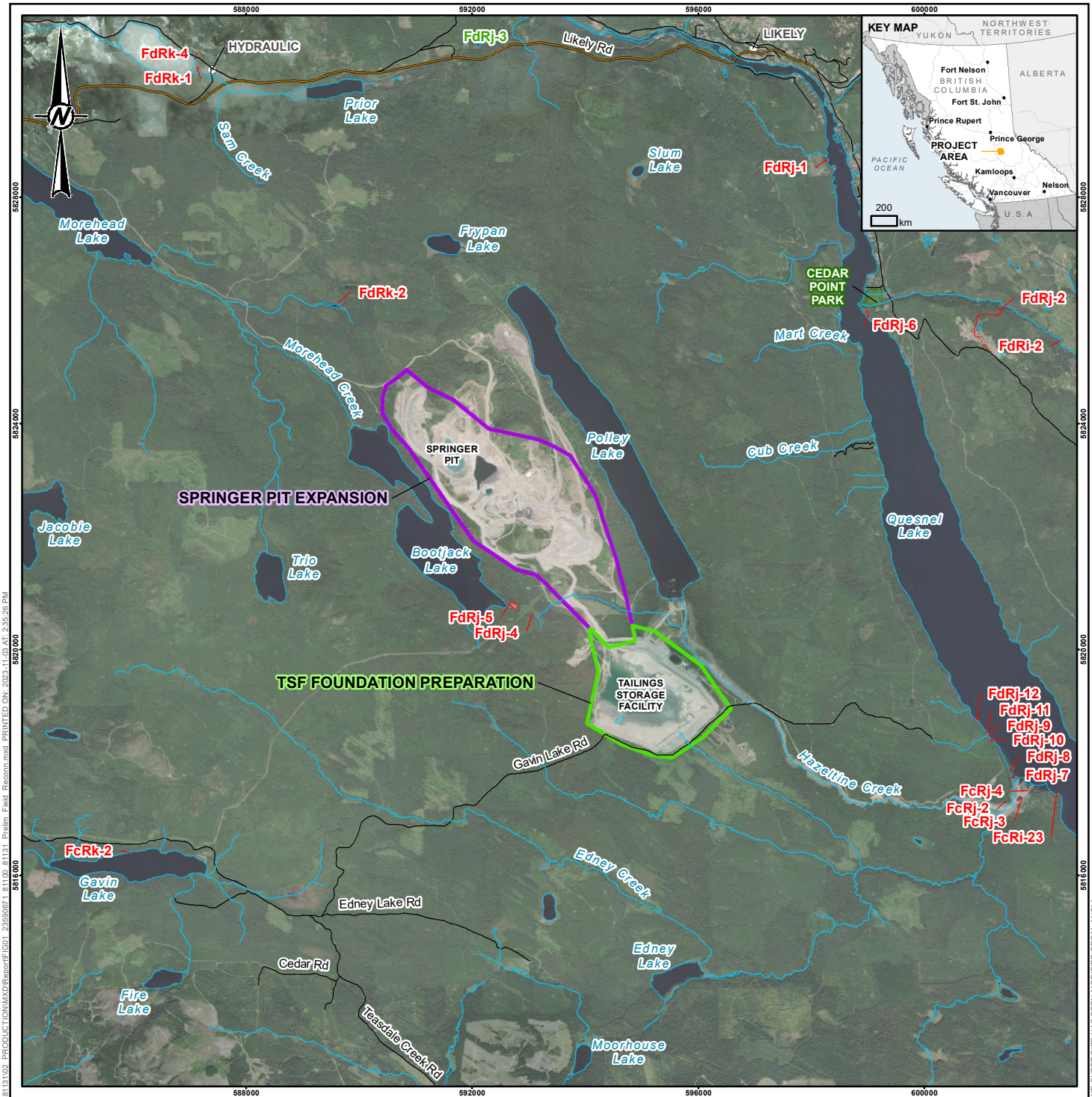

LEGEND

PROJECT DATA

- SPRINGER PIT EXPANSION PROJECT AREA
- TSF FOUNDATION PREPARATION PROJECT AREA
- PREVIOUSLY RECORDED ARCHAEOLOGICAL SITE
- HISTORICAL SITE

BASE DATA

- UNINCORPORATED PLACE
- ROAD - ARTERIAL / COLLECTOR
- ROAD - LOCAL
- WATERCOURSE
- WATERBODY
- PARK / PROTECTED AREA

0 2,000 4,000

1:100,000 METRES

REFERENCE(S)

1. ARCHAEOLOGICAL SITE DATA OBTAINED FROM B.C. MINISTRY OF FORESTS ON 2023-08-09.
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CLIENT
MOUNT POLLEY MINING CORPORATION

PROJECT
SPRINGER PIT EXPANSION AND TSF FOUNDATION PREPARATION AREAS

TITLE
ARCHAEOLOGICAL PRELIMINARY FIELD RECONNAISSANCE OVERVIEW MAP

CONSULTANT
wsp

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APPROVED	ARM

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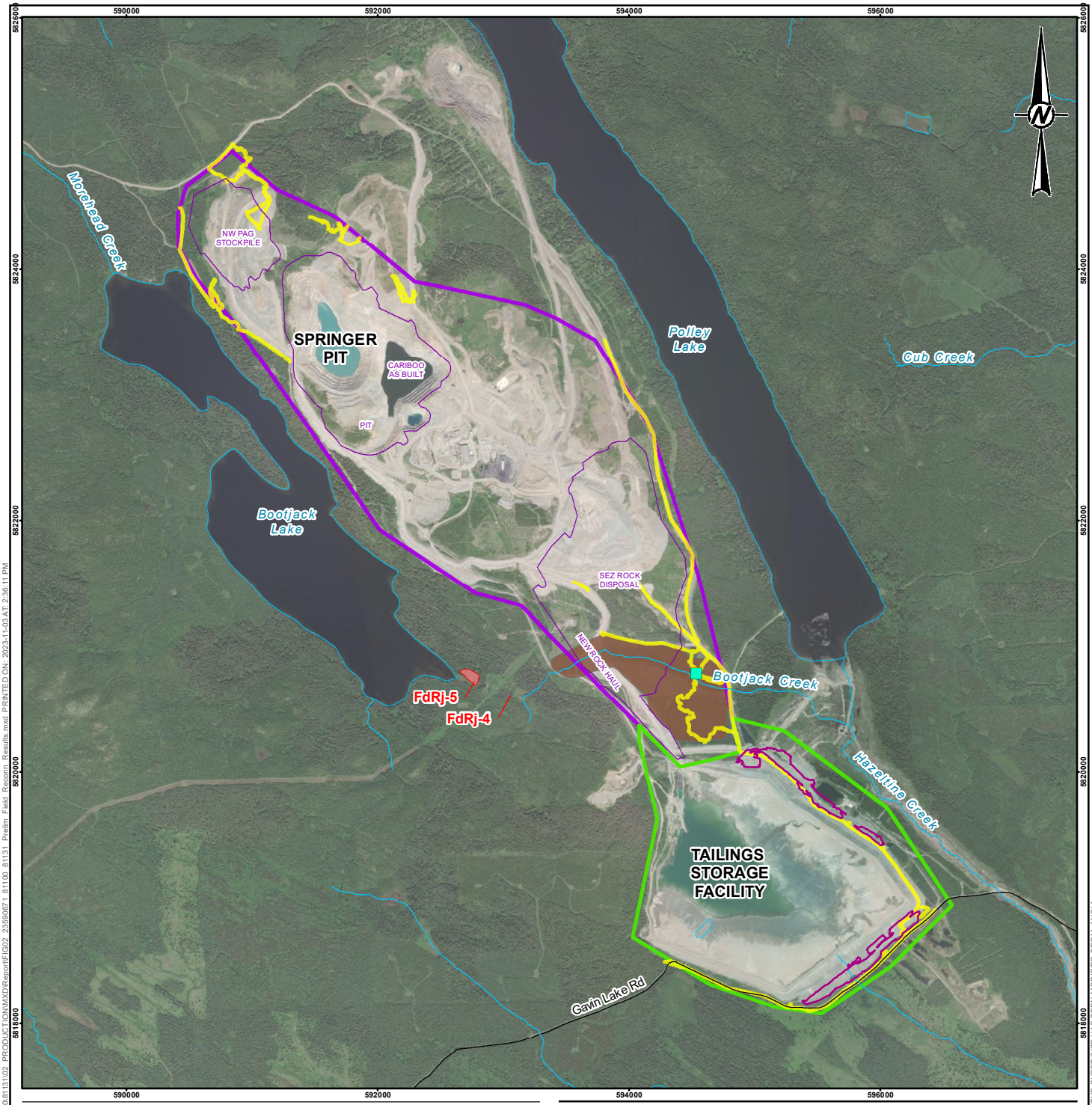

LEGEND

ARCHAEOLOGICAL DATA

- AREA OF ARCHAEOLOGICAL POTENTIAL
- PEDESTRIAN / VEHICLE SURVEY TRACK
- PREVIOUSLY RECORDED ARCHAEOLOGICAL SITE
- FURTHER ARCHAEOLOGICAL ASSESSMENT RECOMMENDED

PROJECT DATA

- INTERIM RAISE BUTTRESS BOUNDARY
- SPRINGER PIT EXPANSION PROJECT AREA
- TSF FOUNDATION PREPARATION PROJECT AREA
- PROJECT FEATURES

BASE DATA

- ROAD - LOCAL
- WATERCOURSE

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REFERENCE(S)

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CLIENT
MOUNT POLLEY MINING CORPORATION

PROJECT
SPRINGER PIT EXPANSION AND TSF FOUNDATION PREPARATION AREAS

TITLE
ARCHAEOLOGICAL PRELIMINARY FIELD RECONNAISSANCE RESULTS MAP

CONSULTANT

wsp

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ATTACHMENT 1

Select Photos

Photo 1: View Northwest to Large Landing in Proposed PAG Stockpile Area

Photo 2: View Southwest to a Rocky Hill and Ridge Extending into the Springer Pit Expansion

Photo 3: View Southwest to the Southern Portion of the Proposed Rock Disposal Area, with the Existing Tailings Pond in Background. Bootjack Creek Follows the Green Deciduous Tree Stand in Middle of the Photo

Photo 4: View West to an Area of Archaeological Potential, with Bootjack Creek Ravine to Left of Frame

Photo 5: View Southwest Through the Southeast Tailings Storage Facility (TSF) Foundation Preparation Area

Photo 6: View Northwest Through Northeast TSF Foundation Preparation Area

Appendix Q

2023 Metal Leaching and Acid Rock Drainage Characterization and Monitoring Program (SRK)

(Electronic format only)

FINAL

Metal Leaching/Acid Rock Drainage Characterization and Monitoring Program – 2023 Annual Report

Mount Polley Mine, BC, Canada

Mount Polley Mining Corporation

SRK Consulting (Canada) Inc. ▪ CAPR003074 ▪ March 2024

srk consulting

FINAL

Metal Leaching/Acid Rock Drainage Characterization and Monitoring Program – 2023 Annual Report

Mount Polley Mine, BC, Canada

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Reviewer: Stephen Day, PGeo **Initials:** SJD

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Suggested Citation:
SRK Consulting (Canada) Inc. 2024. Metal Leaching/Acid Rock Drainage Characterization and Monitoring Program – 2023 Annual Report. FINAL. Prepared for Mount Polley Mining Corporation: Likely, BC. Project number: CAPR003074. Issued March. 2024.

Cover Image(s):
Polley Lake in October 2022

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Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

ABA	Acid Base Accounting
AP	Acid potential
ARR	Annual Reclamation Report
CEMP	Comprehensive Environmental Monitoring Plan
CRM	Certified reference material
DL	Detection limit
DOC	Dissolved organic carbon
DQO	Data quality objective
EMLI	Energy, Mines and Low Carbon Innovation
EMTD	East Main Toe Drain
HCT	Humidity cell test
LCS	Laboratory control standards
LGO	Low grade ore
M-200 Permit	Mines Act Permit M-200
MDC	Mine Drainage Creek
ML/ARD	Metal leaching and acid rock drainage
MPM	Mount Polley Mine
MPIC	Mount Polley Intrusive Complex
MPMC	Mount Polley Mining Corporation
MTD	Main Toe Drain
NAG	Not potentially acid generating
NEZ	North East Zone
NP	Neutralization potential
NW	Northwest
ORP	Oxidation-reduction potential
PAG	Potentially acid generating
POI	Parameters of interest
QAQC	Quality Assurance/Quality Control
RDS	Rock Disposal Site
RPD	Relative percent difference
SERDS	South East Rock Disposal Site
SI	Saturation indices

STD	South Toe Drain
TIC	Total inorganic carbon
TSF	Tailings Storage Facility
TSFHR	TSF Haul Road
WMTD	West Main Toe Drain
WHR	Waste Haul Road
WTP	Water Treatment Plant

Executive Summary

Mount Polley Mining Corporation (MPMC) retained SRK Consulting (Canada) Inc. (SRK) to prepare a report summarizing and describing the metal leaching and acid rock drainage (ML/ARD) monitoring activities carried out during 2022. These activities are required as part of MPMC's Mines Act Permit M-200 (EMLI 2020), which requires the implementation of the ML/ARD Procedure Manual (most recent version: MPMC 2022b) and Water Management Plan (Golder 2021).

This document was prepared by SRK as a stand-alone report to be appended to MPMC's Annual Reclamation Report (ARR). It was prepared using information and data obtained by MPMC and includes interpretation of data collected in 2023.

SRK concluded the program is delivering data that are informing current and future waste rock and tailings management. In 2023, MPMC fulfilled all monitoring commitments as established by the Permit, the ML/ARD Procedure Manual, and the Water Management Plan except the following:

- No samples of co-disposed tailings collected in 2023 were sent to external laboratories for further analyses in 2023. Samples from May, July and August were sent in early 2024. The target frequency was once per month.

Conclusions of the waste rock monitoring program are:

- Approximately one quarter of production pit blast hole samples collected in 2023 from the Springer Pit were classified as PAG (26%). This is consistent with past results showing Springer Pit rock as dominantly NAG with some PAG components.
- In 2023, one placed waste rock sample in the SERDS was classified as PAG after placement. It is likely that this is a reflection of small-scale variation in the material. No further action was taken by MPMC after PAG identification. In the SERDS, excess NP is available for neutralization from surrounding NAG material with greater NP/AP values. As a result, SRK concludes the risk of ARD developing from this material is low.
- Trace element concentrations show that waste rock from 2023 was within historical ranges and averages are similar or lower. More variability as shown by the spread of quartiles is apparent for selenium content.

The tailings monitoring program indicated:

- Monthly tailings composite results from 2023 showed the weighted annual average NP/AP was 9.9 and are consistent with past results, showing tailings are generally NAG.
- Monthly tailings composite trace element concentrations show that tailings from 2023 are within historical ranges and averages are similar or lower except for average molybdenum and selenium content, which were above historical averages but within the historical ranges.
- Tailings co-disposed with waste rock in the SERDS in 2023 were dominantly NAG, with one sample classified as PAG. In the SERDS, excess NP is available for neutralization from surrounding NAG material with greater NP/AP values. As a result, SRK concludes the risk of ARD developing for the co-disposed tailings is low.

The Water Treatment Plant (WTP) waste monitoring program indicated:

- All WTP waste sediment samples collected in 2023 were classified as NAG except for the February sample which could not be classified because there was no TIC result.
- All WTP waste sediment samples collected in 2023 contained high aluminum content, which is a result of the addition of aluminum polychloride coagulant added as a reagent in the WTP. Selenium content is also slightly elevated compared to Mount Polley waste rock and tailings (for comparison, maximum concentration measured between 1998 to 2023 in waste rock is 9.5 mg/kg and in tailings is 8.9 mg/kg).
- Shake flask extraction results in 2023 showed that major cations were dominated by calcium and major anions were dominated by sulphate. Trace element concentrations were highest for aluminum, copper, manganese, molybdenum, and selenium, and other trace elements had concentrations that were low or below the detection limit.

The results of the seepage and contact water monitoring show the following:

- Seepage from the waste rock dumps shows the influence of waste rock leaching and indicates sulphide oxidation is occurring. Chemistry remains circumneutral to slightly alkaline at all sites, indicating pH buffering by calcium and magnesium-bearing carbonate minerals is ongoing. These pH conditions limit the mobility of most trace elements except oxyanions such as selenium.
- Seepage has been mostly stable for key parameters (pH, sulphate, copper, and selenium) over the monitoring period except for the localized influence of sulphuric acid waters likely originating from oxidation of the elemental sulphur pile. The acidity has been neutralized by reaction with carbonate and silicate minerals in the waste rock. Still, it resulted in depressed pH and the occasional breakthrough of acidic waters to waste rock seeps at the toe of the NEZ Dump. The removal of the elemental sulphur pile in 2018 seems to have arrested the downward trend in pH and upward trend in copper. Diversion and management of water from NEZ Seep1 and NEZ Seep 2 has been effective at improving water chemistry downstream.
- Stable or decreasing trends in nitrate, ammonia, and nitrite concentrations are consistent with continued flushing of explosives residuals from the pit walls and waste rock seepage during mining activities in 2023.
- Seepage from the tailings embankment indicates concentrations for parameters of interest were similar from 2022 to 2023, with some exceptions including increasing sulphate and molybdenum. These increases may be the result of flushing of oxidation products as the water level rises.
- No results from the non-contact water ditches were available in 2023 because conditions were dry during attempted sampling events.

1 Introduction

Mount Polley Mining Corporation (MPMC) retained SRK Consulting (Canada) Inc. (SRK) to prepare a report summarizing and describing the metal leaching and acid rock drainage (ML/ARD) monitoring activities carried out during 2023. These activities are required as part of MPMC's Mines Act Permit M-200 (EMLI 2023), which requires the implementation of the ML/ARD Procedure Manual (most recent approved version: MPMC 2022) and Water Management Plan (Golder 2021).

This document was prepared by SRK as a stand-alone report to be appended to MPMC's Annual Reclamation Report (ARR). It was prepared using information and data obtained by MPMC and is the deliverable for Task 110 of SRK Project CAPR003074.

2 Background

2.1 Site Overview and History

Mount Polley Mining Corporation (MPMC), a wholly owned subsidiary of Imperial Metals Corporation, has been operating the Mount Polley Mine (MPM), located approximately 56 km northeast of Williams Lake and approximately 15 km southwest of the community of Likely in British Columbia, Canada, since 1996. MPMC recovers copper and gold from porphyry-style mineralization by open pit and underground mining. The plant is capable of processing 22,000 t/d of ore using standard mineral flotation technology.

Figure 1 shows the mine site layout. Full scale mining began in the Cariboo Pit by mining high oxide and high gold parts of the ore body then transitioning to the Bell Pit in 1999. Mining was suspended in 2001 due to unfavorable market conditions. The mine re-opened in 2005 after a three-and-a-half-year care-and-maintenance period. The following zones have been mined since 2005:

- Completed mining and backfilling of the Bell Pit.
- Completed mining and backfilling of the small Southeast Zone and Pond Zone Pits.
- Completed mining and flooding of the Wight Pit (Northeast Zone).
- Completed mining of the Boundary Pit.
- Completed permitted mining and flooding of Northeast Zone underground (access from the Wight Pit).

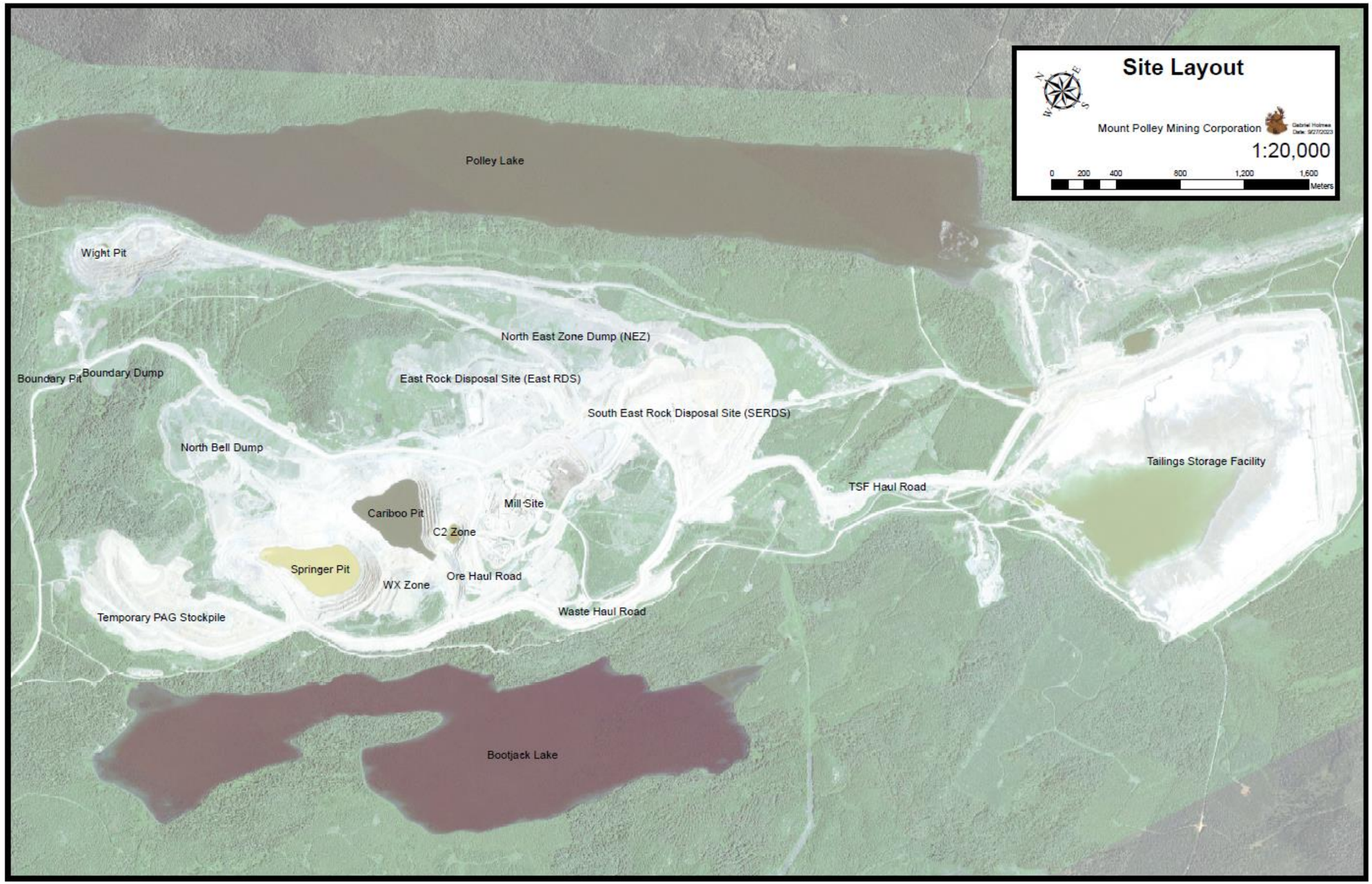
In August 2014, mining was suspended due to the breach of the tailings dam. Mining restarted in 2015 with tailings being deposited in the Springer Pit. In 2016, tailings were deposited in the Tailings Storage Facility (TSF) following reconstruction of the dam.

In May 2019, mining was again suspended due to unfavourable market conditions, but mining operations restarted in November 2021 and milling operations resumed in June 2022. Active mining is currently focussed on the Cariboo and Springer Pits (which will merge to a single pit).

Upon completion of mining, the Springer-Cariboo Pit will be backfilled by rock from the Temporary Northwest (NW) PAG Stockpile and allowed to flood. The Tailings Storage Facility (TSF) will be decommissioned with a minimal water cover.

Between August 2015 and June 2016, tailings were deposited into the Springer Pit after the TSF breach. One third of these tailings were removed in 2018 and 2019 by dredging and placed in the TSF. The remaining 3.5 Mt of tailings will be co-disposed with waste rock in the SERDS. SERDS co-disposal operations began in May 2023 and will continue in 2024.

Figure 1: Mount Polley Mine Site Layout



Sources: Provided by MPMC

2.2 Geological Setting

The Mount Polley deposit is classified as an alkalic porphyry copper gold deposit (BC MINFILE No. 093A 008). With the exception of the distinctive small Pond Zone, it has been mined from several mineralized zones which have the following common features:

- The host rock for porphyry mineralization is the Mount Polley Intrusive Complex (MPIC) which intruded into Nicola Group Volcanics (Figure 2). The intrusion is primarily monzonite to monzo-diorite in composition. Smaller phases vary in composition from diorite to syenite.
- Mineralization is associated with magmatic-hydrothermal breccias. Alteration and mineralization occurs in the matrix of the breccias, and in veins and swarms distributed around the breccias. BX1 is the main host for the bulk of the mineralization at MPM which is mined in the Cariboo and Springer Pits (Figure 2). BX1 is characterized by alteration which resulted in the strongest destruction of both primary and breccia textures. Breccia bodies BX2 host satellite mineralization in the Southeast Zone, Wight Pit, and Boundary Zone. BX2 is less intensively altered and original textures are more apparent. BX3 is unmineralized and has not been mined.
- Alteration at MPM is classified as potassic (sodic and calcic) with salmon-pink potassium feldspar as the main alteration mineral. Biotite is less common. Sodic alteration is defined by albite and calcic alteration (actinolite, diopside, epidote, clinozoisite, and sporadic andraditic garnet). Calcite is pervasive. Alteration is zoned with the strongest calcic-potassic alteration in the core associated with BX1. Nicola Group rocks and fringing MPIC rocks are propylitically-altered and characterized by stronger epidote and pyrite.
- Like other alkalic porphyry deposits (e.g., Copper Mountain, Brenda), MPM lacks the strong hydrothermal alteration zoning that is commonly observed in calc-alkalic porphyry deposits (e.g., Highland Valley Copper, Island Copper, Gibraltar). In particular, phyllic alteration is absent at MPM. A common feature of calc-alkalic porphyry deposits is often a pronounced pyritic halo that surrounds the copper mineralization and is associated with phyllic and propylitic alteration. At MPM, discontinuous pyritic zones are present but do not appear to be mineralization halos. MPM geological staff identified a pyritic zone in the south wall of the Springer Pit which extends into the adjacent Cariboo Pit. Samples from Bell Pit blast holes collected in the early years of operations were identified as being from a Pyrite Zone but the location of this feature is not known.
- Sulphide mineralization consists mainly of chalcopyrite ($CuFeS_2$) and pyrite (FeS_2), with lesser bornite (Cu_5FeS_4), covellite (CuS), and digenite (Cu_9S_5). Bornite is relatively more abundant in the Northeast and Boundary Zones.
- Carbonate mineralization is principally calcite, with occurrences of malachite ($Cu_2CO_3(OH)_2$) formed as a natural weathering product. Iron carbonates have not been reported.
- A significant portion of the copper at the MPM is not associated with sulphides (upwards of 50% in the upper portions of each pit). This fraction has been termed ‘copper oxide’ by MPM personnel and is associated primarily with chrysocolla ($(Cu,Al)_2H_2Si_2O_5(OH)_4 \cdot nH_2O$) and malachite ($Cu_2CO_3(OH)_2$) in equal proportions (Henry 2009). SRK (2015b) has shown that chlorite is a significant host for copper. It is assumed that chlorite formed hydrothermally and incorporated

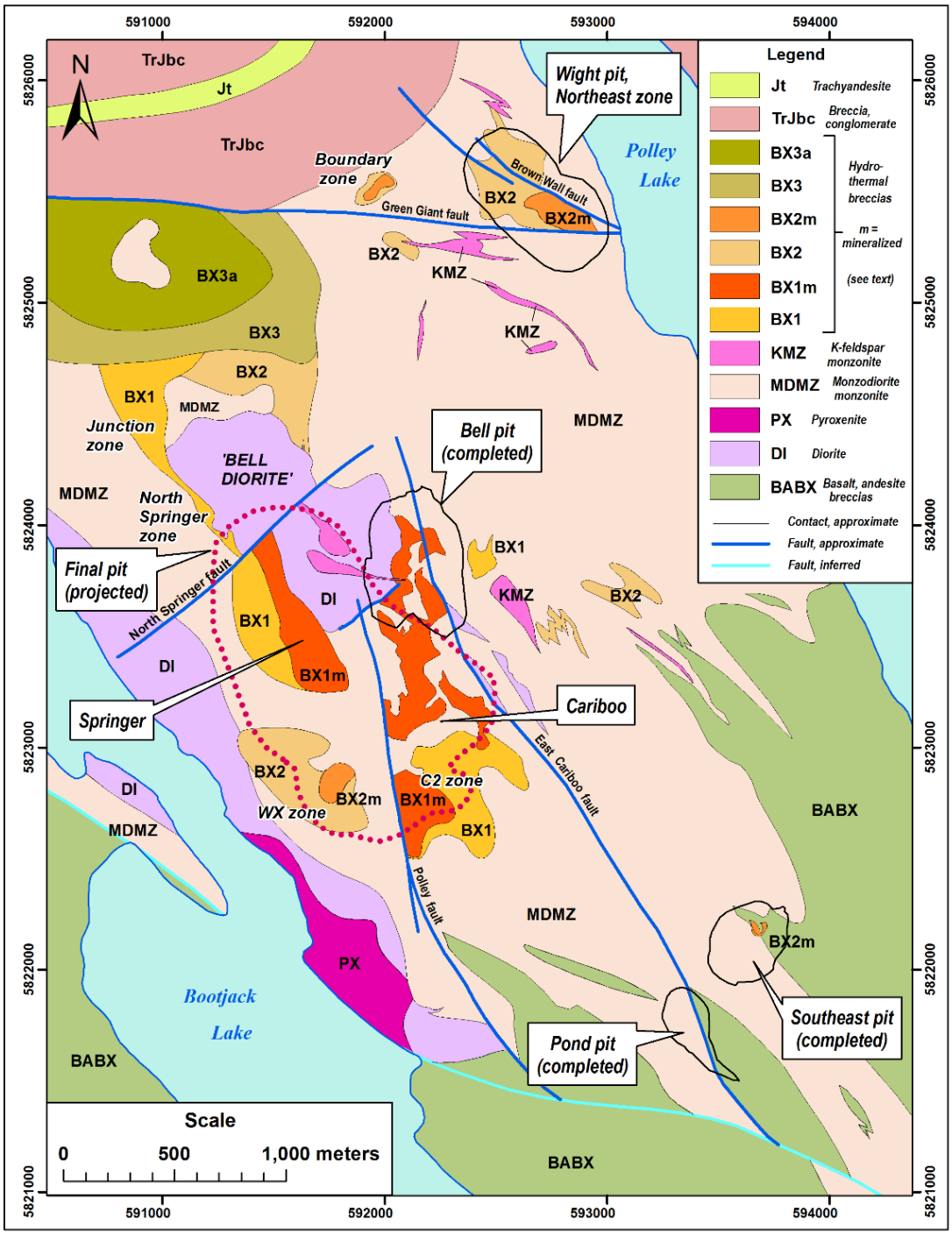
copper as part of the mineralizing event rather than due to weathering. Suarez et al. (2009) found that the form of copper in chlorite at the Aguablanca Ni-Cu-PGE Sulfide Deposit was native copper between silicate layers rather than as a substitution in the crystal lattice. The mineral is suspected to have formed during hydrothermal alteration rather than by natural weathering processes. It is not known whether this same form of copper is also present at MPM.

The small Pond Zone is andradite-clinopyroxene-magnetite skarn mineralization occurring at the contact between a diorite to monzodiorite intrusion and Nicola Group volcanic rocks of andesite to basalt composition. It appears to be linked to the presence of a limestone unit in the Nicola Group.

From an ML/ARD perspective, a significant feature of the Mount Polley mineralization is the lack of reported arsenic, lead, and zinc minerals which are commonly associated with porphyry deposits elsewhere in British Columbia and globally. Since arsenic, zinc, and associated cadmium are relatively mobile under non-acidic conditions, the lack of the minerals hosting these elements indicates that potential for leaching concerns is lower than other porphyries. Based on the copper sulphide and copper oxide dominated mineralogy, the primary metal leaching concern is expected to be for copper.

In addition, the lack of a distinctive pyrite halo means that pyrite abundance is lower than other porphyry deposits and ARD potential is expected to be lower.

Figure 2: Geological Map of the Mount Polley Mine



Sources: Rees (2013)

2.3 ML/ARD Management

2.3.1 Classification of Mine Waste

According to the *Mines Act* Permit M-200 (referred to as the M-200 Permit in this document), potentially acid generating (PAG) and ML materials are defined as:

- Neutralization potential (NP) is calculated using total inorganic carbon (TIC).
- Acid potential (AP) is calculated using total sulphur.
- All waste rock, quarry rock, borrow materials, and tailings are classified as PAG if they have an NP/AP ratio of less than 2.0.
- Borrow material or waste rock containing soluble metal levels (as determined by the shake flask test) higher than the receiving water objectives are defined as having potential for metal leaching.

2.3.2 Mine Waste Rock and Tailings Management

The M-200 Permit specifies the following requirements for waste management:

- Waste Rock
  - PAG waste rock can only be disposed in the Cariboo, combined Cariboo/Springer, Wight, and Southeast Zone pits, where it will be submerged permanently beneath a water cover.
  - A maximum of 62 million tonnes of PAG waste rock can be stored in the Temporary NW PAG Stockpile.
  - Isolated pockets of PAG materials (less than 1,000 tonnes) may be blended with non-Pag materials within the waste rock dumps, at a minimum non-PAG:PAG ratio of 20:1.
- Quarry Rock
  - Quarry rock can be used as construction material if the non-PAG and classified as not potentially metal leaching.
- Tailings
  - PAG tailings may not be used in dam construction.
  - Cyclone tailings must have an NP/AP ratio greater than 2.0.
  - Cycloned tailings may be used for construction of the following TSF components:
    - The upstream and downstream faces of the Perimeter Embankment.
    - The upstream side of the Main Embankment.
    - The maintenance of a till core in the Perimeter and Main Embankments.
  - About 3.5 Mt (2.2 Mm^3) of the remaining tailings deposited in the Springer Pit between August 2015 and June 2016 can be co-disposed with waste rock in the SERDS.

2.4 Conditions in 2023

Mining occurred in the Springer Pit in 2023, with milling of fresh and stockpiled ore and tailings being deposited in the TSF. Tailings previously deposited in the Springer Pit between August 2015 and June 2016 were co-disposed with waste rock in the SERDS between May and December 2023. Further details of disposal procedures are described in SRK (2022c) and summarized in Section 2.6. Environmental management and monitoring in 2023 followed guidelines and procedures in the 2019 Comprehensive Environment Management Plan (approved on February 10, 2021).

As described in MPMC (2024), the average annual precipitation in the Mount Polley Mine area is approximately 622 millimetres (mm/yr).

MPMC maintains two automated HOBO weather stations to collect climate data for the site and in 2023, 581 mm of precipitation was recorded: 337 mm as rain and 224 mm as snow water equivalent.

The average monthly air temperature at Mount Polley Mine in 2023 ranged from an average monthly low of -6.2˚C in February to 29˚C in August. In 2023, weather generally was drier and warmer than average and was consistent with regional trends with respect to drought conditions. Drought conditions persisted throughout 2023 at Mount Polley Mine.

2.5 Water Treatment Plant

As described in MPMC (2022), the Water Treatment Plant (WTP) at Mount Polley Mine removes suspended solids using Veolia ACTIFLO® water treatment technology prior to discharge. The feed water is dosed with an aluminum polychloride coagulant and a polymer to create floc particles. Microsand is added to ballast the flocculants, which settle and create a sludge. The clarified water is discharged, and the sludge is separated from the microsand, which is recycled in the process. The sludge is discharged into the TSF.

The plant operated continuously most of 2023, but was run on an as-needed basis near the end of the year.

2.6 SERDS Co-Disposal

Between August 2015 and June 2016, tailings were deposited into the Springer Pit after the TSF breach. Ore sources for the tailings included the Cariboo Pit and Wight Pit underground. Ore was processed using the previous milling process: comminution followed by froth flotation. Approximately one third of the tailings were removed in 2018 and 2019 by dredging and placed in the TSF. About 3.5 Mt (2.2 Mm^3) of tailings remained and in 2023, co-disposal of these tailings with waste rock in the SERDS was started on May 8, 2023. The tailings removal strategy involves placing waste rock on top of tailings and shoveling the mixture (10% waste rock, 90% tailings) into haul trucks which are later disposed as a mixture in the SERDS (SRK 2022c).

3 Monitoring Commitments Assessment

Table 1, Table 2, and Table 3 summarize the monitoring commitments as established by the Permit, the ML/ARD Procedure Manual, and the Water Management Plan. The tables also indicate the degree to which MPMC met its monitoring commitments in 2023. Figure 3 shows rock disposal sites and the PAG stockpile, as well as representative seep monitoring locations summarized in Table 2. Figure 4 and Figure 5 show the contact water and seepage monitoring locations summarized in Table 2 and Table 3, respectively.

Mount Polley Mine also operates kinetic tests on waste rock and tailings in support of long-term waste management planning and water quality prediction. The kinetic tests were performed for various activities, including permitting of mining the Wight Pit and lowering of the NP/AP criterion (waste rock humidity cells), reclamation activities (waste rock columns), and long-term kinetic testing of tailings collected from Hazeltine Creek following the TSF breach (tailings humidity cells and columns).

In 2023, MPMC complied with most monitoring commitments for managing of ML/ARD potential. Five of eight required samples of co-disposed tailings collected for trace element content and pore water chemistry were missed in 2023. The purpose of these analyses is to inventory geochemical characteristics of the co-disposed tailings, so the missed analyses are not significant from an environmental standpoint.

Table 1: ML/ARD Sampling Commitments

Material Type/Facility	Component	Purpose	Sampling Method	Total S	Total C	Element Scan[1]	Shake Flask Extraction Test[1]	Water Sample[1]	Tonnage Mined (t)	Target Frequency	Target Number of Samples	Number of Samples Collected	Percent Complete
Waste Rock/In-Pit	Areas of known NAG waste rock	To confirm material is NAG and provide information for source terms	Composite sample of blasthole cuttings	X	X	-	-	-	8,176,980	1 in 40,000 t			
	Areas of known PAG waste rock or suspected PAG/NAG waste rock boundaries	To define PAG/NAG boundaries and PAG material	Composite sample of blasthole cuttings	X	X	-	-	-	3,789,784	1 in 20,000 t	599[2]	675	>100%
	Drill pulp samples	Additional source of data for site geochemical models	Random selection of an existing blasthole composite sample	-	-	X	-	-	-	Monthly	12	25	>100%
Waste Rock/Waste Rock Dump	NAG waste rock dump	As QA/QC to confirm waste is being appropriately characterized and handled	Composite Sample of active crest	X	X	-	-	-	-	Weekly when NAG material is actively mined	52	52	100%
Ore/In-Pit	Ore to be temporarily stockpiled rather than processed immediately	To classify material as NAG or PAG	Composite sample of blasthole cuttings	X	X	-	-	-	10,700	1 in 20,000 t	1	14	>100%
Tailings/TSF	Processed tailings	To classify material as NAG or PAG To support development of site geochemical models	Monthly composite sample of tailings produced from processing plant	X	X	X	-	-	-	Monthly when ore processing occurs	12	12	100%
SERDS Co-Disposal Tailings	Tailings disposed in the SERDS co-disposal facility	To confirm material is NAG	Grab samples collected during deposition	X	X	-	-	-	-	Weekly when deposition occurs	33	141	>100%
		To characterize material from ML/ARD perspective	Grab samples collected during deposition			X	-	X[3]	-	Monthly when deposition occurs	8	3	38%
Water Treatment Plant Waste/WTP	Water Treatment Plant waste	To support development of site geochemical models To characterize material from ML/ARD perspective	Composite sample from wastewater exited the WTP prior to disposal to TSF	-	-	X	X	X	-	Quarterly	4	5	>100%

Notes:

[1] Analysis conducted at an external laboratory.

[2] Tonnage was not provided by MPMC based on proximity to NAG/PAG boundaries. Assumed target frequency of 1 in 20,000 t for both components to assess compliance.

[3] Pore water sample.

Table 2: Mount Polley Mine Contact Water Sampling Monitoring Locations

Station Name	EMS Code	Description	Drainage	Permit[1]	Analytical Sampling Frequency	Samples in 2023	Percent Complete
E1a	E225309	TSF Supernatant	Tailings slurry, seepage collection ponds	Permit M-200	Quarterly[2]	47	100%
Long Ditch	-	Long Ditch	East RDS, NEZ Dump, SERDS, Wight Pit dewatering	Permit M-200	Quarterly	11	100%
SERDS Ditch	-	SERDS Ditch	SERDS, West Ditch, MDC Sump	Permit M-200	Quarterly	10	100%
E13	-	NW Sump	Temporary NW PAG Stockpile	Permit M-200	Quarterly	4	100%
E14	-	Mine Drainage Creek Sump	Upper Mine Drainage Creek, West Ditch	Permit M-200	Quarterly	5	100%
E15	-	Bootjack Creek Culvert Sump	TSF Haul Road, Upper Bootjack Creek	Permit M-200	Quarterly	4	100%
E17	-	9km Sump	Temporary NW PAG Stockpile	Permit M-200	Quarterly	4	100%
E4	-	Main Embankment Seepage Collection Pond	MTD, STD, Main Embankment foundation drains	Permit M-200	Quarterly	4	100%
E18	-	Central Collection Sump	Long Ditch, SERDS Ditch	Permit M-200	Quarterly	4	100%
East MTD	-	East Main Toe Drain	East TSF Main Embankment toe drain	Permit M-200	Quarterly	4	100%
West MTD	-	West Main Toe Drain	West TSF Main Embankment toe drain	Permit M-200	Quarterly	4	100%
STD	-	South Toe Drain	TSF South Embankment toe drain	Permit M-200	Quarterly	4	100%
Gavin's Ditch	-	-	Undisturbed area east of Polley Mountain	Permit 11678[3]	Semi-annually[4]	-	100%[5]
TSF Clean Water Diversion	-	-	Undisturbed area west of TSF	Permit 11678[3]	Semi-annually[4]	-	100%[5]
Wight Pit Clean Water Diversion	-	-	Undisturbed area north of Wight Pit	Permit 11678[3]	Semi-annually[4]	-	100%[5]
E19[6]	-	Water Treatment Plant Feed	East RDS, NEZ Dump, SERDS, Wight Pit dewatering	-	-	52	100%
E19a[6]	-	Perimeter Embankment Till Borrow Pit	East RDS, NEZ Dump, SERDS, Wight Pit dewatering	-	-	10	100%

Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2022_ContactWQ_CAPR002434_rev0_SJL.xlsb]

Notes:
[1] Permit regulating the sample
[2] When reclaim water is sourced from TSF
[3] Under Section 2.4.1 of Permit 11678, surface runoff from undisturbed areas must be diverted away from mine workings. These clean water ditches are monitored to ensure water quality is maintained.
[4] In spring and fall, coinciding with ditch inspections
[5] Sites were visited twice, but no flow was observed. No samples were collected in 2023.
[6] E19 and E19a are not included in the list of contact monitoring locations in the 2019 Comprehensive Environmental Monitoring Plan (CEMP), they have been included here for comparison as they represent the collected mix of contact water that is sent to the Water Treatment Plant.

Table 3: Mount Polley Seep Monitoring Locations Overview

Drainage	Area	Representative Sample	Samples		Analytical Sampling Frequency	Percent Complete
North Bell Dump	Waste Rock Dump	Joe's Creek Pipe	Joe's Creek Pipe		Quarterly	100%
Boundary Dump	Waste Rock Dump	Boundary Dump Seep 2	Boundary Dump Seep 1		Semi-Annually	100%
			Boundary Dump Seep 2		Quarterly	100%[2]
			Boundary Dump Seep 3		Semi-Annually	100%
East RDS	Waste Rock Dump	-	East Dump Seep 1 East Dump Seep 1A East Dump Seep 2 East Dump Seep 2A East Dump Seep 3 East Dump Seep 4 East Dump Seep 5		Semi-Annually	100%
NEZ Dump	Waste Rock Dump	NEZ Seep 1	NEZ Seep 1		Quarterly	100%
			NEZ Dump Seep 2 NEZ Seep 2a NEZ Dump Seep 3 NEZ Dump Seep 4 NEZ Dump Seep 5 NEZ Dump Seep 6 NEZ Dump Seep 7 NEZ Dump Seep 8	NEZ Dump Seep 9 NEZ Dump Seep 10 NEZ Dump Seep 11 NEZ Dump Seep 12 NEZ Dump Seep 13 NEZ Dump Seep 14 NEZ Dump Seep 15	Semi-Annually	100%
Waste Haul Road	Waste Rock Dump	Mine Drainage Creek Culvert	Mine Drainage Creek		Quarterly	100%
			Waste Haul Road Under Culvert Waste Haul Road Seep 1 Waste Haul Road Seep 2 Waste Haul Road Seep 4 Waste Haul Road Seep 5 Waste Haul Road Seep 6 Waste Haul Road Seep 7 Waste Haul Road Seep 8 Waste Haul Road Seep 9 Waste Haul Road Seep 10 Waste Haul Road Seep 11 Waste Haul Road Seep 12 Waste Haul Road Seep 13 Waste Haul Road Seep 14 Waste Haul Road Seep 15	Waste Haul Road Seep 16 Waste Haul Road Seep 17 Waste Haul Road Seep 18 Waste Haul Road Seep 19 Waste Haul Road Seep 20 Waste Haul Road Seep 21 Waste Haul Road Seep 22 Waste Haul Road Seep 23 Waste Haul Road Seep 24 Waste Haul Road Seep 25 Waste Haul Road Seep 26 Waste Haul Road Seep 27 Waste Haul Road Seep 28 WHR 29	Semi-Annually	100%
Temporary NW PAG Dump	Waste Rock Dump	PAG Seep 15	PAG Dump Seep 1 PAG Dump Seep 2 PAG Dump Seep 3 PAG Dump Seep 4 PAG Dump Seep 5 PAG Dump Seep 6 PAG Dump Seep 7 PAG Dump Seep 8 PAG Dump Seep 9 PAG Dump Seep 10	PAG Dump Seep 11 PAG Dump Seep 12 PAG Dump Seep 13 PAG Dump Seep 14 PAG Dump Seep 16 PAG Dump Seep 17 PAG Dump Seep 18 PAG Dump Seep 19 PAG Dump Seep 20 PAG Dump Seep 22	Semi-Annually	100%
			PAG Dump Seep 15		Quarterly	100%[2]
TSF Haul Road	Waste Rock Dump	-	TSF Haul Road Seep 1 TSF Road 2 TSF Haul Road Seep 3 TSF Haul Road Seep 4 TSF Haul Road Seep 5 TSF Road 5a TSF Haul Road Seep 6 TSF Haul Road Seep 7 TSF Haul Road Seep 8	TSF Haul Road Seep 9 TSF Haul Road Seep 10 TSF Haul Road Seep 11 TSF Haul Road Seep 12 TSF Haul Road Seep 14 TSF Haul Road Seep 15 TSF Haul Road Seep 16 TSF Haul Road Seep 17	Semi-Annually	100%
SERDS	Waste Rock Dump	SERD Seep 13	SERDS Seep 1 SERDS Seep 2 SERDS Seep 3 SERDS Seep 4 SERDS Seep 5 SERDS Seep 6	SERDS Seep 7 SERDS Seep 8 SERDS Seep 9 SERDS Seep 10 SERDS Seep 11 SERDS Seep 12	Semi-Annually	100%
			SERDS Seep 13		Quarterly	100%
			SERDS Seep 14 SERDS Seep 15 SERDS Seep 16 SERDS Seep 17 SERDS Seep 18 SERDS Seep 19 SERDS Seep 20	SERDS Seep 21 SERDS Seep 22 SERDS Seep 23 SERDS Seep 24 SERDS Seep 25 SERDS Seep 26	Semi-Annually	100%
Cariboo Pit	Pit	E8	E8		Semi-annually[1]	100%
Wight Pit	Pit	E10	E10		Semi-annually[1]	100%
Springer Pit	Pit	E11	E11		Semi-annually[1]	100%
Boundary Pit	Pit	Boundary Pit	Boundary Pit		Semi-annually[1]	100%

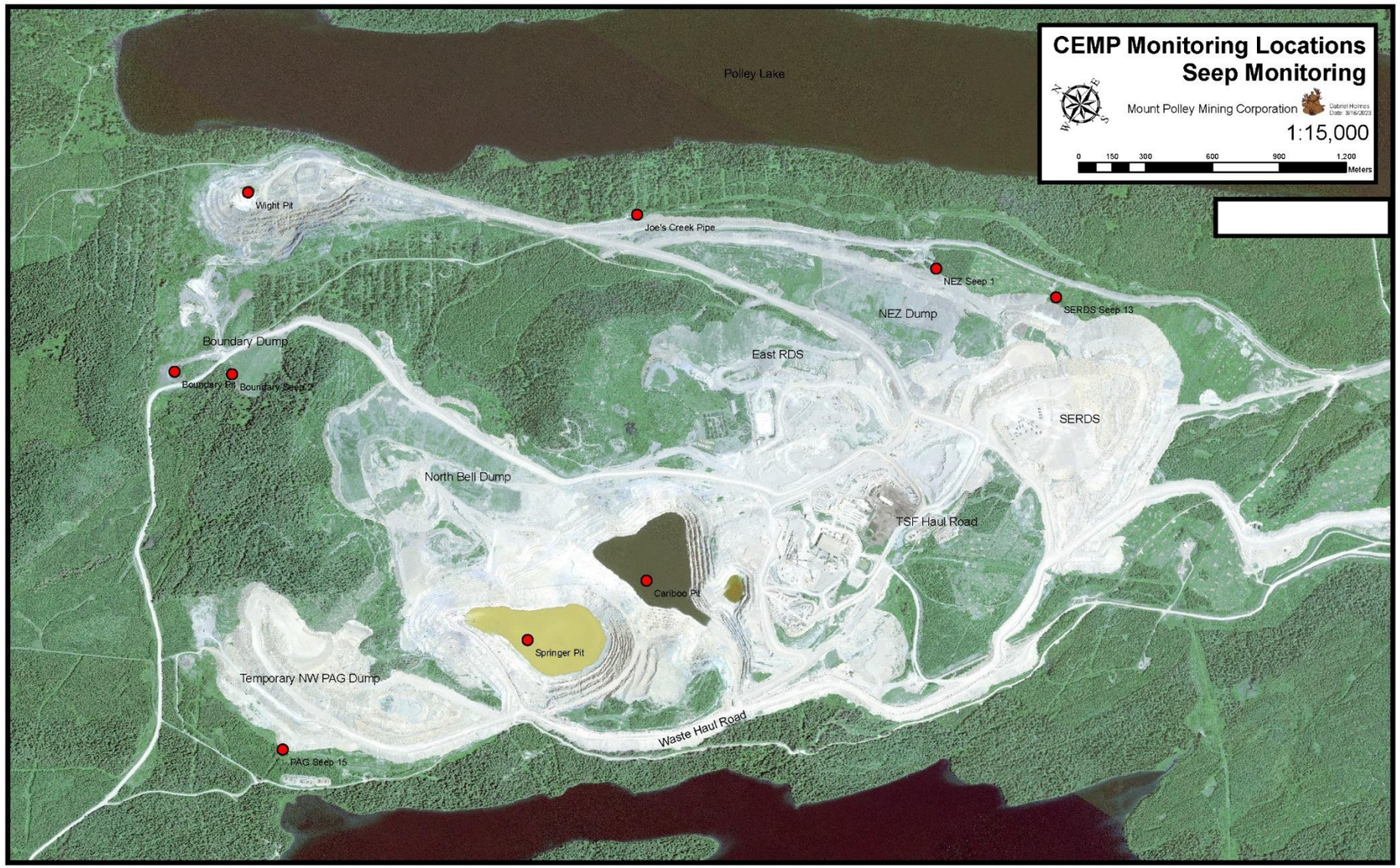
Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2022_ContactWQ_CAPR002434_rev0_SJL.xlsb]

Notes:

[1] When pit is not storing water from other sources on site

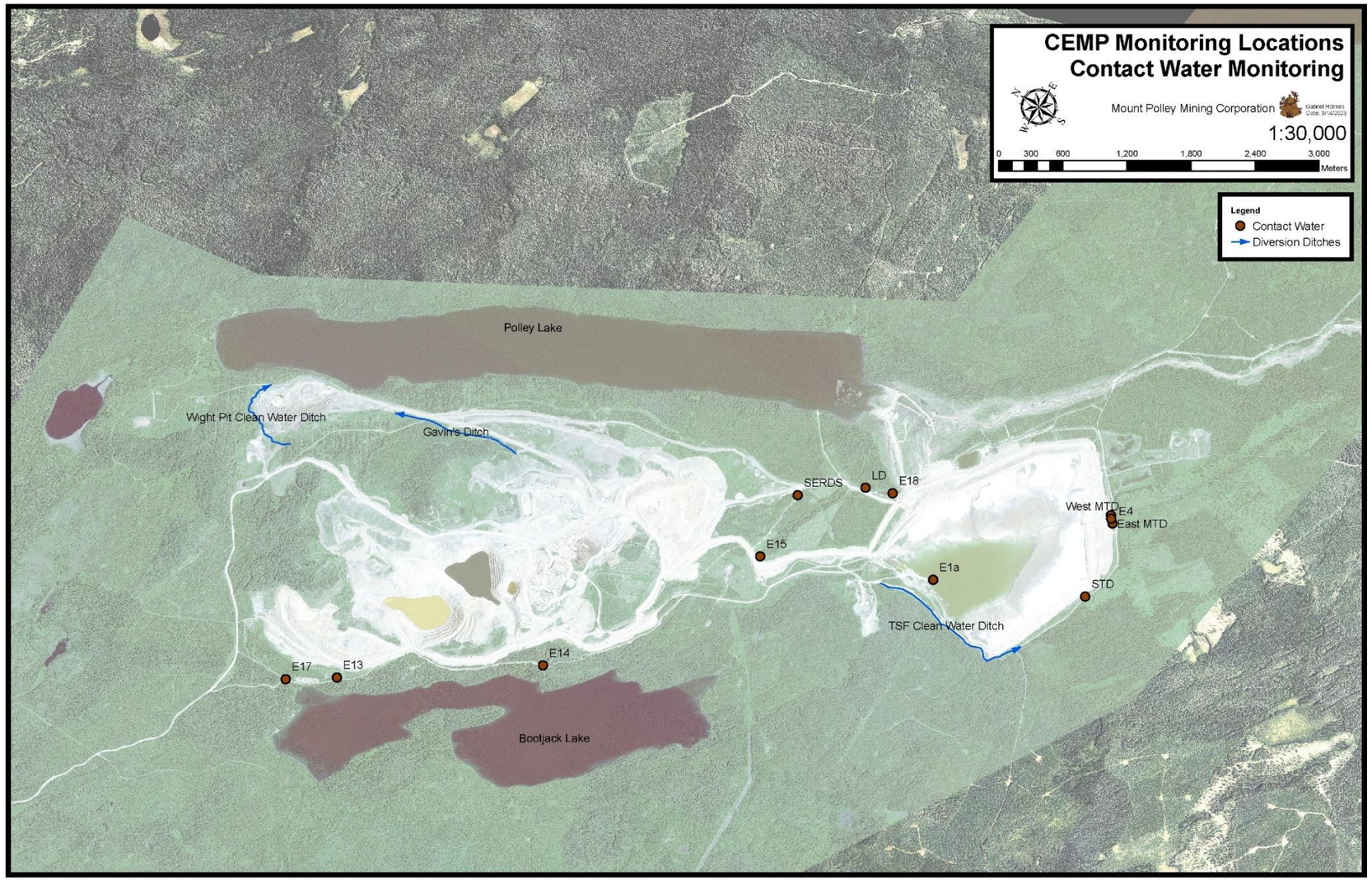
[2] Locations were visited four times but seepage was only observed three times. Three samples were collected in 2023.

Figure 3: Representative Seep Monitoring Locations, Rock Disposal Sites, and PAG Stockpile Facility



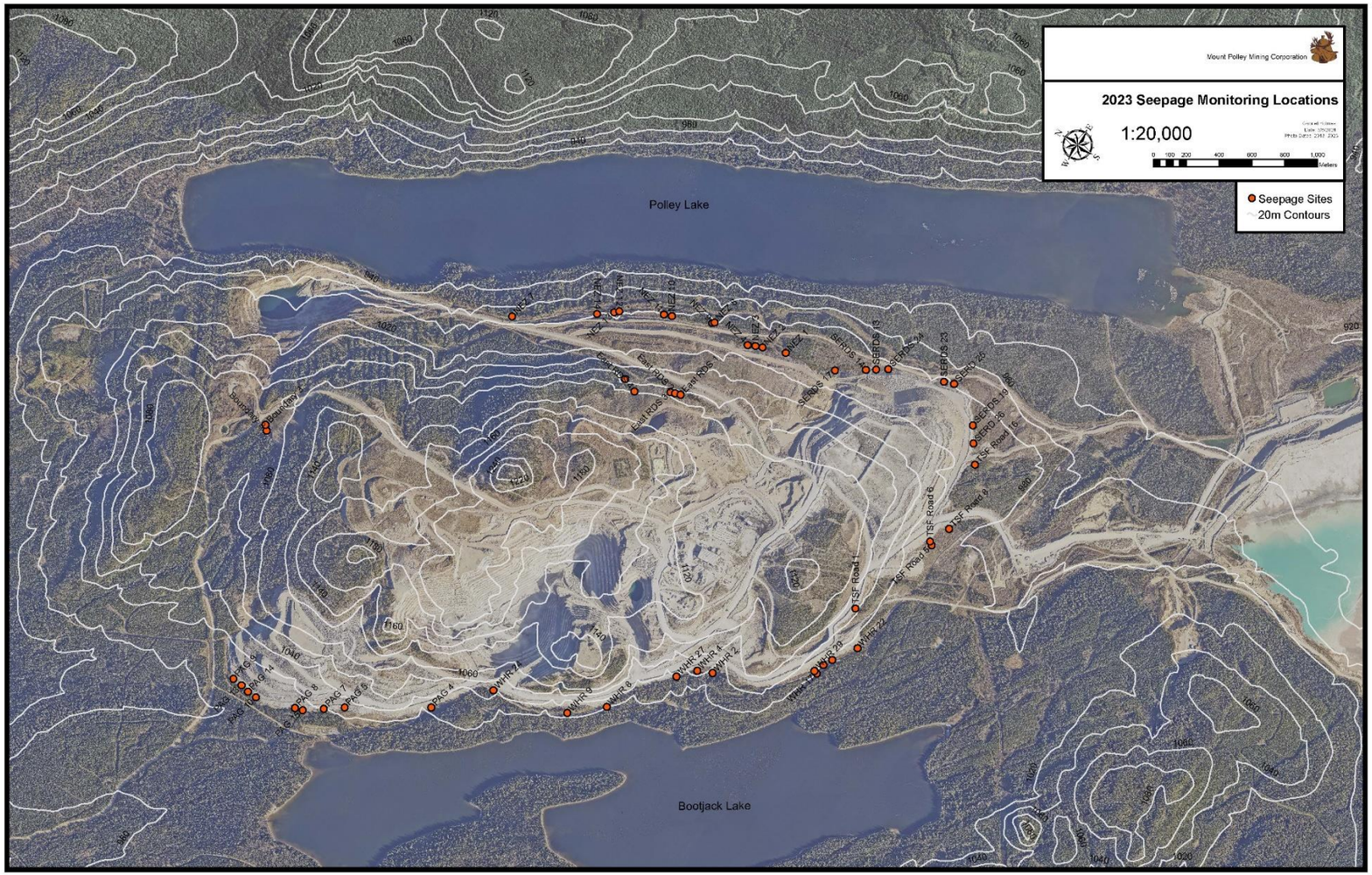
Source: MPMC

Figure 4: 2023 Contact Water Monitoring Locations



Source: MPMC

Figure 5: 2023 Seepage Monitoring Locations



Source: MPMC

4 Methods

4.1 Overview

Chemical analysis is either carried out by MPMC's on-site laboratory or external laboratories. Operational monitoring of ARD potential is carried out by the on-site laboratory (Section 4.3). Confirmatory analyses for the on-site lab as well as additional geochemical studies, such as humidity cell tests (HCTs) and water sampling, are analyzed at external laboratories (Section 4.4).

In this report, all laboratory results have been rounded to two significant figures to reflect analytical uncertainty. When results are less than detection limits, the detection limit was used for calculations.

4.2 Sample Acquisition

4.2.1 Solid Samples

Blast Hole Samples

Blast hole samples drilled for production are sampled by MPMC personnel. Testing for waste classification consisted of ABA analysis in the on-site laboratory as described in Section 4.3. MPMC carried out testing on 979 samples in 2023. The methodology for drilling to waste segregation and characterization is described in MPMC (2022b).

Two random blast hole samples were selected each month when mining and submitted to an external laboratory for trace element analysis, as described in Section 4.4.

Placed Rock Samples

Sampling of placed rock samples followed procedures outlined in *MPMC-SOP-016: ABA and Soil Sampling* (MPMC 2021). Testing on placed rock samples was carried out in the on-site laboratory as described in Section 4.3. In 2023, 52 samples were tested.

Tailings Samples

Tailings monthly composite samples are collected by MPMC personnel and comprise weighted shift composite samples. Testing consists of ABA analysis in the on-site laboratory as described in Section 4.3 and trace element analysis at an external laboratory, as described in Section 4.4. Monthly samples were collected in 2023 (twelve samples total).

SERDS Co-Disposal Samples

MPMC staff collected co-disposed tailings samples in accordance to sampling procedures outlined in *MPMC-SOP-016: ABA and Soil Sampling* (MPMC 2021). In 2023, 141 samples were collected

between May and December, at a frequency of approximately daily when tailings are deposited. This exceeds the recommended frequency of once per week for the time period.

Three samples collected in May, June, and August 2023 were sent to the external laboratory for analysis of trace elements and porewater but results were not available at the time of reporting. The required frequency is once per month for these analyses.

Kinetic Testing Samples

Waste rock samples selected for humidity cell testing as part of past geochemical testing programs were drill core samples selected to evaluate oxidation rates for typical and elevated sulphide concentrations. One sample from the Pond Zone, two samples from the Springer Deep Zone, and two samples from the WX Zone are continuing.

Waste rock and tailings samples collected for the waste rock columns were collected by Mount Polley site personnel.

The tailings samples were collected from Hazeltine Creek following the TSF breach and were selected to represent visually distinctive tailings materials (magnetite sand and grey tailings). The samples are dominated by tailings solids but also contained native materials (mineral and organic soils, and glacial sediments entrained in the debris flow). The samples characterize weathering behaviour for a range of sulphur concentrations which align with typical characteristics of tailings in the TSF.

4.2.2 Water Samples

MPMC staff were responsible for the collection of samples and submission to the analytical laboratory (ALS Environmental in Burnaby, BC). MPMC managed the 2023 data. SRK assumes that all water quality results have undergone Quality Assurance/Quality Control (QA/QC) as outlined in MPMC's QA/QC Manual and has not performed additional QA/QC.

4.2.3 Water Treatment Plant Waste Samples

Water samples were collected at the discharge pipe outflow.

Composite sediment samples were collected from the sludge pile adjacent to the WTP. In 2023, five samples of WTP wastewater and six sediments samples were collected at a frequency of approximately once per quarter.

4.3 On-Site Laboratory

4.3.1 Analytical Procedures

Static testing of all solid monitoring samples consists of ABA analysis by means of total carbon and total sulphur determination by induction furnace combustion using a LECO CS230CSH. Any other

analyses used to inventory waste characteristics rather than make operational management decisions are performed off-site.

4.3.2 Quality Control and Quality Assurance

4.3.3 Off-Site Confirmatory Analysis

4.4 External Laboratories

Additional studies are performed off-site at either Bureau Veritas (waste rock kinetic tests), formerly Maxxam Analytics (Burnaby, BC) or ALS Environmental (Burnaby, BC).

4.4.1 Static Testing

Static testing consisted of:

- Acid Base Accounting (ABA):
  - Paste pH
  - Total sulphur and total carbon (by Leco)
  - Sulphate sulphur (HCl leach), sulphide sulphur (by difference)
  - Total inorganic carbon (HCl leach, evolved CO_2 analysed by Leco)
  - Modified Sobek NP
- Elemental analysis (aqua regia digest followed by ICP-MS multi-element scan)
- Shake Flask Extraction (SFE) conducted on select WTP sediment samples.

4.4.2 Kinetic Testing

Leachates from kinetic testing are analyzed for:

- pH, conductivity, oxidation-reduction potential (ORP),
- Total acidity (HCTs only), total alkalinity, sulphate, chloride (newest HCTs and columns only), fluoride (newest HCTs and columns only), nitrate (columns only), and
- Dissolved metals (multi-elemental ICP-MS).

4.4.3 Water Samples

Water samples are collected from waste rock and tailings embankment seepage, and sumps and ditches in the water management infrastructure around the mine site. Analytical parameters and parameters of interest (indicated by an 'X') are in Table 4. Parameters of interest (POIs) have been chosen based on discharge permit limits (ENV 2022). Samples were analyzed for general parameters,

organic carbon, anions, nutrients, and total and dissolved elements. Field pH and conductivity were recorded for all stations in-situ at the time of sampling.

Table 4: Summary of Analytical Parameters and Parameters of Interest

Parameter	Unit	POI
Field Parameters		
Field pH	pH unit	x
Field Specific Conductivity	µS/cm	
Field Temperature	°C	
Field Turbidity	NTU	
Physical Parameters		
Electrical Conductivity	µS/cm	
Hardness (as $CaCO_3$)	mg/L	
Lab pH	pH unit	x
Total Dissolved Solids	mg/L	
Total Suspended Solids	mg/L	x
Lab Turbidity	NTU	
Anions and Nutrients		
Alkalinity, Total (as $CaCO_3$)	mg/L	
Ammonia, Total (as N)	mg/L	x
Chloride (Cl)	mg/L	
Fluoride (F)	mg/L	x
Nitrate and Nitrite (as N)	mg/L	
Nitrate (as N)	mg/L	x
Nitrite (as N)	mg/L	x
Total Nitrogen	mg/L	
Orthophosphate-Dissolved (as P)	mg/L	
Phosphorus (P) – Total Dissolved	mg/L	
Phosphorus (P) – Total	mg/L	x
Sulphate (SO_4)	mg/L	x
Organic / Inorganic Carbon		
Dissolved Organic Carbon	mg/L	

Parameter	Unit	POI
Total and Dissolved Metals		
Aluminum (Al)	mg/L	x
Antimony (Sb)	mg/L	
Arsenic (As)	mg/L	x
Barium (Ba)	mg/L	
Beryllium (Be)	mg/L	
Bismuth (Bi)	mg/L	
Boron (B)	mg/L	
Cadmium (Cd)	mg/L	x
Calcium (Ca)	mg/L	
Chromium (Cr)	mg/L	x
Cobalt (Co)	mg/L	
Copper (Cu)	mg/L	x
Iron (Fe)	mg/L	x
Lead (Pb)	mg/L	
Lithium (Li)	mg/L	
Magnesium (Mg)	mg/L	
Manganese (Mn)	mg/L	x
Molybdenum (Mo)	mg/L	x
Nickel (Ni)	mg/L	
Potassium (K)	mg/L	
Selenium (Se)	mg/L	x
Silicon (Si)	mg/L	
Silver (Ag)	mg/L	
Sodium (Na)	mg/L	
Strontium (Sr)	mg/L	
Thallium (Tl)	mg/L	
Tin (Sn)	mg/L	
Titanium (Ti)	mg/L	
Uranium (U)	mg/L	
Vanadium (V)	mg/L	
Zinc (Zn)	mg/L	x

4.5 Data Interpretation Methods

4.5.1 Sulphur Species and Acid Potential

Total sulphur is assumed to be a proxy for sulphide sulphur because other sulphur forms (including sulphate) are rare at Mount Polley Mine (SRK 2023). Therefore, acid potential (AP) is calculated as follows:

$$AP\ (kg\ CaCO_3/t) = Total\ Sulphur\ (\%) \times 31.25$$

4.5.2 Neutralization Potential

Total carbon is assumed to be a proxy for reactive carbonate minerals. The assumption is described in SRK (2023) and is supported by the observed dominance of calcite, the lack of reported iron carbonate at Mount Polley, and the strong correlation and equivalence of total carbon and total carbonate. Therefore, neutralization potential from total inorganic carbon (NP*) is calculated as follows:

$$NP^*\ (kg\ CaCO_3/t) = Total\ Carbon\ (\%) \times (1000/12)$$

4.5.3 Acid Rock Drainage Potential

Calculated NP*/AP ratios indicated future potential for ARD as sulphides oxidize with time. The NP_{TIC} represented calcium carbonate that contributes to neutralization and the AP represented acid potential measured from the sulphide content of the sample.

A NP*/AP greater than 2 indicated negligible potential for ARD (non-PAG or NAG), whereas a NP*/AP equal to or less than 2 indicated the material had potential to generate ARD (PAG).

4.5.4 Metal Leaching Potential

Trace element concentrations provide an indication of the degree to which rock may contain elevated concentrations. Results were compared to the Mount Polley waste rock and tailings database.

4.5.5 Interannual Trends in Water Chemistry

A visual qualitative review of time trends in concentrations was conducted for contact water and seepage monitoring locations. In addition, a statistics review was conducted to compare concentrations in 2023 to historical concentrations. A sample was considered to have a significant increase in a parameter concentration in 2023 if the 2023 dataset's lower 95% confidence limit was higher than the historical dataset's upper 95% confidence limit. A sample was considered to have a significant decrease in a parameter concentration in 2023 if the 2023 dataset's upper 95% confidence limit was less than the historical dataset's lower 95% confidence limit.

4.5.6 PHREEQC Modelling Methods for Water Chemistry

Saturation Indices (SI) for gypsum ($CaSO_4 \cdot 2H_2O$), calcite ($CaCO_3$), malachite ($Cu_2CO_3(OH)_2$), tenorite (CuO), and calcium molybdate ($CaMoO_4$) were modelled using PHREEQC with the minteq.v4 database to indicate possible constraining minerals. Concentrations that were below the detection limit were modelled using the detection limit concentration. An SI value of zero conventionally indicates that the mineral is at equilibrium (neither forming nor dissolving). However, this might change due to dilution, dissolution of other minerals, and changes in the gas' phases. No SI reference values have been established for Mount Polley, so it was assumed that samples with an SI below -0.5 indicated under-saturation, values between -0.5 and 0.5 indicated near equilibrium, and values above 0.5 indicated super-saturation.

5 Data Quality Review

5.1 Solids

5.1.1 In-House Quality Control

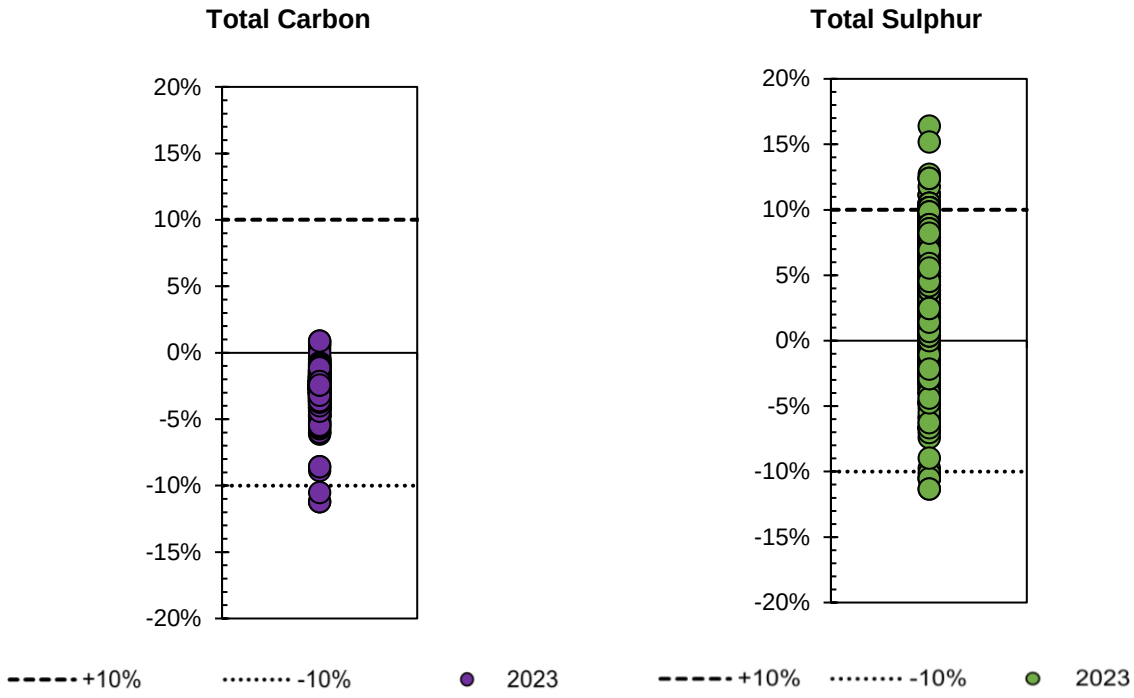
The on-site laboratory QAQC at Mount Polley includes testing blank samples and samples of one reference material. Blank samples are considered to meet QAQC standards if results are less than 2 times the detection limit of the analysis. The Certified Reference Material (CRM) standard is 0.79% total carbon and 0.28% total sulphur. CRMs are considered to meet QAQC standards if results are within tolerance limits of 0.71 to 0.87% and 0.25 and 0.31% for total carbon and total sulphur, respectively.

In 2023, a total of 3,326 solids samples in 258 sample trays (i.e., batches) were analysed at the on-site laboratory for ML/ARD monitoring, which consisted of the following:

- 1,108 blast hole rock samples, including two field duplicates, and 127 on-site laboratory duplicates.
- 23 tailings samples, including 11 on-site laboratory duplicates.
- 54 placed waste rock samples, including one field duplicate and one on-site laboratory duplicate.
- 177 samples of tailings collected during SERDS co-disposal, including 36 on-site laboratory duplicates.
- 774 blank samples.
- 1,033 samples of one CRM (NBM-1).
- 157 samples that were not reported, as they are not part of the monitoring commitments.

Blank samples are prepared using no sample and run with only combustible reagents through the LECO furnace. All blank samples were at or below detection for total carbon and total sulphur, meeting QAQC standards. The CRM sample failed on two analyses for total carbon (0.2% of CRM samples) and on 14 analyses for total sulphur (1.4% of CRM samples). In general, total carbon results trended lower than the CRM (Figure 6). No trend was evident for total sulphur results. These failed analyses impacted 11 of 258 sample trays. Four of the failed sample trays were flagged by the laboratory technician but were not reanalyzed, while six of the failed trays were not flagged. The six trays that were not flagged had total sulphur values measured at 0.32%. Field duplicates are discussed in their respective QA/QC sections below.

Figure 6: Variation of Total Carbon (Left) and Total Sulphur (Right) CRM Results Compared to CRM Standard Concentration



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Deliverables/2023_MLARD_Annual_Report/020_Tables/[Onsite-Lab-QAQC_Table_CAPR002434_Rev00_KWJ.xlsx]

In 2023, 23 samples analyzed by the on-site laboratory were selected and sent to an external ISO certified commercial laboratory for analysis. Blast hole rock and tailings samples were sent to ALS Laboratories in Burnaby, BC for confirmatory analysis of total carbon and total sulphur. Total sulphur and total carbon analysis were determined using a Leco furnace. The results between the on-site (X_{int}) and external (X_{ext}) laboratories were compared using a relative percent difference (RPD), calculated as follows:

$$RPD = \frac{X_{int} - X_{ext}}{(X_{int} + X_{ext})/2} \times 100\%$$

SRK applied an RPD acceptance criterion of ±20% for both total carbon and total sulphur.

Raw results are included in Appendix A.

Blast Hole Rock Samples

Eleven blast hole rock samples were sent off site to ALS for confirmatory analysis in 2023. Figure 7 shows the distribution of total carbon and total sulphur RPDs between the on-site and off-site laboratories for the 11 samples.

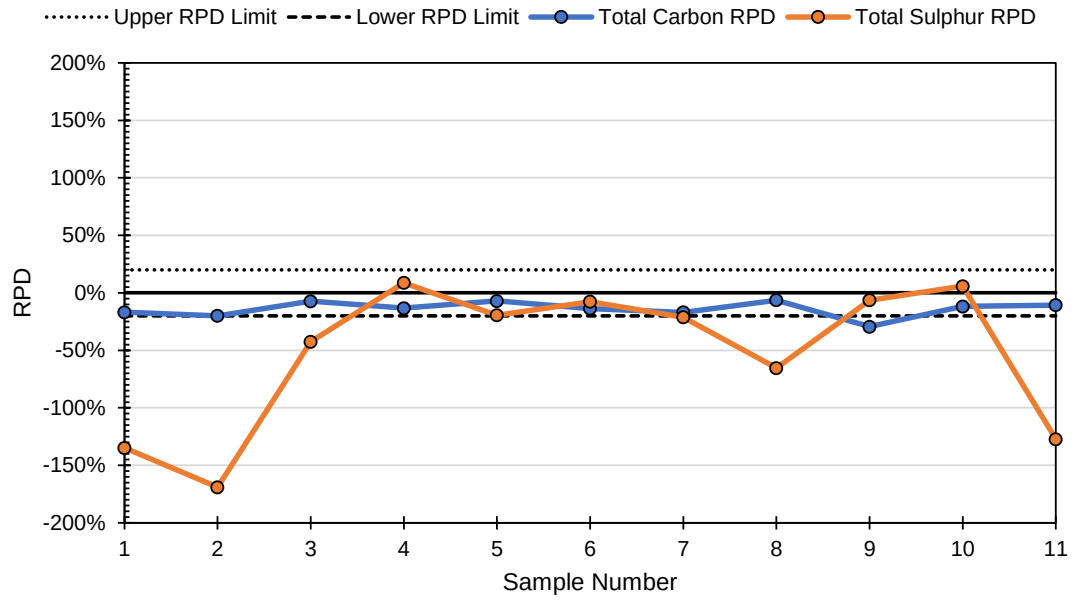
One of the 11 samples was outside of the ±20% RPD acceptance criterion for total carbon. All samples showed lower concentrations of total carbon from the on-site laboratory results in comparison to the off-site laboratory results.

Six samples were outside of the 20% RDP acceptance criteria for total sulphur with large variability. All failing samples showed lower concentrations of total sulphur from the on-site laboratory results in comparison to the off-site laboratory results. Five of these six samples (numbers 1, 2, 3, 8, and 11 in Figure 7) had off-site laboratory results that were less than 10 times the detection limit (0.01% for both on-site and off-site laboratories) and is likely the reason for these RPDs being outside the acceptance criteria. The remaining sample with an RPD outside of the acceptance criteria was close to passing (-21% RPD). The RPD for when total sulphur results were greater than 10 times the detection limit ranged between -21% to 9%.

Figure 8 compares the NP/AP calculated using on-site laboratory results and external laboratory results for these samples. No samples were misclassified as PAG or non-PAG. SRK considers discrepancies within $\pm$20% RPD as acceptable when total sulphur and total carbon values are greater than 10 times the detection limit.

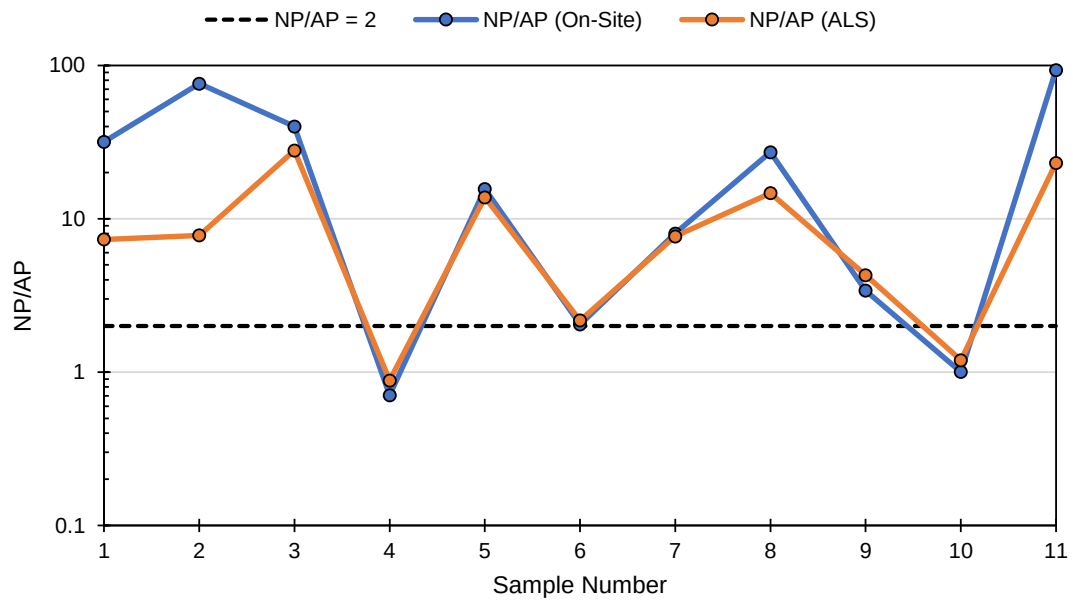
MPMC did not provide SRK with details about how it handled laboratory results that were outside of its acceptance criteria in 2023.

Figure 7: Relative Percent Difference of On-Site and External Lab Duplicates for Total Carbon and Total Sulphur Analyses for Waste Rock Samples



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Deliverables/2023_MLARD_Annual_Report/020_Tables/[Onsite-Lab-QAQC_Table_CAPR002434_Rev00_KWJ.xlsx]

Figure 8: NP/AP of On-Site and External Lab Duplicates for Waste Rock Samples



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Deliverables/2023_MLARD_Annual_Report/020_Tables/[Onsite-Lab-QAQC_Table_CAPR002434_Rev00_KWJ.xlsx]

Tailings Samples

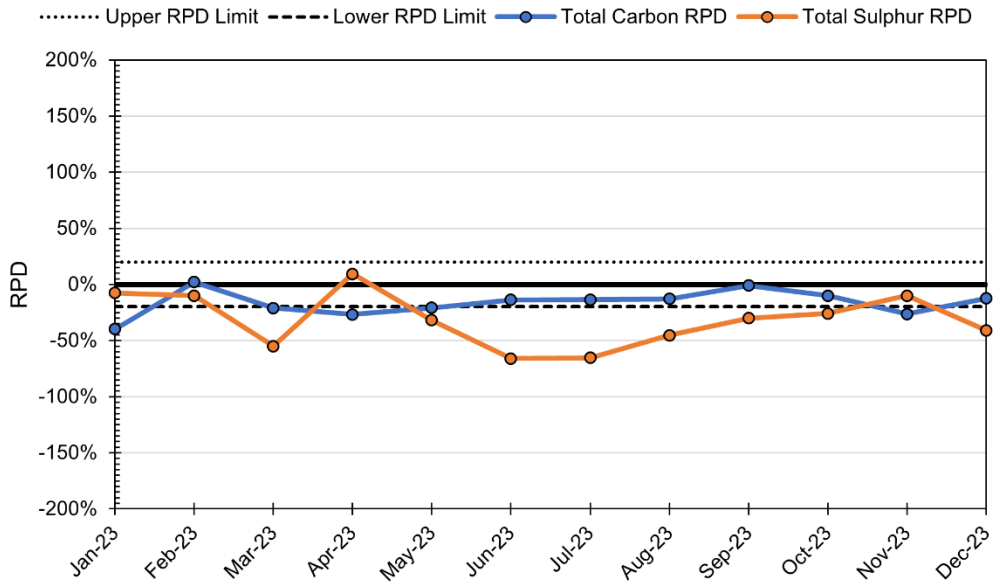
Twelve tailings samples were sent off site to ALS for confirmatory analysis in 2023. Five of the 12 samples (42%) were outside of the 20% RPD acceptance criteria. All five of the failing samples showed lower concentrations of total carbon from the on-site laboratory results in comparison to the off-site laboratory results (Figure 9).

Eight samples (67%) were outside of the 20% acceptance criteria for total sulphur. Similar to total carbon, all of the failing samples showed lower concentrations of total sulphur from the on-site laboratory results in comparison to the off-site laboratory results.

Based on these results, SRK considers the on-site laboratory may be underreporting total carbon and total sulphur results of tailings samples. Figure 10 compares the NP/AP calculated using on-site laboratory results and external laboratory results for these samples. No samples were misclassified as PAG or non-PAG based on-site data.

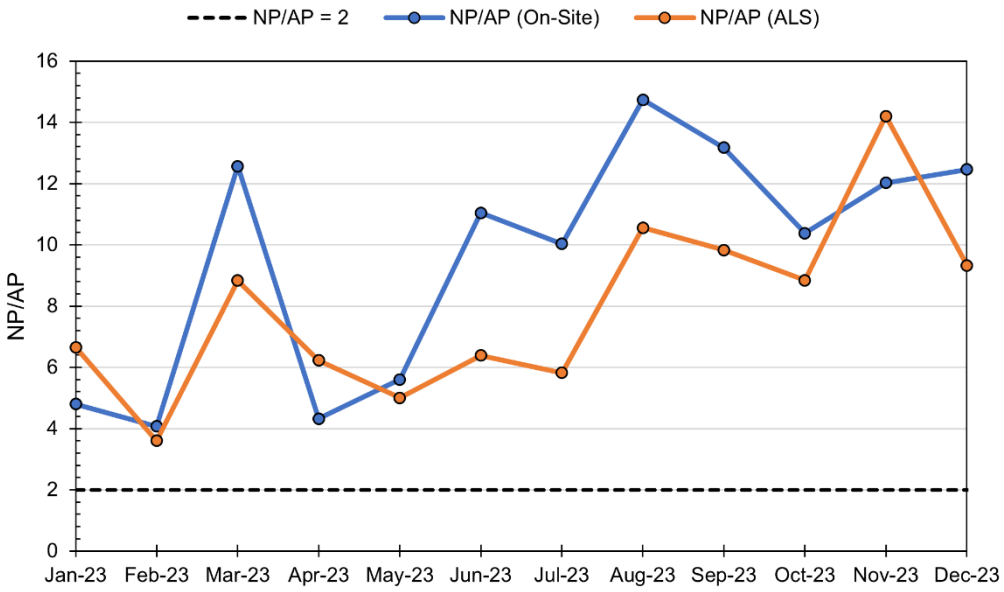
MPMC did not provide SRK with details about how it handled laboratory results that were outside of its acceptance criteria in 2023.

Figure 9: Relative Percent Difference of On-Site and External Lab Duplicates for Total Carbon and Total Sulphur Analyses for Tailings Samples



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Deliverables/2023_MLARD_Annual_Report/020_Tables/[Onsite-Lab-QAQC_Table_CAPR002434_Rev00_KWJ.xlsx]

Figure 10: NP/AP of On-Site and External Lab Duplicates for Tailings Samples



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Deliverables/2023_MLARD_Annual_Report/020_Tables/[Onsite-Lab-QAQC_Table_CAPR002434_Rev00_KWJ.xlsx]

5.1.2 QAQC Recommendations

Based on the review of the on-site laboratory QAQC results, the following recommendations have been made:

- The frequency of in-house duplicates and off-site confirmatory analysis is too low for blast hole and placed material samples. Both should be performed on 10% of all samples until acceptable performance is achieved, after which 5% will be appropriate. In 2023, a sufficient number of in-house duplicates were analyzed for blast hole and tailings samples, as well as off-site confirmatory samples for tailings. The other datasets were not sufficient to determine if the on-site laboratory is performing acceptably.
- CRM and blank analysis can be reduced to 5% of samples.

5.1.3 External Quality Assurance

All static testing coordinated by SRK undergoes SRK's internal QA/QC check composed of:

- For ABA testing:
  - For pH, lab duplicates should be within ±0.5 difference pH unit.
  - Total carbon should be equal to or higher than total inorganic carbon.
  - Sulphate should not exceed total sulphur. Sulphide is determined by difference.

  - Comparison between Total S-Leco and S-ICP should have RPD within ±20%.
  - NP does not exceed maximum NP indicated by acid strength and acid volume indicated by fizz.
  - Negative NP has paste pH below 5.
  - For laboratory duplicates RPD better than ±30% except within 10 times of detection limit (DL).
  - Standard reference materials should be within ±20%.
  - Lab blank should be under 2 times the DL.
- For elemental analysis:
  - Lab blank should be under 2 times the DL.
  - For lab duplicates samples over 10 times the DL, RPD within ±20%.
  - Standard reference materials should be within ±20%.
- For shake flask extraction:
  - Lab blank should be under 2 times the DL.
  - For lab duplicates samples over 10 times the DL, RPD within ±20%.
  - Standard reference materials should be within ±20%.

Results that do not pass the quality checks are evaluated and if considered necessary submitted for re-analysis. QA/QC of external laboratory results are discussed in their respective sections in Section 5.

The quality of all laboratory humidity cell and column data are regularly assessed for:

- Ion charge balance calculations with a target balance of less than ±10%.
- Off-trend spikes in the data that may indicate issues with the sampling or analysis.
- Contamination of the deionized water used for the test.

Results that do not pass the quality checks are evaluated, and if detected within the respective holding time, are submitted again for analysis.

Spikes in the data are flagged and reanalyzed. The value is either replaced by the reanalyzed concentration or confirmed. When a spike is confirmed, the lab is asked to identify potential issues that may have led to the spike in concentration. These causes are documented and if possible, amended. Parameter concentrations that show consistent fluctuations at concentrations near the detection limit are considered effects of analytical uncertainty.

5.2 Waters

SRK has assumed that the database of water quality results received from MPMC are of acceptable quality.

6 Blast Hole Monitoring

6.1 QA/QC

In 2023, two field duplicates of blast hole samples were collected and analysed at the on-site laboratory for total sulphur and total carbon. RPD values were calculated between the parent and duplicate sample, and RPD values were 1.2% and 5.1% for total carbon and both 0% for total sulphur. All RPD values were within the 10% RPD acceptance criteria.

Trace element concentrations of blast hole samples were analyzed at ALS Environmental in Burnaby, BC in 2023. QA/QC for these analyses are summarized in Table 5. SRK considered all results acceptable for this assessment.

Table 5: QA/QC for Blast Hole Samples Analyzed in External Laboratory

QC Test	n	SRK QC Criteria	Results
Physical Tests (Matrix: Soil/Solid)			
Lab Duplicate	5	For any samples, +/- 0.5 difference pH unit.	All Passed
Laboratory Control Sample (1:2 soil:water)	5	Within specified tolerance ranges.	All Passed
Reference Material (1:2 soil:water)	5	Within specified tolerance ranges.	All Passed
Organic / Inorganic Carbon (Matrix: Soil/Solid)			
Method Blank for Total Carbon	5	<2X detection limit (DL)	All Passed
Lab Duplicate	5	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample for Total Carbon	5	Within specified tolerance ranges.	All Passed
Reference Material for Total Carbon	5	Within specified tolerance ranges.	All Passed
Inorganics (Matrix: Soil/Solid)			
Method Blank for Total Sulfur	5	<2X detection limit (DL)	All Passed
Lab Duplicate for Total Sulfur	5	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample for Total Sulfur	5	Within specified tolerance ranges.	All Passed
Reference Material for Total Sulfur	5	Within specified tolerance ranges.	All Passed
Metals (Matrix: Soil/Solid)			
Method Blank	6	<2X detection limit (DL)	All passed.
Lab Duplicate	6	>10X DL, RPD better than +/- 20%	All passed.
Laboratory Control Sample	6	Within specified tolerance ranges.	All passed.
Reference Material	6	Within specified tolerance ranges.	All passed.

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/040_Lab Data/2023 Annual Reporting/Blast Data/QAQC Results/[CAPR003074_Mt Polley_Blast_Data_Compiled Summary QAQC Results_cc.xlsx]Summary QAQC

6.2 Monitoring of ARD Potential

Table 6 summarizes the tonnage of low grade ore (LGO) and waste rock stockpiled in 2023. Raw blast hole sampling data are provided in Appendix B.

Summary statistics of the ABA data for ore and LGO in 2023 are provided in Table 7 and Table 8. On average, ore and LGO are NAG. Table 9 shows summary statistics for waste rock in 2023. Of the 675 waste rock samples collected in 2023, 497 (74%) were classified as NAG while the remainder were PAG. Results are consistent with past results (e.g., SRK 2015a, SRK 2016, SRK 2023a) that showed Springer Pit rock as dominantly NAG with some PAG components (Figure 11). In 2023, 8 blasthole samples were not classified according to ore, LGO, and waste.

Table 6: Waste Rock and Low Grade Ore Stockpiled in 2023

Name of Waste Pile or Stockpile	Potentially Acid Generating		Non-Acid Generating	
Waste Dumps				
	2023	**Total**	**2023**	**Total**
1. Southeast Rock Dump	0	0	7,083,080	69,815,254
2. NAG/PAG Dump	3,789,784	34,768,129	1,093,900	9,557,116
Total	**3,789,784**	**34,768,129**	**8,176,980**	**79,372,370**
Low Grade Ore / Coarse Reject / Other Mine Waste				
1. Belt Cleanup Stockpile	0	0	0	0
2. #3 Ore Stockpile (LG)	0	165,600	0	0
3. Leach Stockpile (LG)	0	2,564,475	0	0
4. Southeast Rock Dump	0	0	0	0
5. Cariboo LG Stockpile	0	267,921	10,700	10,700
Total	**0**	**2,997,996.00**	**10,700**	**10,700**

Sources: MPMC

Table 7: Statistical Summary of Blast Hole ABA Data for Ore in 2023

Statistic (n =282)	Total Sulphur	Total Carbon	AP	NP	NP/AP
	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-
Min	0.01	0.018	0.31	1.5	0.11
P5	0.014	0.092	0.44	7.7	0.64
P25	0.11	0.17	3.6	14	1.7
P50	0.18	0.25	5.6	21	3.5
Average	0.28	0.28	8.8	23	2.6
P75	0.34	0.36	11	30	6.8
P95	0.83	0.58	26	48	28
Max	2.4	0.9	75	75	110

Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL_KWJ.xlsx

Table 8: Statistical Summary of Blast Hole ABA Data for Low Grade Ore in 2023

Statistic (n = 14)	Total Sulphur	Total Carbon	AP	NP	NP/AP
	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-
Min	0.01	0.092	0.31	7.7	0.25
P5	0.018	0.1	0.56	8.4	2.3
P25	0.03	0.15	0.95	12	5.0
P50	0.066	0.22	2.1	18	7.3
Average	0.2	0.3	6.1	25	4.1
P75	0.12	0.38	3.8	32	21
P95	0.75	0.73	23	61	97
Max	1.7	0.8	53	66	98

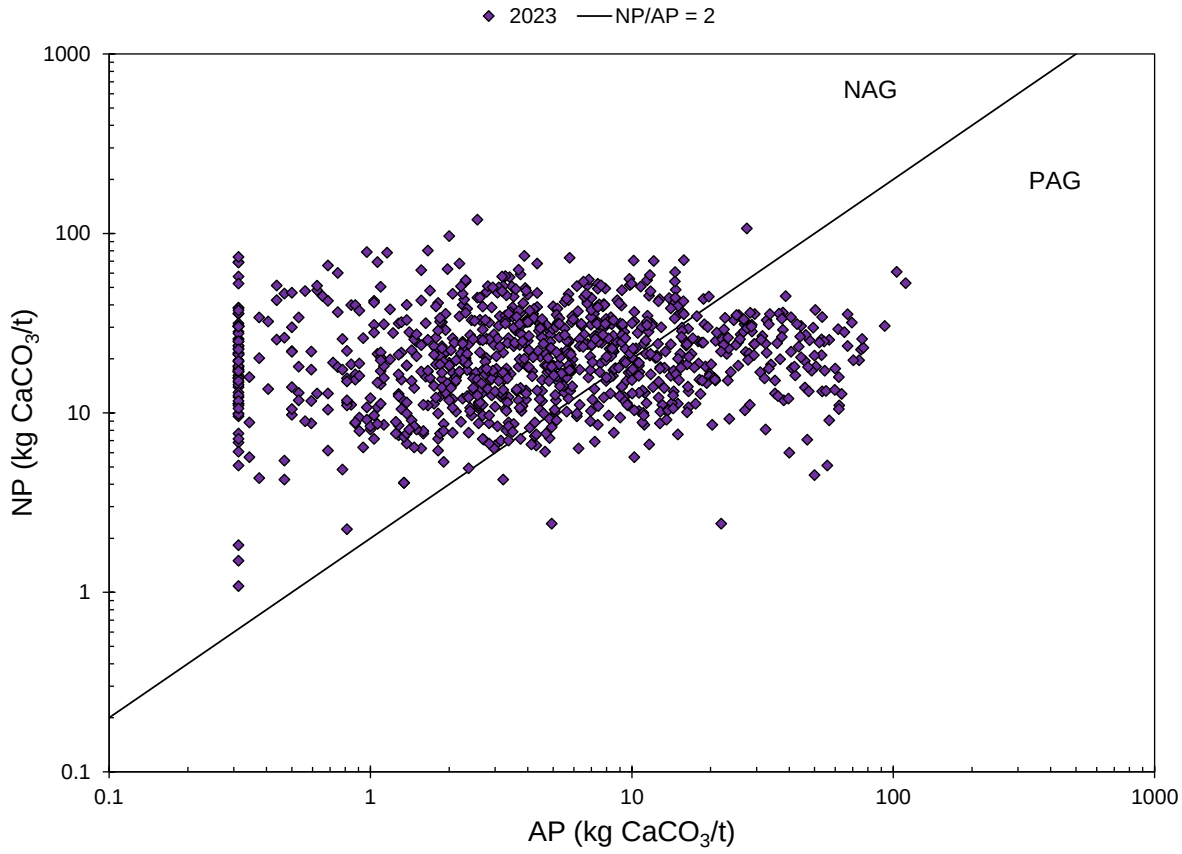
Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL_KWJ.xlsx

Table 9: Statistical Summary of Blast Hole ABA Data for Waste Rock in 2023

Statistic (n = 675)	Total Sulphur	Total Carbon	AP	NP	NP/AP
	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-
Min	0.01	0.013	0.31	1.1	0.09
P5	0.01	0.089	0.31	7.4	0.43
P25	0.047	0.16	1.5	13	1.8
P50	0.11	0.24	3.3	20	5.3
Average	0.32	0.28	10	24	2.4
P75	0.32	0.37	10	31	13
P95	1.5	0.61	47	51	68
Max	3.6	1.4	110	120	240

Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL_KWJ.xlsx

Figure 11: NP/AP of Blast Hole Samples Collected in 2023



Sources:https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

6.3 Monitoring of Trace Element Concentrations

As described in SRK (2023b), when compared to the global average for igneous rocks (Price 1997), some rocks (greater than 75% of samples) at Mount Polley Mine have concentrations an order of magnitude higher for antimony, arsenic, copper, molybdenum, selenium, and silver. Copper concentrations correlate with selenium concentrations.

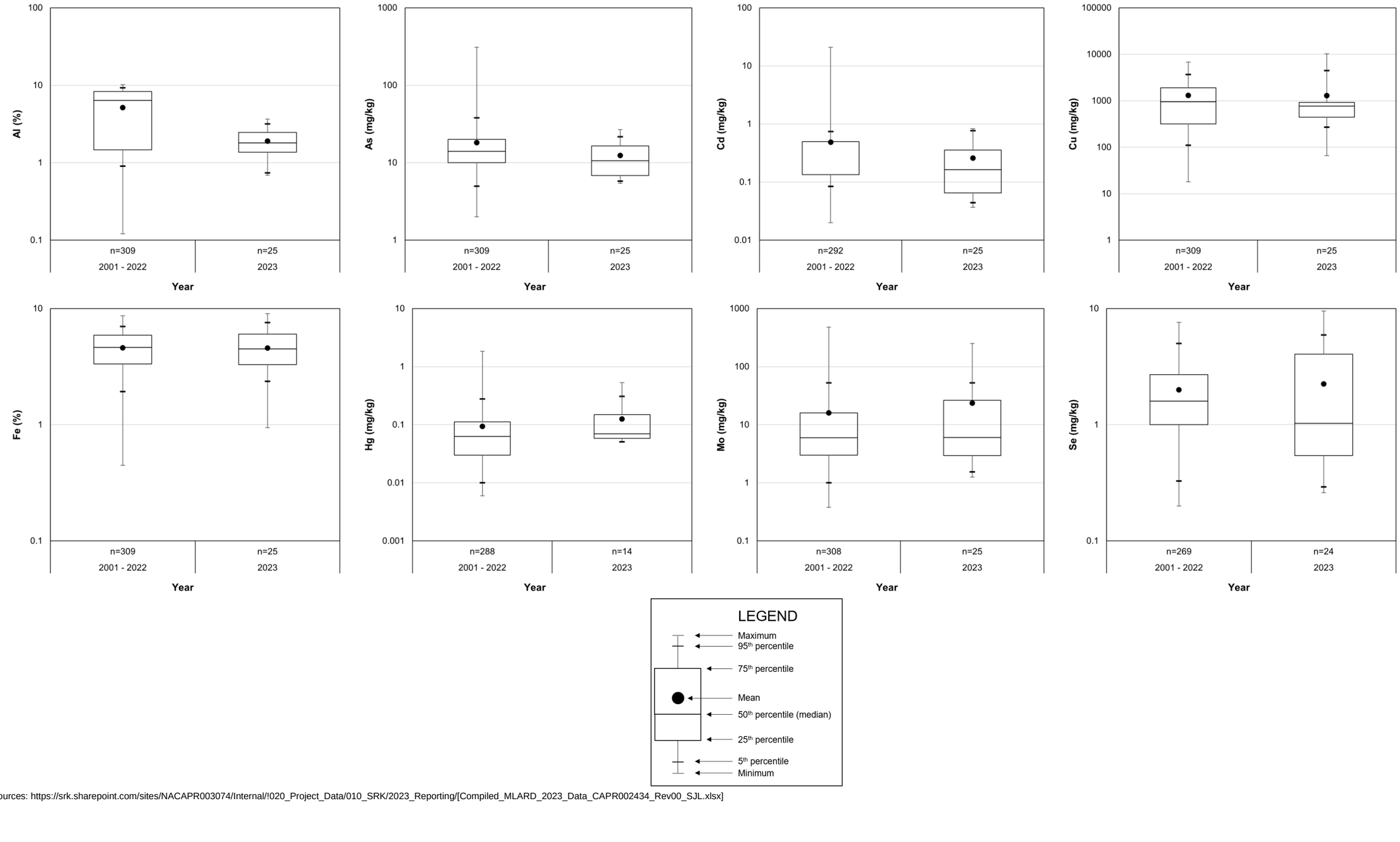
Summary statistics of these trace element concentrations as well as POIs identified in Section 4.4.3 of drill hole waste rock samples collected in 2023 are provided in Table 10. Box-and-whisker plots comparing these elements to previous trace element waste rock data are provided in Figure 12. Results from 2023 are within historical ranges and averages in 2023 are also similar compared to historical averages. More variability as shown by the spread of quartiles is apparent for selenium content.

Table 10: Select Trace Element Concentrations of Blast Hole Waste Rock Samples in 2023

Year	Statistic	Aluminum	Arsenic	Cadmium	Copper	Iron	Mercury	Molybdenum	Selenium
		%	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg
2023 (n = 25)	Min	0.69	5.4	0.037	66	0.94	0.05	1.3	0.26
	P5	0.74	5.8	0.044	270	2.4	0.051	1.6	0.29
	P25	1.4	6.8	0.065	440	3.3	0.058	2.9	0.54
	P50	1.8	11	0.16	770	4.5	0.07	6	1
	Average	1.9	12	0.26	1300	4.6	0.13	24	2.2
	P75	2.5	17	0.36	920	6	0.15	26	4.1
	P95	3.2	22	0.77	4400	7.6	0.31	53	5.9
	Max	3.7	27	0.8	10000	9.1	0.5	250	9.5

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

Figure 12: Select Trace Element Concentrations of Blast Hole Waste Rock Samples Collected in 2023 Compared to Previous Years



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

7 Waste Rock Monitoring

7.1 QA/QC

QA/QC of ABA parameters analyzed at the on-site lab is described in Section 4.3.2.

In 2023, one field duplicate sample was collected during placed waste rock monitoring. This sample was analyzed at the on-site laboratory for total carbon and total sulphur, and the calculated RPD values were 9.7% and 16%, respectively. The total sulphur RPD value was outside of the 10% RPD acceptance criteria and may reflect small-scale variability during sample collection.

No analyses for placed waste rock samples were completed at external laboratories.

7.2 Confirmatory Sampling

In 2023, 52 confirmatory samples of placed waste rock were collected and analyzed for total sulphur and total carbon (Table 11). Raw results are provided in Appendix C. These samples were collected from the active dump crest on the South East Rock Disposal Site (SERDS) and locations where rock was being used as construction material, including road and TSF dam construction. MPMC indicated that NAG waste rock was mined for 52 weeks in 2023 and MPMC collected weekly samples, resulting in full compliance for confirmatory sampling.

One sample collected from the SERDS was classified as PAG (NP/AP = 1.5) after placement (2% of all samples) (Figure 13). The field duplicate collected was also classified as PAG (NP/AP = 1.6). Other confirmatory samples collected from the SERDS were NAG (NP/AP ranged from 4.4 to 220), so it is likely that this PAG sample was a reflection of small-scale variation in the material. No resampling was conducted, and no further action was taken by MPMC.

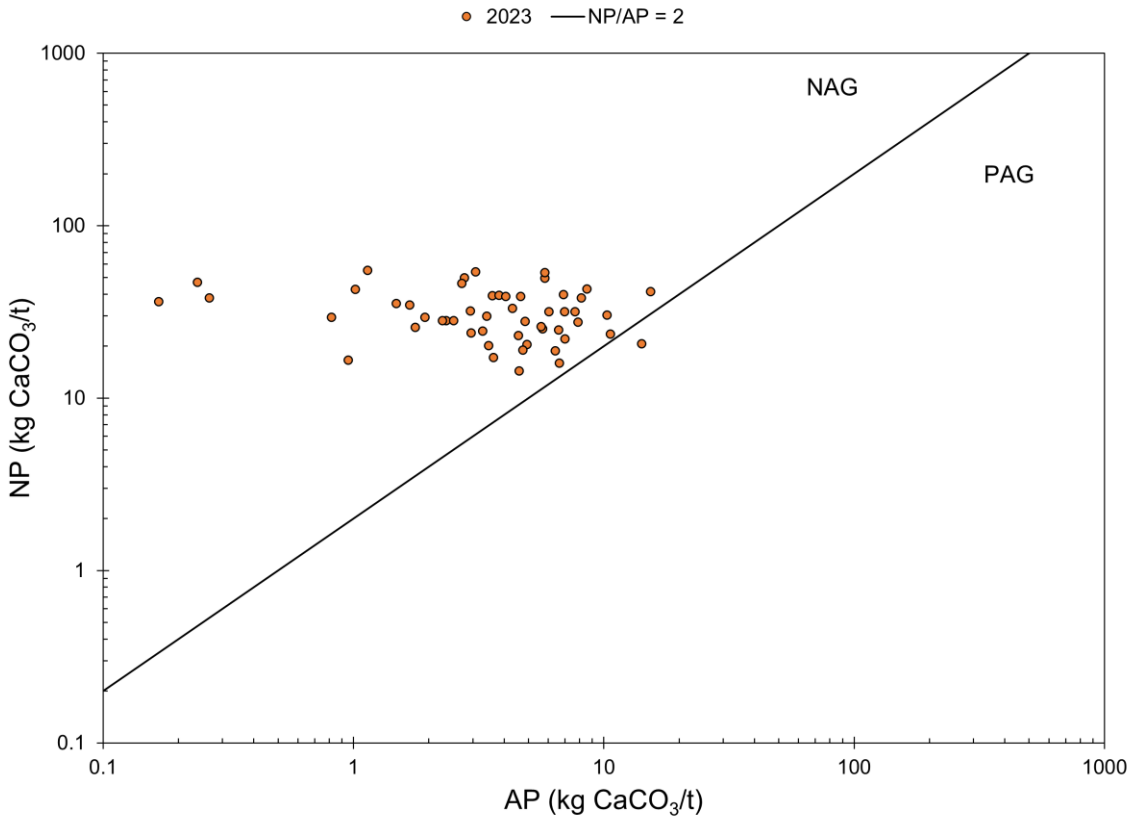
In the SERDS, excess NP is available for neutralization from surrounding NAG material with greater NP/AP values. As a result, SRK concludes the risk of ARD developing for this material is low.

Table 11: Summary Statistics of ABA Parameters for Placed NAG Waste Rock Samples in 2023

Statistic	Total Sulphur	Total Carbon	AP	NP	NP/AP
(n = 52)	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-
Min	0.005	0.17	0.17	14	1.5
P5	0.018	0.2	0.57	17	2.6
P25	0.079	0.29	2.5	24	4.4
P50	0.13	0.36	4.2	30	7.9
Average	0.15	0.38	4.7	32	6.8
P75	0.21	0.47	6.5	39	15
P95	0.33	0.62	10	51	91
Max	0.5	0.66	15	55	220

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL_KWJ.xlsx]

Figure 13: NP/AP of Placed Waste Rock Confirmatory Samples



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

8 Waste Rock Kinetic Testing

8.1.1 Overview

Kinetic tests are designed to measure rates of constituent release as well as acid generation and neutralization of specific rock types representing waste rock at site. These data are inputs into determining a site-specific critical NP*/AP (NP*/AP_{crit}) value defining the threshold between PAG and NAG and estimating of the time to onset of acid rock drainage.

In 2009, a humidity cell sample from the Pond Zone was submitted for an acid-leaching procedure to remove carbonate and evaluate the reactivity of silicate minerals (Table 12). In 2022, four humidity cells samples were specifically selected to represent future waste rock that would be generated by mining the Springer Deep and WX Zones, which represent the source of waste rock for the remaining mine life (Table 12). Samples were selected by SRK from the drill hole database to represent upper range sulphur content for the dominant rock types in both zones. The tests were initiated on August 5, 2022.

Columns 1, 2 and, 3 were set-up by Mount Polley Mine in January 2012 to evaluate the effect of reduction in infiltration into waste rock. MPMC personnel independently designed the program and selected samples.

Table 12: Characteristics of Samples in Waste Rock Humidity Cells

HCT	Sample ID	Zone	Rock Type[1]	Date Started	Date Stopped	Paste pH	TIC	Total S	SO4-S	AP	Mod NP	NP/AP	NP*/AP	Ag	As	Ca	Cd	Co	Cu	Hg	Mg	Mn	Mo	Ni	Pb	Sb	Se	V	Zn
							%C	%	%S	kg $CaCO_3$/t	kg $CaCO_3$/t			ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
HC2	31576	NE	PPp	7/21/2004	1/7/2013	8	0.79	1.4	<0.01	44	83	1.9	1.5	0.4	19	3.0	1.1	8.7	330	0.57	0.6	1400	13	1.2	38	0.3	0.7	85	170
HC3	32491	NE	Bx	7/21/2004	8/11/2008	8.3	1.1	0.45	<0.01	14	140	10	6.4	1.1	12	4.4	0.6	19	1700	0.39	1.3	1900	5.8	3.3	17	0.2	1	260	150
HC4	31943	NE	Bx	7/21/2004	8/11/2008	8.4	1.1	0.99	<0.01	31	130	4.1	2.9	1.2	10	4.2	0.9	20	1300	0.25	0.7	2000	7.6	4.2	21	0.3	1.4	210	170
HC5	32519	NE	PPp	7/21/2004	8/11/2008	8.6	0.62	0.54	<0.01	17	88	5.2	3.1	0.7	18	3.4	0.1	14	1700	0.19	1.2	1400	1.9	4.1	13	0.5	1.3	200	100
HC6	SE-05-17 Comp #1	SE	MZ	9/26/2005	1/7/2013	8.4	0.12	0.72	<0.01	23	21	0.91	0.43	0.3	17	0.87	<0.1	8.1	710	0.1	0.6	420	170	1.7	7.6	0.7	0.9	88	34
HC7	SE-05-30 Comp #1	SE	MZ	9/26/2005	1/7/2013	8.7	0.12	0.37	<0.01	12	40	3.5	0.85	<0.1	15	1.7	0.1	11	180	0.02	0.9	480	6.1	12	10	0.4	0.5	110	30
HC8	SE-07-66-72.5-75.13	SE	-	8/11/2008	1/7/2013	9.2	0.082	1	0.01	32	19	0.59	0.21	0.12	10	1.3	0.1	7.9	160	0.02	0.9	460	6	2.7	7.5	0.92	1.5	100	40
HC9	476111	Springer	-	8/11/2008	10/6/2009	7.9	0.011	0.04	0.01	0.94	18	19	0.97	0.34	11	1.7	0.42	21	710	0.08	1.3	1100	1.1	9.3	7.8	0.21	0.5	160	89
HC10	146677	Boundary	-	8/11/2008	10/6/2009	8.4	2	0.1	0.01	2.8	150	53	59	0.13	14	6.3	0.21	30	510	0.04	1.5	2800	1.4	12	7.8	0.64	0.7	160	110
HC11	146794	Boundary	-	8/11/2008	10/6/2009	8.4	1.4	0.15	0.01	4.4	160	35	27	0.17	17	4.7	0.37	23	250	0.12	1.2	2300	3	9.2	10	0.54	1.3	150	110
HC12	50033-1; Composite-4	Pond	MZ	4/20/2009	6/8/2009	6.6	<0.01	0.51	<0.01	16	8.4	0.53	<0.03	0.48	14	1.2	0.15	10	340	0.02	0.7	610	4.9	4.7	5.7	0.37	1.9	66	47
HC13	50033-1; Composite-5	Pond	DI	4/20/2009	Ongoing	7.7	<0.01	0.19	<0.01	5.9	7.9	1.3	<0.08	0.25	12	0.89	0.11	8.8	250	0.01	0.6	520	3.5	4.1	6	0.4	1.2	65	49
HC14	465240; SD-07-23	Springer	BX	10/12/2009	1/7/2013	8.1	0.48	0.39	-	12	96	7.9	3.3	0.62	34	2.6	0.98	14	720	0.4	1	1500	6	2.8	10	0.28	4.3	130	86
HC15	475695; SD-07-48	Springer	DI	10/12/2009	1/7/2013	8.1	0.27	2.5	-	79	94	1.2	0.29	0.88	18	2.3	0.09	20	780	0.02	1	500	18	5	11	0.07	8.2	150	41
HC16	480684; SD-07-57	Springer	MZ	10/12/2009	1/7/2013	8.9	0.14	0.06	-	1.9	69	37	6.4	0.52	13	2.2	0.43	14	360	0.14	0.7	730	3.5	2.4	10	0.16	0.5	130	92
HC17	HC-17 SD MZ	Springer Deep	MZ	8/5/2022	Ongoing	8.8	0.28	1.4	0.03	43	32	0.75	0.55	0.41	18	3.2	0.28	17	519	0.1	0.86	556	39	4.0	15	0.3	6.0	146	53
HC18	HC-18 SD FBXm	Springer Deep	FBXm	8/5/2022	Ongoing	8.8	0.17	2.0	0.02	61	36	0.59	0.23	0.61	20	1.5	0.19	28	1368	0.1	1.6	626	47	5.0	5.9	0.5	8.0	205	49
HC19	HC-19 WX MZ	WX	MZ	8/5/2022	Ongoing	8.6	0.14	2.0	0.03	63	23	0.36	0.19	0.36	11	2.3	0.3	12	577	0	0.82	430	36	1.0	14	0.1	5.0	152	53
HC20	HC-20 WX FBXm	WX	FBXm	8/5/2022	Ongoing	8.5	0.37	2.5	0.02	78	40	0.51	0.39	0.43	15	2.7	0.17	14	830	0.2	0.89	611	44	2.0	11	0.4	7.0	144	45

Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Source_Terms/Report_Tables_CAPR002434_Rev01_KWJ.xlsm

Notes:

[1] Rock types for some humidity cells were not recorded. PPp = Plagioclase porphyry, Bx = Breccia, DI = Diorite, Monz = Monzonite, FBXm = Monzonite breccia.

8.1.2 Determination of Critical NP*/AP

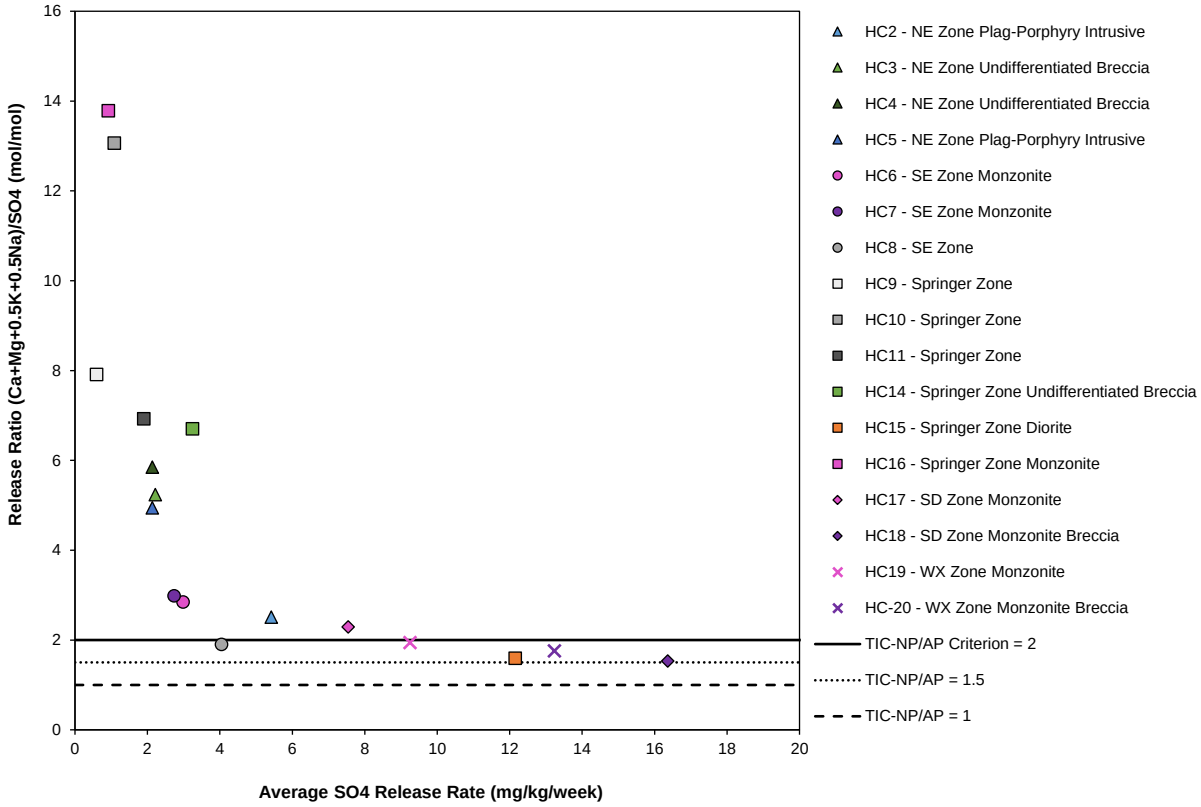
The current operational NP*/AP for classifying waste rock as NAG (or non-PAG) is specified in the Permit as 2. However, the critical NP*/AP ratio ($NP*/AP_{crit}$) was developed using data from humidity cell tests in SRK (2023b), which recommended defining $NP*/AP_{crit}$ of 1.6 based on available data. $NP*/AP_{crit}$ was derived from the comparison of cation release ratios and sulphate release rates.

Cation release ratios reflect carbonate dissolution, while sulphate release rates reflect sulphide oxidation. The trend of these data approaches a cation release ratio value between 1 and 2 and none of these cells have generated acid thus far. Relative rates expressed as the molar ratio of the stable release rates of the four cations to sulphate [$(Ca+Mg+0.5Na+0.5K)/SO_4$] mol/mol were used directly to estimate the NP/AP_{crit} for the waste rock. These ratios were compared to sulphate release rates from the HCTs to differentiate between dissolution of carbonates by sulphuric acid (from pyrite oxidation) and by carbonic acid (formed by carbon dioxide dissolved in the deionized water). The consideration of Na and K reflects the potential for Ca and Mg liberated by carbonate dissolution to exchange with Na and K in phyllosilicates. The release rate for Na and K are halved to account for their lower charge. Inclusion of Na and K also limits the possibility of under-stating carbonate mineral utilization thereby resulting in a lower $NP*/AP_{crit}$.

At low oxidation rates (lower sulphate release), the dominant process in the test is assumed to be dissolution of carbonates by carbonic acid and the $(Ca+Mg+0.5Na+0.5K)/SO_4$ ratio is high. As the influence of sulphide oxidation increases (shown by increase in sulphate release), the $(Ca+Mg+0.5Na+0.5K)/SO_4$ ratio greater reflects the interaction of sulphuric acid with carbonates which is the expected dominant process at full scale in waste rock dumps.

A lack of testing on samples with high oxidation rates hampered previous estimations of $NP*/AP_{crit}$ (SRK 2016). The initiation of the four HCTs in 2022, which had run for 48 weeks at the time of reporting in SRK (2023), all have higher oxidation rates than previous HCTs and were used to define the $NP*/AP_{crit}$ of 1.6. Figure 14 compares the cation release ratio compared to the oxidation rate, updated using the most recent data (68 weeks at the time of reporting for the four HCTs initiated in 2022). SRK recommends updating the $NP*/AP_{crit}$ to 1.5 based on the more recent data.

Figure 14: Cation Release Ratio versus Oxidation Rate



Sources: https://srk.sharepoint.com/sites/NA1CM017.011/Internal/!020_Project_Data/030_Lab Data/Kinetic Data/Calculations/[Mt_Polley_HCT_WR_Outcomes_1CM017.011_rtc_rev00.xlsx]

8.1.3 Delay to Onset of Acid Generation

Following the same method used in SRK (2016) and SRK (2023), the straight-line average of the correlation between initial NP*/AP (i.e., at time = 0, NP^*/AP_0) and calculated time for the onset of acidification (t_{onset}, in years) for all humidity cells from MPM was updated using NP^*/AP_{crit} of 1.5:

$$t_{onset} = 74 \times \left(\frac{NP^*}{AP}\right)_0$$

The equation indicates that a sample with NP/AP of 1 might be expected to generate acid in 74 years. The calculated lower 95% confidence on the 74 years coefficient was 64 years.

This is similar to the result of the calculation presented in SRK (2023), where the coefficient was 63 years, and supports the general finding from the kinetic testing is that acidification of PAG materials at MPM will take on the order of decades to centuries to develop. This is consistent with the widespread pH neutral weathering conditions at MPM in both natural and mined materials. Initial mining at Mount Polley was 25 years ago but waste rock has not acidified.

8.1.4 Status Update on Continuing Tests and Recommendations

An update on the status of the waste rock test work along with recommendations for continuation or termination is discussed below, which includes:

- A rock sample from the Pond Zone which was leached to remove carbonate neutralization potential and observed to understand the chemistry of acidic water.
- Two rock samples each from the Springer Deep Zone and WX Zone.
- Three waste rock columns investigating the effects of infiltration reductions.

Pond Zone Humidity Cell

HC-13 has now operated for about 15 years. Despite removal of carbonate minerals, the lowest pH shown by the sample was 4.5 and for about 3 years, pH has steadily increased and has reached 5 in most recent measurements (Figure 15). Oxidation rate (as shown by sulphate release) has decreased as pH increased and reflects ongoing depletion of sulphide. Metal concentrations are low and continue to decrease.

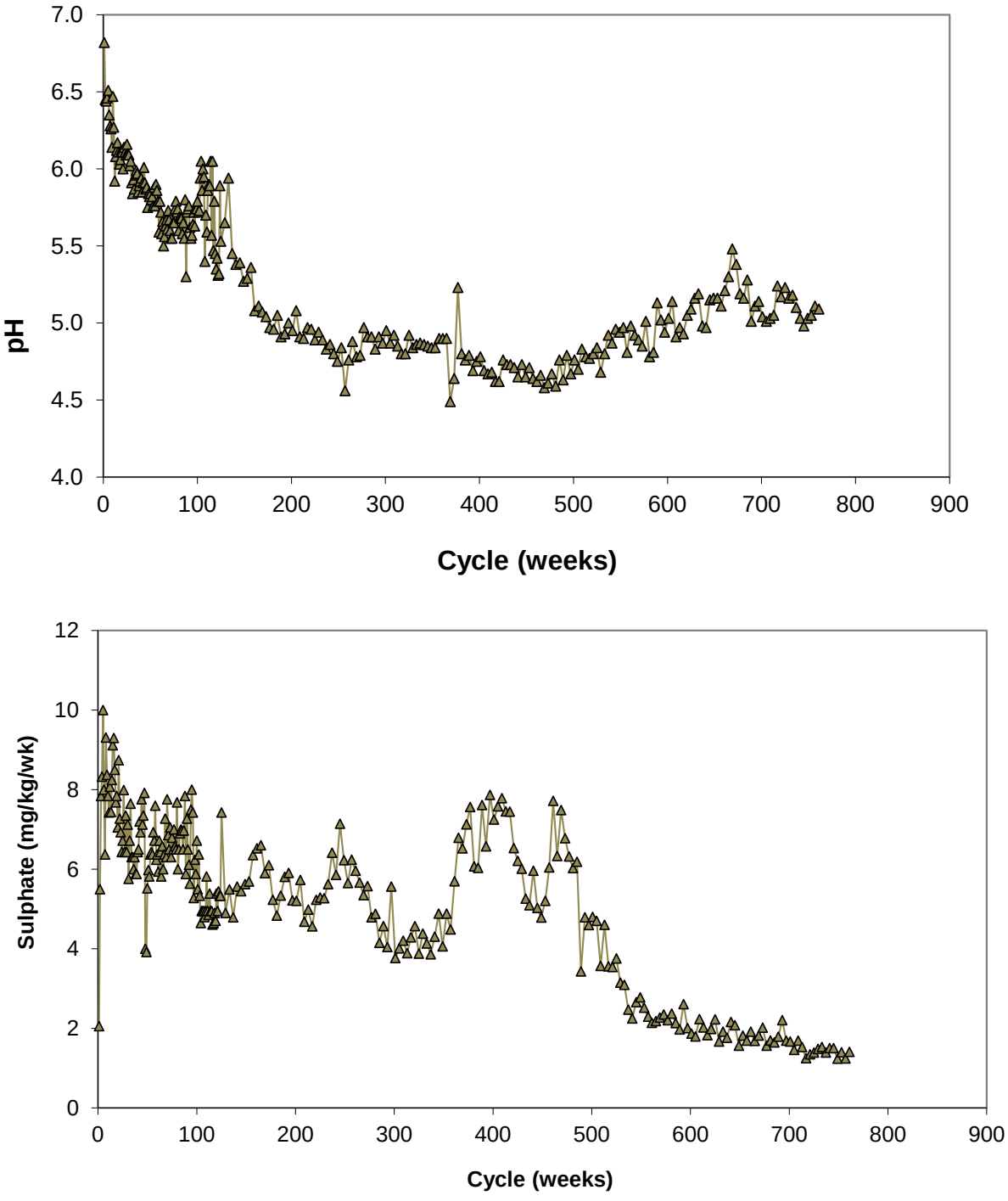
The test has yielded data on the role of silicates in consuming acid which was the original objective. As recommended in the previous 2022 annual report, the test can therefore be stopped.

Springer Deep and WX Zone Humidity Cells

All four tests yielded non-acidic leachate (pH 7.1 to 8.3) from weeks 0 to 68 (Figure 21) and showed stabilizing weathering rates after 16 to 24 weeks for most major and trace elements following an initial flush of accumulated weathering products, including sulphate (Figure 21).

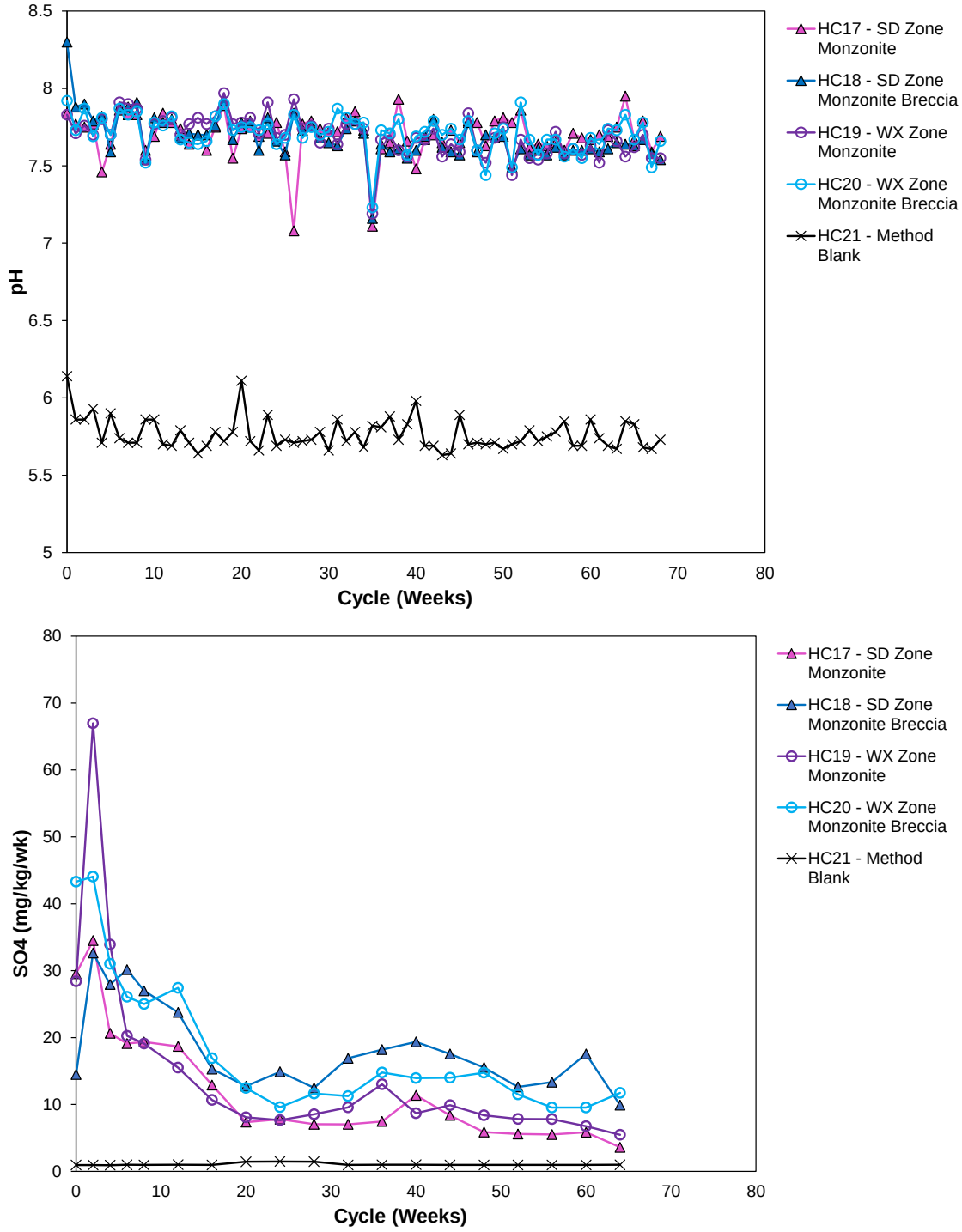
Because these tests represent the source of waste rock for the remaining mine life, SRK recommends continuing these cells to carry on refining NP^*/AP_{crit} and time to onset of acid generation estimation.

Figure 15: HC-13 pH and Sulphate Trends



Sources: https://srk.sharepoint.com/sites/NA1CI008.000/SRK Internal/Ongoing Kinetic Tests/HC/Charts/[Mt_Polley_HC_Loadings_Ongoing.xlsx]

Figure 16: pH and Sulphate Trends in Springer Deep and WX Zone HCTs



Sources: https://srk.sharepoint.com/sites/NA1CM017.011/Internal/!020_Project_Data/030_Lab Data/Kinetic Data/Calculations/[Mt_Polley_ HCT_WR_loadings charts_1CM017.011_rtc_rev00.xlsm]

Waste Rock Columns

Columns 1, 2 and 3 were set-up by Mount Polley Mine in January 2012 to evaluate the effect of reduction in infiltration into waste rock:

- Column 1 is the base case and consists of crushed rock with low potential to generate acid.
- Column 2 contains the same material as Column 1, but the water application rate is 50% of Column 1.
- Column 3 contains the same material as Column 1 and a tailings layer, and the water application rate is the same as Column 1.

The tests have been running for twelve years.

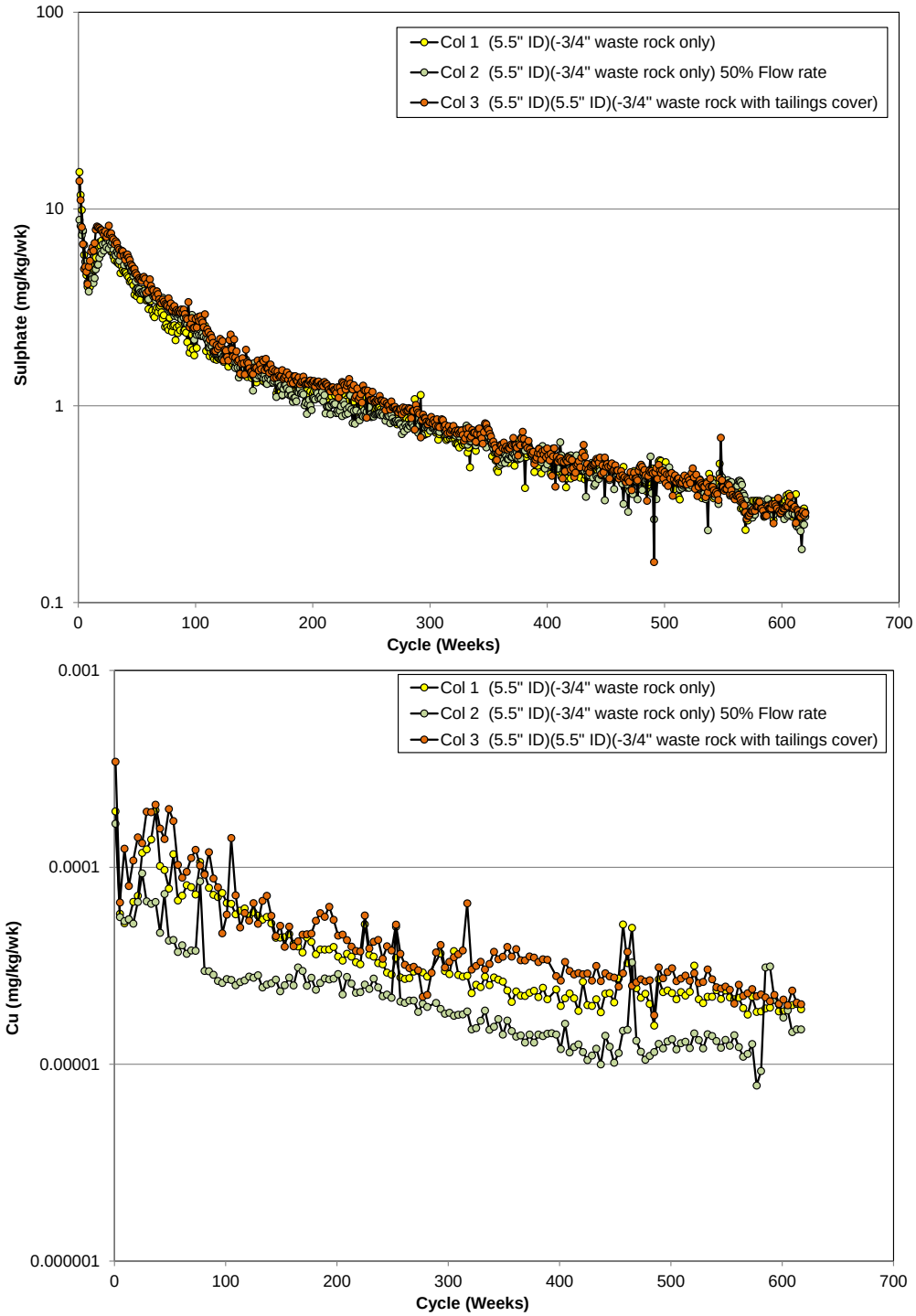
Since the tests are intended to evaluate reduction in loadings due to the effect of infiltration rates and possibly oxygen entry, results are presented as release rates (in mg/kg/week) rather than concentrations.

All tests have yielded pHs between 7.8 and 8.3 with Column 1 yielding pHs at the low end of the range. Sulphate releases rates are now similar for all three columns and continue to show the same declining trend as observed in previous years (Figure 17).

Copper release rates were declining but in the past years have stabilized, except in Column 2 (Figure 17). Release rates increased in 2023 for Column 2 but, as previously reported, this column continues to have the lowest release rates because it contains waste rock and has a higher pH than Column 1. Column 3 has highest release rates perhaps due to the presence of tailings with their greater weathering surface area but has converged with Column 1 in the past years.

The results appear generally stable and currently indicate low levels of weathering activity. As recommended in the previous 2022 annual report, the tests can therefore be stopped.

Figure 17: Columns 1 to 3 – Sulphate and Copper Release Rates



Sources: https://srk.sharepoint.com/sites/NA1CI008.000/SRK Internal/Ongoing Kinetic Tests/Col/Charts/[Mt. Polley_Col_Loadings_Charts_1CM017.000_rtc_rev00.xlsx]

9 Tailings Monitoring

9.1 QA/QC

No field duplicates for tailing samples were collected in 2023.

Trace element concentrations of tailings samples were analyzed at ALS Environmental in Burnaby, BC. QA/QC for these analyses are summarized in Table 13. SRK considered all results acceptable for this assessment.

Table 13: QA/QC for Tailings Samples Analyzed in External Laboratory

QC Test	n	SRK QC Criteria	Results
Physical Tests (Matrix: Soil/Solid)			
Lab Duplicate	9	For any samples, +/- 0.5 difference pH unit	All Passed
Laboratory Control Sample (1:2 soil:water)	9	Within specified tolerance ranges.	All Passed
Organic / Inorganic Carbon (Matrix: Soil/Solid)			
Method Blank for Total Carbon	9	<2X detection limit (DL)	All Passed
Lab Duplicate	9	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample for Total Carbon	9	Within specified tolerance ranges.	All Passed
Reference Material for Total Carbon	9	Within specified tolerance ranges.	All Passed
Inorganics (Matrix: Soil/Solid)			
Method Blank for Total Sulfur	9	<2X detection limit (DL)	All Passed
Lab Duplicate for Total Sulfur	9	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample for Total Sulfur	9	Within specified tolerance ranges.	All Passed
Reference Material for Total Sulfur	9	Within specified tolerance ranges.	All Passed
Metals (Matrix: Soil/Solid)			
Method Blank	9	<2X detection limit (DL)	All passed.
Lab Duplicate	9	>10X DL, RPD better than +/- 20%	All passed.[1]
Laboratory Control Sample	9	Within specified tolerance ranges.	All passed.
Reference Material	9	Within specified tolerance ranges.	All passed.
TCLP Metals (Matrix: Soil/Solid)			
Method Blank	9	<5X Detection Limit	All passed.
Reference Material	9	Within specified tolerance ranges.	All passed.

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/040_Lab Data/2023 Annual Reporting/Tailings/QAQC_Results/[CAPR003074_Mt Polley_Tailings_Compiled Summary QAQC Results_cc.xlsx]Summary QAQC

Notes:

[1] Duplicate results outside ALS Data Quality Objective (DQO), due to sample heterogeneity. Results passed SRK's QC criteria.

9.2 Monitoring of ARD Potential

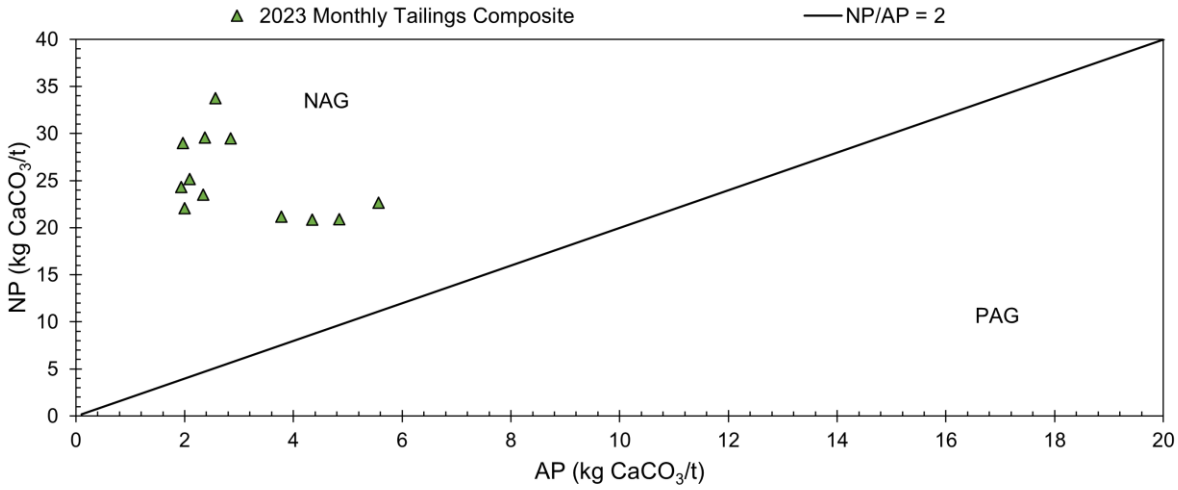
In 2023, 5,900,000 t of tailings were deposited into the TSF. Total carbon ranged from 0.25% to 0.41% while total sulphur ranged from 0.06% to 0.18% (Table 14). Results from 2023 had a weighted annual average NP/AP of 8.6 and are consistent with past results (SRK 2023), showing tailings are generally not PAG (Figure 18). All tailings composite samples collected in 2023 were classified as NAG.

Table 14: ABA Parameters of Monthly Tailings Composite Samples in 2023

Month	Tonnage	Total Carbon	Total Sulphur	NP	AP	NP/AP	Classification
	t	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-	-
January	510,000	0.25	0.14	21	4.3	4.8	NAG
February	350,000	0.27	0.18	23	5.6	4.1	NAG
March	520,000	0.29	0.062	24	1.9	13	NAG
April	450,000	0.25	0.16	21	4.8	4.3	NAG
May	470,000	0.25	0.12	21	3.8	5.6	NAG
June	490,000	0.27	0.064	22	2.0	11	NAG
July	460,000	0.28	0.075	24	2.3	10	NAG
August	570,000	0.35	0.063	29	2.0	15	NAG
September	490,000	0.41	0.082	34	2.6	13	NAG
October	430,000	0.35	0.091	30	2.8	10	NAG
November	580,000	0.30	0.067	25	2.1	12	NAG
December	540,000	0.36	0.076	30	2.4	12	NAG
Weighted Annual Average	-	0.30	0.09	25	2.9	8.6	NAG

Sources:https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL_KWJ.xlsx]

Figure 18: NP/AP of Monthly Tailings Composite Samples in 2023



Sources:https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

9.3 Monitoring of Trace Element Concentrations

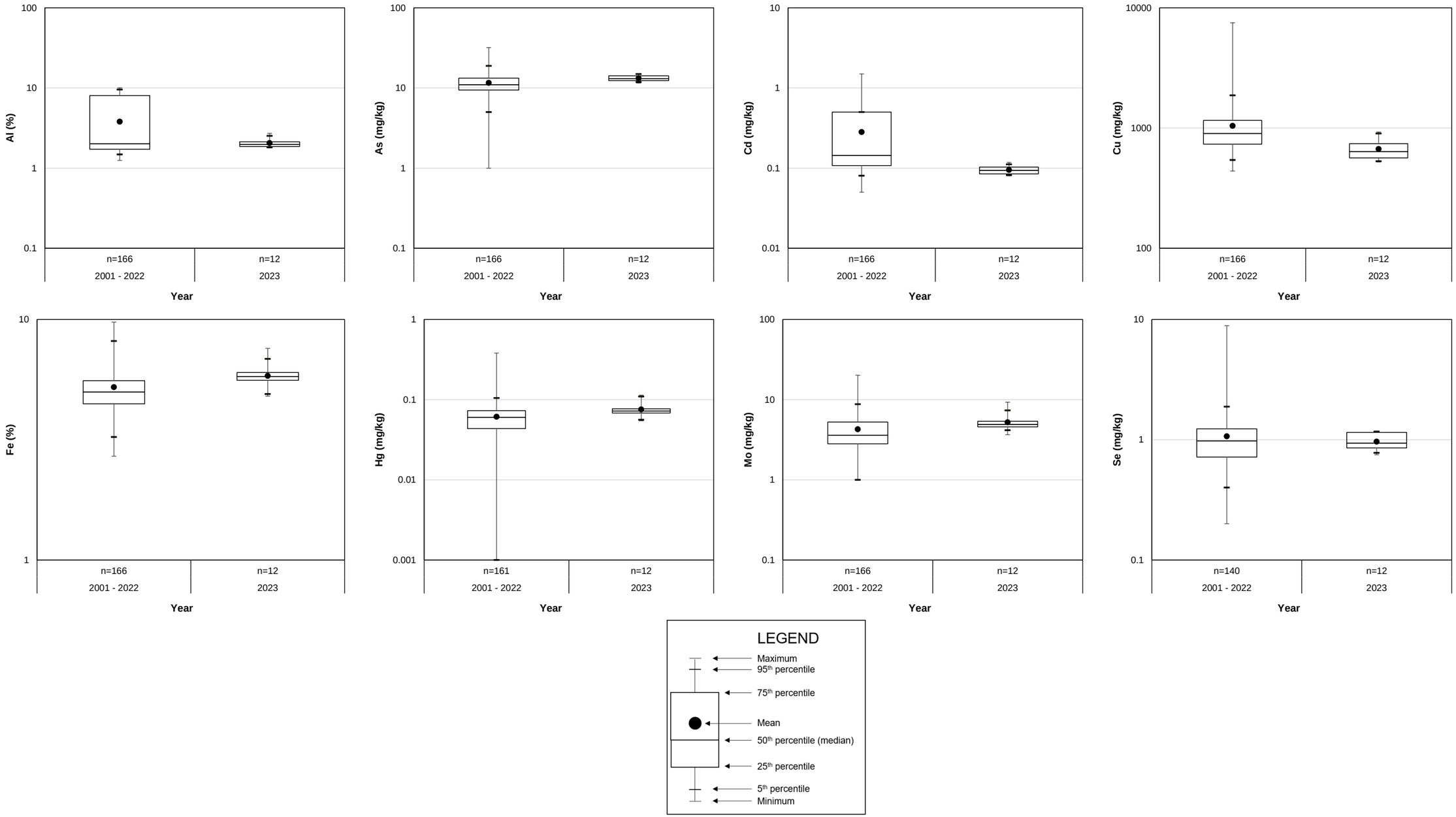
Trace element concentrations identified in Section 6.3 for waste rock were also compared to tailings samples. Summary statistics of these trace element concentrations for tailings composite samples collected in 2023 are provided in Table 15 and lab reports are provided in Appendix D. Box-and-whisker plots comparing these elements to previous trace element tailings data are provided in Figure 19. Results from 2023 are within historical ranges and averages are roughly equivalent to 2022 (Table 15). Results from recent tailings (2021 and later) are also within historical ranges and averages were similar or lower except for molybdenum and selenium content, which were above their respective historical averages but within historical ranges (Figure 19).

Table 15: Select Trace Element Concentrations of Tailings Samples in 2023

Month	Aluminum	Arsenic	Cadmium	Copper	Iron	Mercury	Molybdenum	Selenium
	%	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg
January	1.9	12	0.10	520	6.2	0.055	4.9	0.92
February	1.9	13	0.084	670	5.7	0.058	5.7	0.96
March	2.1	14	0.088	540	5.9	0.059	4.6	0.75
April	2.2	15	0.12	570	5.8	0.071	9.3	1.2
May	2.1	14	0.10	880	6.0	0.072	4.9	1.2
June	2.4	14	0.085	540	6.3	0.078	4.7	0.81
July	2.0	14	0.10	580	5.7	0.072	4.6	0.88
August	1.8	12	0.090	600	5.6	0.077	3.7	0.80
September	1.9	12	0.083	720	5.0	0.072	4.6	0.95
October	1.9	12	0.097	820	4.8	0.076	5.0	1.2
November	2.7	15	0.11	930	7.6	0.11	5.4	1.2
December	1.8	12	0.080	670	5.4	0.11	5.4	0.87
Annual Average	**2.1**	**13**	**0.095**	**670**	**5.8**	**0.076**	**5.2**	**0.97**

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

Figure 19: Select Trace Element Concentrations of Tailings Samples Collected in 2023 Compared to Previous Years



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL.xlsx]

9.4 Tailings Co-Disposed in SERDS

9.4.1 QA/QC

QA/QC of ABA parameters analyzed at the on-site lab is described in Section 4.3.2.

No field duplicates were collected in 2023 and samples were not sent for analysis at external laboratories.

9.4.2 Monitoring of ARD Potential

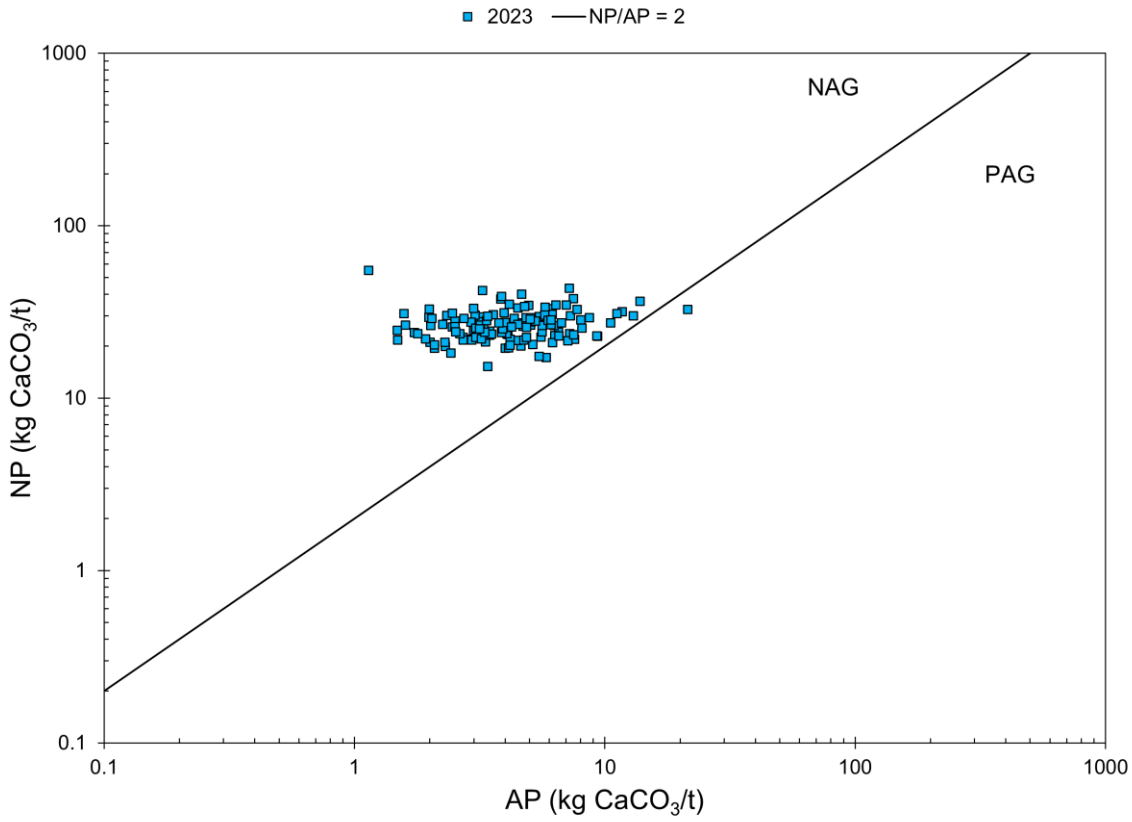
In 2023, 955,000 t of tailings were co-disposed with NAG waste rock into the SERDS. ABA results are summarized in Table 16 and raw data are presented in Appendix E. Total sulphur ranged from 0.04% to 0.7% with a mean of 0.15%, while total carbon ranged from 0.18% to 0.66% with a mean of 0.32% (Table 16). One tailings sample was classified as PAG (NP/AP = 1.5) after disposal (0.7% of all samples) (Figure 20). In the SERDS, excess NP is available for neutralization from surrounding NAG material with greater NP/AP values. As a result, SRK concludes the risk of ARD developing for the co-disposed tailings is negligible.

Table 16: Summary Statistics of ABA Parameters for SERDS Co-Disposal Tailings Samples in 2023

Statistic	Total Sulphur	Total Carbon	AP	NP	NP/AP
(n = 141)	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-
Min	0.04	0.18	1.1	15	1.5
P5	0.06	0.24	1.9	20	2.8
P25	0.1	0.28	3	23	4.7
P50	0.13	0.32	4.1	26	6.3
Average	0.15	0.32	4.7	27	5.7
P75	0.19	0.35	5.8	29	8.6
P95	0.3	0.44	9.3	36	14
Max	0.7	0.66	21	55	48

Sources:https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev01_SJL_KWJ.xlsx]

Figure 20: NP/AP of SERDS Co-Disposed Tailings Samples in 2023



Sources:https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

9.4.3 Monitoring of Trace Element Concentrations

No samples of co-disposed tailings were analysed for trace element concentrations in 2023 so trace element concentrations could not be assessed, resulting in a non-compliance.

9.5 TSF Breach Tailings Kinetic Tests

9.5.1 Overview

An update on the status of the TSF breach tailings sample kinetic test work is discussed in the following subsections, which includes:

- Two humidity cells containing tailings released by the TSF breach.
- Three columns containing tailings released by the TSF breach.

9.5.2 Humidity Cells

Two humidity cells (HC-3, HC-4) containing “grey” tailings released during the dam breach and a method blank have now been operating for eight years. HC-3 contains more sulphur than HC-4 (0.33% and 0.08% pyrite, respectively). Both samples are classified as non-acid generating due to NP*/AP ratios well above 2. Copper and selenium concentrations are higher in HC-3 likely due to its higher sulphide content.

Both tests have consistently yielded pHs between 7 and 8 though declining pH has been observed in the last four years which has also been observed in the blank test (Figure 21).

Both tests have shown steadily declining sulphate concentrations for several years. HC-3 has yielded higher sulphate concentrations consistent with its higher sulphide content. About 45% and 30%, respectively of the initial sulphur inventory has been leached. Selenium concentrations correlate with sulphide content. Generally, HC-3 leachates have higher selenium concentrations than in HC-4 leachates, but HC-3 concentrations have continued to decrease and are now similar to HC-4 concentrations.

Although HC-3 has higher sulphide and copper than HC-4, HC-4 leaches higher copper concentrations. This has been attributed to the higher dissolved organic carbon (DOC) in leachates from HC-4 (2 mg/L) compared to HC-3 (1 mg/L) which may form humic complexes with copper, increasing its solubility. DOC concentrations have increased to about 2 mg/L in HC-3, but copper concentrations have remained steady.

Other parameters continue to decline or have remained stable. There have been no new emerging trends for other parameters in 2023.

SRK recommends continuation of these tests because sulphate continues to decline.

9.5.3 Columns

Three columns are being operated on two samples of “magnetite sand” (coarser tailings, Col-1 and Col-2) and one sample of “grey tailings” (finer tailings, Col-3). Col-3 contains the same material as HC-3 described above. Sulphur content is similar to the humidity cells and all three samples are classified as non-acid generating. A method blank is being run in parallel with the tailings columns. The tests have been operating for eight years.

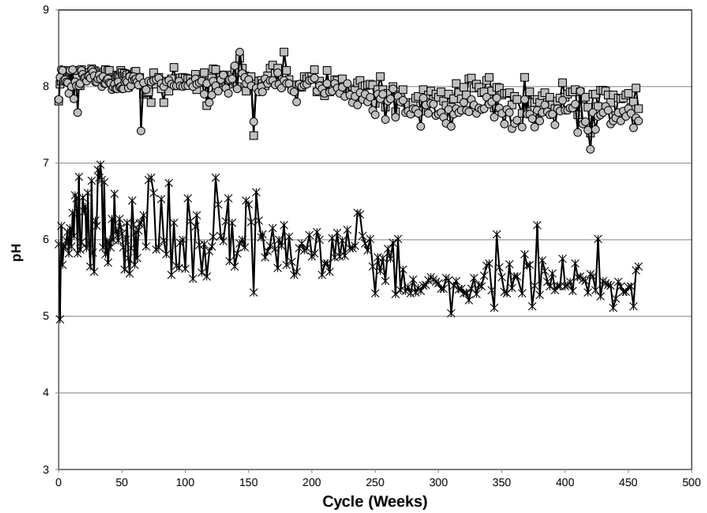
The tests have continually yielded non-acidic leachates (pHs near 8) though pHs have declined in the past five years as the pH of the blank test has declined (Figure 22). Sulphate release for all three columns is now similar, though Col-1 is yielding slightly higher sulphate perhaps due to its higher sulphide content.

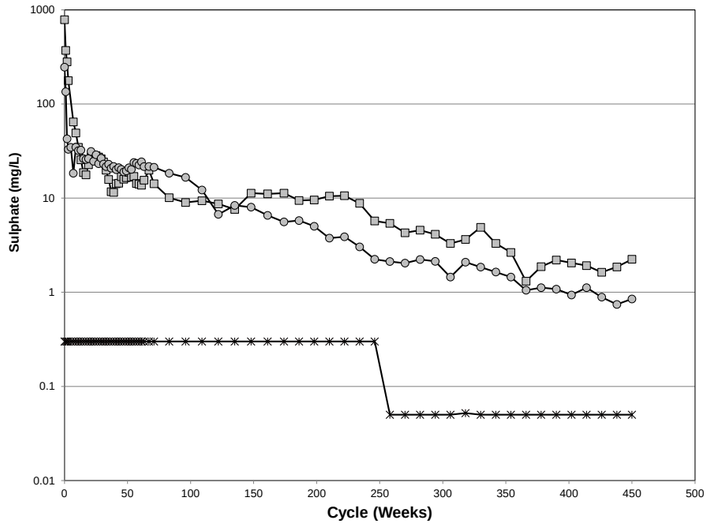
In 2023, selenium leaching for Col-1 continued a slow declining trend. Col-2 increased sharply from 0.005 mg/L to greater than 0.01 mg/L in 2020, but decreased and stabilized at release rates below 0.005 mg/L from 2022 onwards. Col-3 had oscillating selenium rates in previous years but was stable in 2023 at approximately 0.002 mg/L.

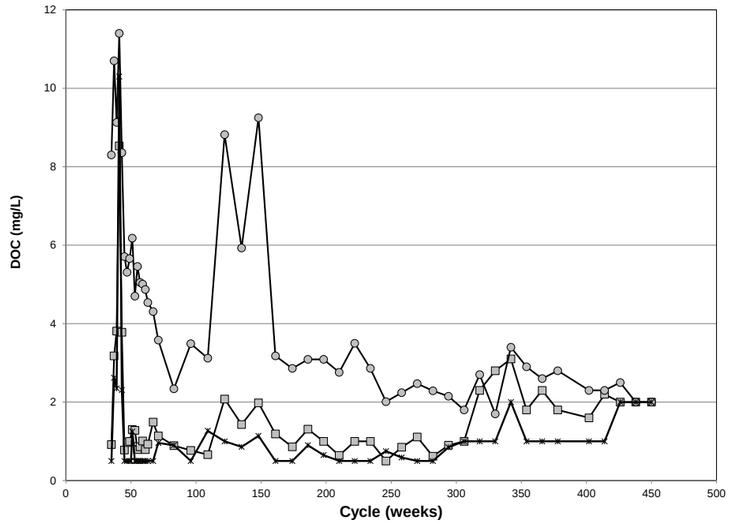
Copper concentrations in leachates from the two magnetite sand columns followed a smooth declining trend which has stabilized at approximately 0.004 and 0.002 mg/L for Col-1 and Col-2 respectively. In contrast, copper leaching has stabilized for Col-3 at higher concentrations than the sand columns (about 0.007 mg/L). As observed for the humidity cell tests, the higher copper leaching from Col-3 appears to be correlated with the higher DOC in leachates for this column.

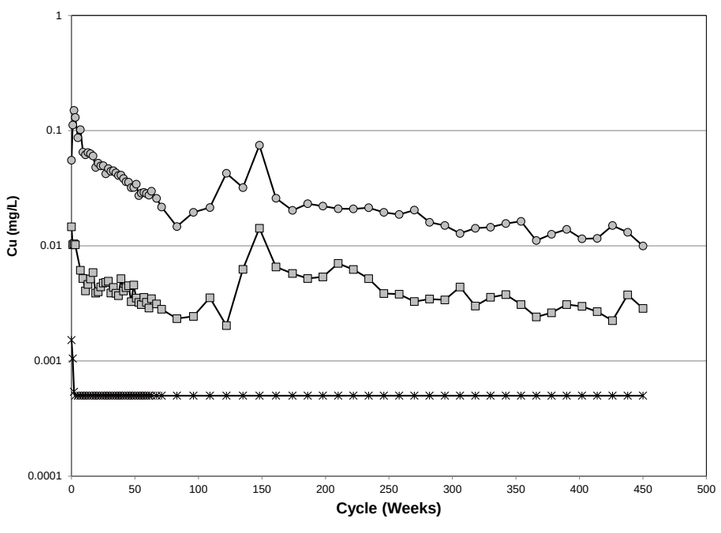
As recommended in the 2020 annual report, SRK recommends continuation of Magnetite Sand Column 1 and Grey Tailings Column 3 to allow comparison of differences in copper leaching, and termination of the Magnetite Sand Column 2.

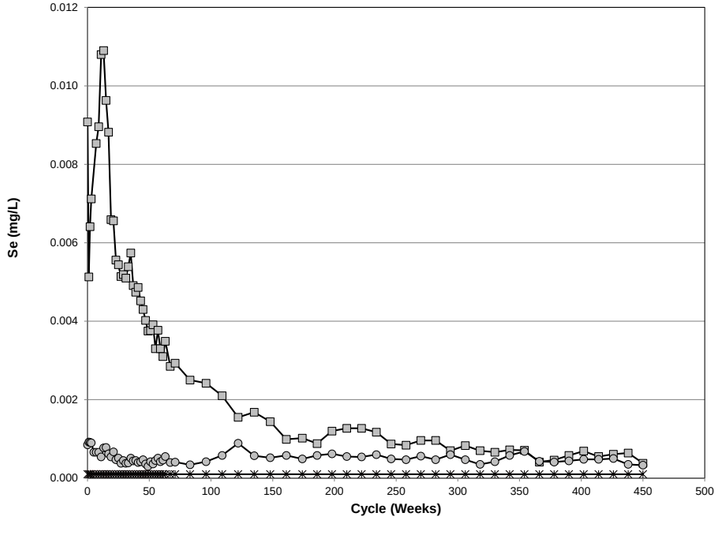
Figure 21: Tailings Humidity Cell Test Selected Leachate Chemistry: pH, Sulphate, Dissolved Organic Carbon, Copper, Selenium







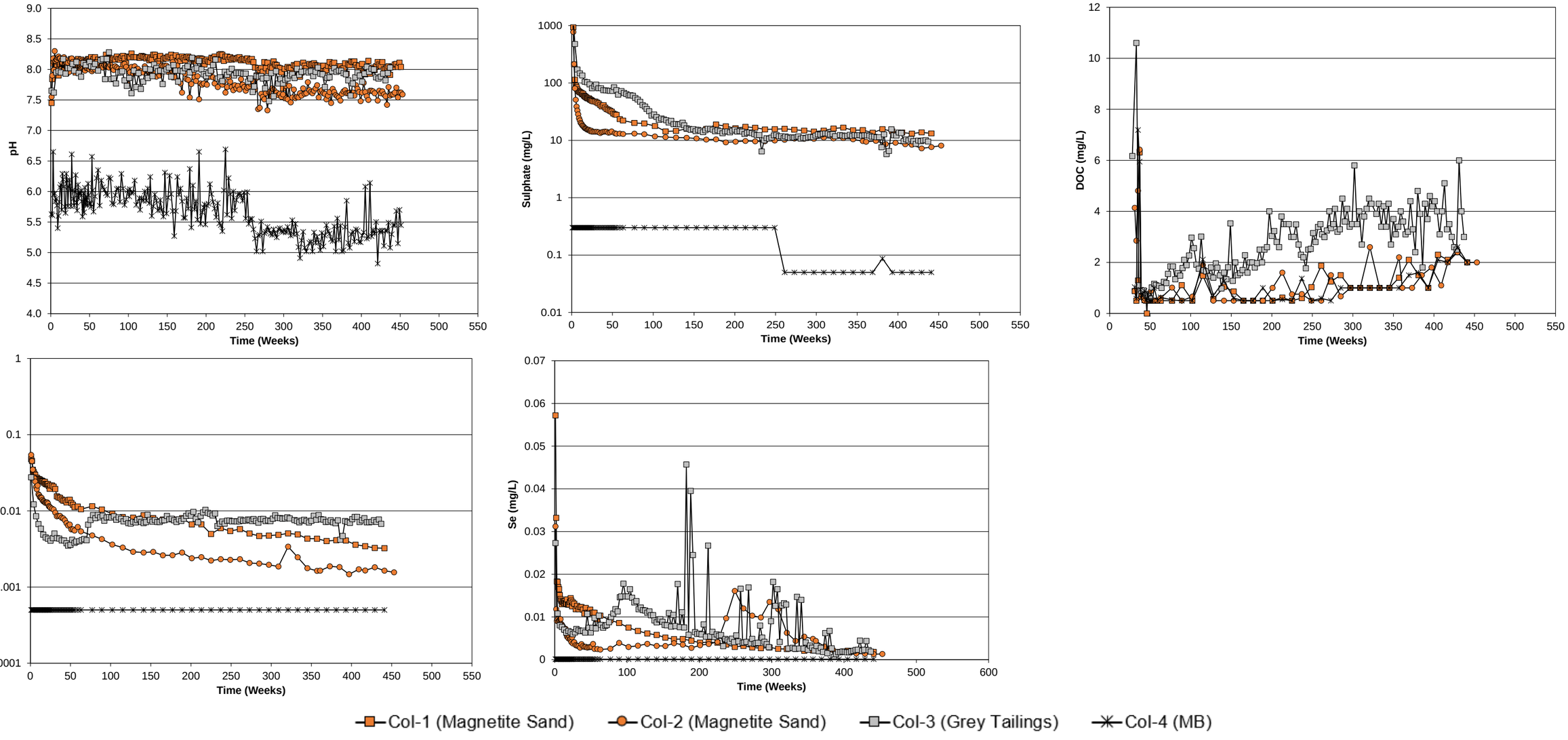




HC-3 (Grey Tailings) HC-4 (Grey Tailngs) HC-7 (MB)

Sources: https://srk.sharepoint.com/sites/NA1CI008.003/Internal/410_Kinetic_Tests/Calculations+Charts/HCTs/[Mt. Polley_HCT_Conc Charts _1CI008-003_rtc_rev02.xlsx]

Figure 22: Tailings Column Selected Leachate Chemistry: pH, Sulphate, Dissolved Organic Carbon, Copper, Selenium



Sources: https://srk.sharepoint.com/sites/NA1CI008.003/Internal/410_Kinetic_Tests/Calculations+Charts/COLs/[Mt. Polley_Col_Conc Charts_1CI008-003_rtc_rev02.xlsx]

10 Water Treatment Plant Waste

10.1 QA/QC

In 2023, six water treatment waste sediment samples were analyzed for ABA and trace element concentrations, and three samples were analyzed for SFE at ALS Environmental in Burnaby, BC. No field duplicates were collected. QA/QC for these analyses are summarized in Table 17. One blank sample failed for nitrate according to SRK's QA/QC criteria and rechecks are currently ongoing at ALS at the time of reporting. SRK considered all results acceptable for this assessment.

Table 17: QA/QC for Water Treatment Waste Samples Analyzed in External Laboratory

QC Test	n	SRK QC Criteria	Results
Physical Tests (Matrix: Soil/Solid)			
Method Blank (1:2 soil:water)	1	<2X detection limit (DL)	All Passed
Lab Duplicate	6	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample (1:2 soil:water)	6	Within specified tolerance ranges.	All Passed
Organic / Inorganic Carbon (Matrix: Soil/Solid)			
Method Blank	(n=1) for carbon, inorganic [IC] and (n=2) for Total Carbon	<2X detection limit (DL)	All Passed
Lab Duplicate	(n=1) for carbon, inorganic [IC] and (n=2) for Total Carbon	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample	(n=1) for carbon, inorganic [IC] and (n=2) for Total Carbon	Within specified tolerance ranges.	All Passed
Reference Material	(n=1) for carbon, inorganic [IC] and (n=2) for Total Carbon	Within specified tolerance ranges.	All Passed
Inorganics (Matrix: Soil/Solid)			
Method Blank	2	<2X detection limit (DL)	All Passed
Lab Duplicate	2	>10X DL, RPD better than +/- 20%	All Passed
Laboratory Control Sample for Total Sulfur	2	Within specified tolerance ranges.	All Passed
Reference Material for Total Sulfur	2	Within specified tolerance ranges.	All Passed
Metals (Matrix: Soil/Solid)			
Method Blank	6	<2X detection limit (DL)	All passed.
Lab Duplicate	6	>10X DL, RPD better than +/- 20%	All passed.
Laboratory Control Sample	6	Within specified tolerance ranges.	All passed.
Reference Material	6	Within specified tolerance ranges.	All passed.

QC Test	n	SRK QC Criteria	Results
TCLP Metals (Matrix: Soil/Solid)			
Method Blank	5	<5X Detection Limit	All passed.
Reference Material	5	Within specified tolerance ranges.	All passed.
Leachable Anions & Nutrients (Matrix: Soil/Solid)			
Method Blank	3	<2X detection limit (DL)	VA23B0791: Nitrate (as N) Failed
Lab Duplicate	2	>10X DL, RPD better than +/- 20%	All passed.
Laboratory Control Sample	3	Within specified tolerance ranges.	All passed.
Reference Material	1	Within specified tolerance ranges.	All passed.
Leachable Metals (Matrix: Soil/Solid)			
Method Blank	3	<2X detection limit (DL)	All passed.
Lab Duplicate	2	>10X DL, RPD better than +/- 20%	All passed.
Laboratory Control Sample	3	Within specified tolerance ranges.	All passed.
Reference Material	2	Within specified tolerance ranges.	All passed.

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/040_Lab Data/2023 Annual Reporting/WTP/Sediments/QAQC Results/[CAPR003074_Mt Polley_WTP_Sediments_Compiled Summary QAQC Results_cc.xlsx]Summary QAQC

10.2 Monitoring of ARD Potential

All required ABA parameters were available for the WTP samples, except for TIC for the sample collected in February 2023. Table 18 summarizes the ABA results for samples collected in 2023 and raw data are presented in Appendix F.

Paste pH measurements exceeded 7.5 for 2023 samples and total sulphur ranged from 0.23% to 0.64% with a mean of 0.44%. All samples were classified as NAG on the basis of TIC-NP/AP except for the February sample which could not be classified because there was no TIC result.

Table 18: ABA Results for WTP Waste Sediment Samples Collected in 2023

Date	Paste pH	Total Carbon	Total Inorganic Carbon	Total Sulphur	NP[1]	AP	NP/AP	Classification
		%	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t		
14-Feb-23	8.6	8.0	-	0.64	-	20	-	-
14-Mar-23	7.7	7.0	2.3	0.50	190	16	12	Non-PAG
23-Mar-23	7.6	4.0	1.2	0.39	99	12	8.1	Non-PAG
16-May-23	7.7	5.1	0.76	0.24	63	7.5	8.4	Non-PAG
21-Aug-23	7.6	4.0	0.76	0.23	64	7.3	8.8	Non-PAG
1-Nov-23	7.9	2.8	1.0	0.27	86	8.4	10	Non-PAG

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

Notes:

[1] Calculated from total inorganic carbon values.

10.3 Monitoring of Trace Element Concentrations

Table 19 summarizes select element concentrations following aqua regia digest for samples collected in 2023. Lab reports are provided in Appendix E. High aluminum content is a result of the addition of aluminum polychloride coagulant added as a reagent in the WTP. Selenium content (ranging from 5.2 to 22 mg/kg with a mean of 11 mg/kg) is also slightly elevated compared to Mount Polley waste rock and tailings (for comparison, maximum concentration measured between 1998 to 2023 in waste rock is 9.5 mg/kg and in tailings is 8.9 mg/kg). Concentrations for other trace constituents were similar to or lower than Mount Polley waste rock and tailings.

Table 19: Select Trace Element Content of WTP Waste Sediment Samples Collected in 2023

Date	Aluminum	Arsenic	Cadmium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Selenium
	%	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg
14-Feb-23	10	15	0.62	14	1200	1.4	740	0.10	26	16
14-Mar-23	14	30	0.64	15	2000	1.8	670	0.12	32	22
23-Mar-23	10	34	0.52	17	1300	2.3	1300	0.10	25	12
16-May-23	7.2	23	0.37	21	780	3.2	930	0.14	10	5.2
21-Aug-23	5.9	21	0.32	21	720	2.7	830	0.11	9.3	5.5
1-Nov-23	7.1	26	0.39	20	810	2.8	1000	0.14	16	8.1

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

10.4 Shake Flask Extraction

Table 20 summarizes select SFE constituent concentrations for samples collected in 2023. Lab reports are provided in Appendix E.

Major cations were dominated by calcium (range of 410 to 460 mg/L) with lesser sodium, magnesium, and potassium (range of 8.6 to 80 mg/L for all three parameters). Major anions were dominated by sulphate (range of 1,000 to 1,300 mg/L), which was over one order of magnitude higher than total alkalinity, chloride, and fluoride (range of 0.52 to 96 mg/L for all three parameters). The sample collected in March 2023 had notably higher total ammonia (by one order of magnitude) and nitrate concentrations than other WTP samples. Metals concentrations were highest for aluminum, copper, manganese, molybdenum, and selenium. Aluminum is high due to the addition of aluminum polychloride coagulant to the WTP. Other metals identified as having elevated solids concentrations had SFE concentrations that were near or below the analytical detection limit.

Table 20: Select Leachable Constituent Concentrations of WTP Waste Sediment Samples Collected in 2023

Date	Nutrients and Major Ions											
	Total Alkalinity	Sulphate	Chloride	Fluoride	Phosphorus	Total Ammonia	Nitrate	Nitrite	Calcium	Magnesium	Potassium	Sodium
	mgCaCO3/L	mg/L	mg/L	mg/L	mg/L	mgN/L	mgN/L	mgN/L	mg/L	mg/L	mg/L	mg/L
23-Mar-23	62	1300	25	1.2	0.13	14	3.7	0.17	460	16	18	80
16-May-23	69	1000	16	0.52	0.10	1.3	<0.65	0.26	410	24	8.6	68
1-Nov-23	96	1100	11	0.58	0.058	1.2	0.85	0.32	410	22	10	51

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

Date	Trace Elements									
	Aluminum	Arsenic	Cadmium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Selenium
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
23-Mar-23	0.62	0.0066	<0.00025	0.00058	0.36	<0.15	0.075	<0.000050	0.70	0.088
16-May-23	0.32	0.0092	<0.00025	0.00049	0.13	<0.060	0.18	<0.000050	0.32	0.020
1-Nov-23	0.24	0.0086	<0.00015	0.00047	0.063	<0.060	0.51	<0.000050	0.39	0.039

Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/[Compiled_MLARD_2023_Data_CAPR002434_Rev00_SJL.xlsx]

11 Seepage and Contact Water Monitoring

11.1 Waste Rock Seepage

11.1.1 Conceptual Geochemical Model

NAG Waste Rock

Processes in NAG waste rock under non-acidic conditions include:

- Oxidation of sulphides (pyrite, chalcopyrite, and bornite) to release iron, acidity, sulphate, and trace elements contained in the sulphides. Copper is expected to be primarily released by oxidation of chalcopyrite and bornite. Iron released by oxidation of sulphides replaces pyrite and other sulphides as solid iron (III) oxyhydroxides. Iron concentrations in the drainage are expected to be at or near detection limits.
- The oxidation reaction is exothermic (releases heat) and is expected to result in average internal temperatures that are higher than ambient average temperatures. During winter, internal temperatures will be higher than ambient temperatures.
- Due to the temperature difference in winter, air will move by advection through the waste rock by convection. Cold air will be drawn in through coarser materials at the base formed by end-dumping. The heated air will exit the dump at a higher elevation. This process is expected to result in deep penetration of oxygen and generally an over-supply of oxygen for oxidation of sulphides.
- Neutralization of acidity produced by the oxidation reaction will be by reaction with calcium carbonate minerals or mixing with alkaline waters resulting in neutral to basic pHs. The pH of contact waters will be determined by the partial pressure of carbon dioxide in pore gases (lower pH with higher CO_2).
- For non-PAG waste rock the neutral pH weathering environment will result in precipitation of metals as various secondary minerals, including gypsum ($CaSO_4 \cdot 2H_2O$), metal oxides (tenorite - CuO), metal carbonates (malachite – $Cu_2CO_3(OH)_2$), and metal silicates (e.g., chrysocolla). Adsorption to secondary oxides will also occur. The resulting concentrations of metals (principally copper) in contact waters will be controlled by the relatively low solubility of the secondary minerals and the tendency to be adsorbed at these pHs.
- Selenium and molybdenum originate from oxidation of pyrite, but form oxyanions that are mobile at the expected pH. The concentrations of these trace elements are expected increase.
- There is a hydraulic lag between when waste is placed, and its signature appears at monitoring locations.

Due to the solubility control exerted by secondary minerals, contact water chemistry is expected to be constrained so that chemical loadings are directly proportional to infiltrating water volume. Sulphate is expected to increase as new waste is added but will be constrained by gypsum solubility.

Elevated sulphate and metal concentrations at NEZ Seep 1 and NEZ Seep 2 since 2014 were believed to be influenced by elemental sulphur stockpile oxidation and leaching. The stockpile was stored on the East RDS near the leach pad until its removal in 2018.

PAG Waste Rock

Segregated and exposed ex-pit PAG waste rock is present in the Temporary NW PAG Stockpile located adjacent to the Springer Pit. PAG rock at MPM is not defined by a particular rock type but is associated with pyrite halos formed by hydrothermal alteration. Sulphide content is higher than NAG waste rock.

Due to the higher sulphide content of PAG waste rock, the overall oxidation rate of PAG waste rock is expected to be greater than NAG waste rock. However, before acidification occurs, PAG and NAG weathering conditions are expected to be similar with secondary minerals exerting solubility controls. For example, the solubility of sulphate is expected to be controlled by gypsum which will be similar regardless of the sulphide oxidation rate.

Acidification is expected to take decades to progress with early contact waters remaining basic and having metal concentrations controlled by the solubility of secondary minerals. The timeframe for acidification effects is expected to be on the order of decades.

Co-Disposed Waste Rock and Tailings

As described in SRK (2022c), the geochemical weathering processes described above for waste rock will occur in tailings with the following exceptions:

- Tailings are much finer than waste rock and therefore will present a much greater surface area for reactions potentially resulting in higher chemical release rates than waste rock.
- The dominant mechanism for delivery of oxygen to sulphide mineral reaction sites is diffusion rather than advection.
- The rate of diffusion depends in the particle size distribution, the degree of saturation and the rate of oxidation. At some depth into tailings, oxygen concentrations are too low for oxidation to occur.
- For tailings containing sulphur concentrations near 0.1%, the expectation is that oxidation of tailings will occur to tens of metres in depth.

Based on SRK's understanding of the approach used to place tailings in the SERDS, the tailings will complete fill the voids in waste rock. Compared to the conceptual models for waste rock and tailings:

- The geochemical processes occurring in waste rock and tailings will also occur in the mixture.
- The presence of fine-grained material in the waste rock voids will prevent oxygen movement into the waste rock by advection. As with tailings, air entry by diffusion is expected to become the dominant control.
- Initial drainage will be dominated by drain down of water contained in the tailings. Contact water chemistry will be reflected in longer term seepage.

Nitrogen Leaching

Nitrogen leaching originates from explosives residuals rather than mineral weathering. Since the rock does not generate leachable nitrogen, the leaching of residuals provides a flush of nitrogen which occurs with water contact. It is expected that the load of nitrogen flushed is greatest initially then decaying in proportion to the remaining soluble nitrogen. In terms of cumulative leaching, a newly constructed waste rock dump would be expected to show increasing loads for several years then stable loads as the volume of rock added each year becomes small relative to the total volume. “Tailing off” at closure will occur. Delays and lag effects may be expected due to hydrological factors.

Downstream Contact Water

Flows from waste rock piles are collected in a series of ditches and sumps around the Mount Polley Mine site. These downstream monitoring locations show different water chemistry than the seeps that flow into them. Hypotheses to explain some of these differences include:

- Dilution from other water sources that report to the ditch/sump. Lower apparent concentrations of conservative species such as chloride and sulphate would result.
- Removal of some parameters dissolved in surface waters by attenuation processes such as precipitation and adsorption.
- Seeps exiting waste rock piles are often over pressurized with respect to CO_2, which will de-gas as it equilibrates with the atmosphere, causing the pH to increase.

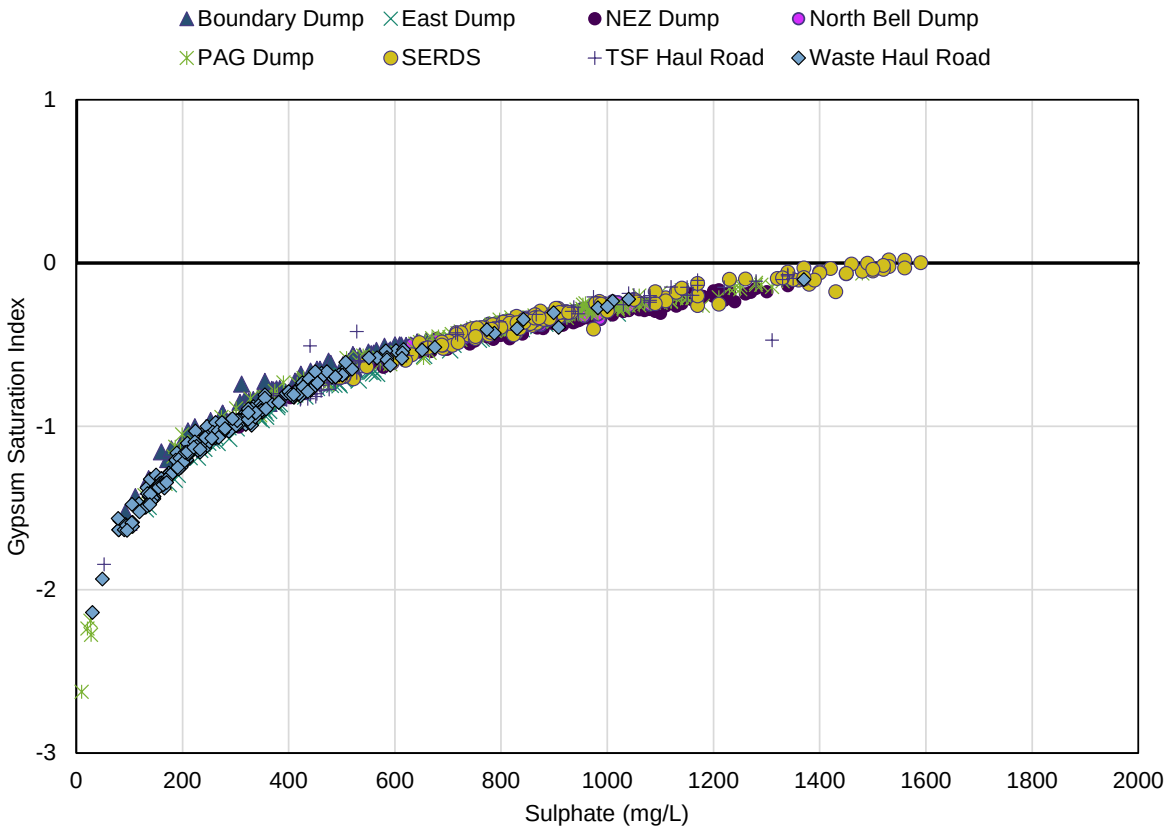
11.1.2 Solubility Controls

pH

Circumneutral to alkaline field pH values (pH above 7) dominate in seeps downstream of waste rock areas across the site (Figure 1 in Appendix G). Field pH measured in the seeps in 2023 ranged from 6.8 and 8.7. No field pH measurements showed influence by local PAG materials.

Gypsum likely controls major ion (calcium and sulphate) chemistry with pH control by dissolution of carbonate minerals. Figure 23 shows modelled calcite SI compared to modelled partial pressure of carbon dioxide (p_{CO2}). p_{CO2} above $10^{-3.4}$ atm (dashed vertical line in Figure 24) indicates CO_2 is over-pressurized, and as water equilibrates with atmospheric pressure, pCO_2 decreases along the flow path. pH will increase as a result and carbonates (such as calcite or malachite) may become oversaturated. Most seeps at Mount Polley have $p_{CO2} > 10^{-3.4}$ but no seeps show increasing p_{CO2} or metal (e.g., copper, nickel, cobalt, zinc) to sulphate ratios, both of which would be early indicators of acid generation.

Figure 23: Relationship between Gypsum ($CaSO_4 \cdot 2H_2O$) Saturation Indices and Sulphate Concentrations



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Mineral Saturation Indices

Consistent with previous seep water chemistry interpretations (e.g., SRK 2016, SRK 2023b), saturation indices for sulphate were consistent with gypsum ($CaSO_4 \cdot 2H_2O$) as a strong solubility control for sulphate, as expected based on the conceptual model (Figure 24). Gypsum is expected to form as a secondary mineral when sulphate and acidity released by oxidation of sulphides are neutralized by reaction with carbonate minerals. Gypsum saturation indices approached zero at higher sulphate concentrations.

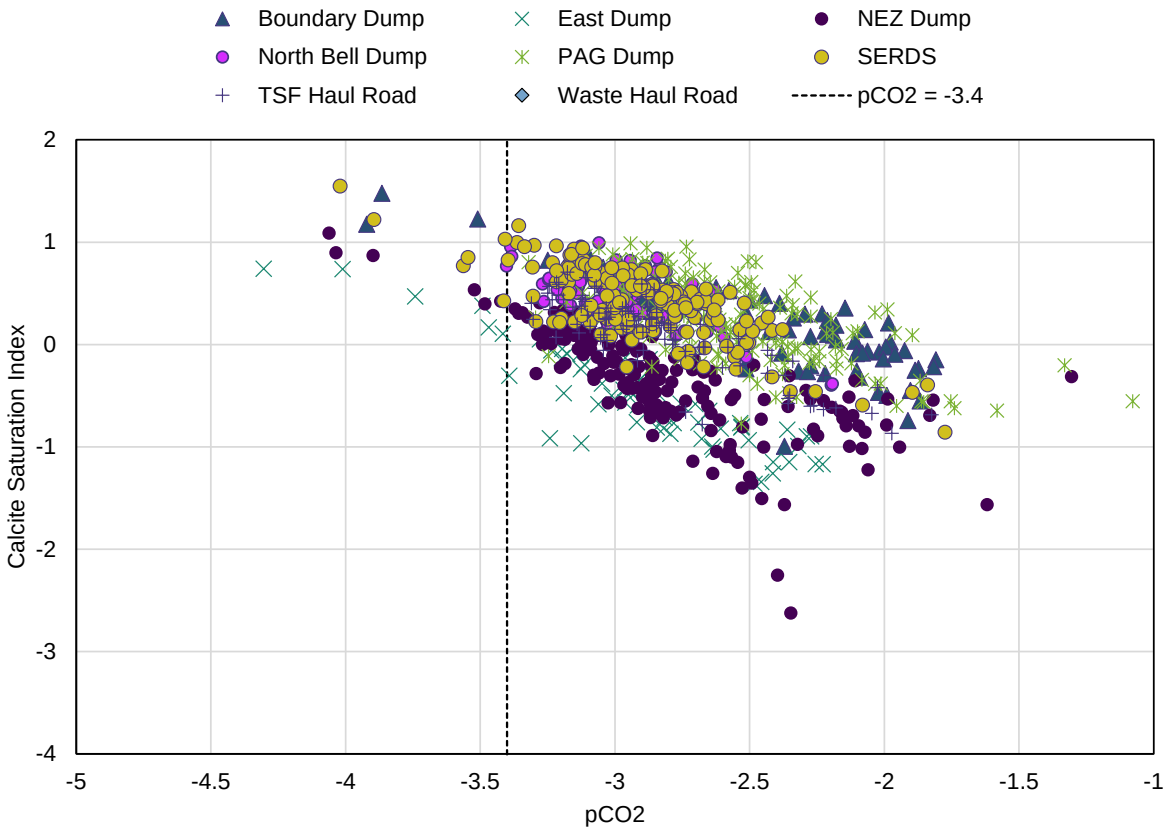
As previously noted in SRK (2023b), most seeps have sulphate concentrations below those required for gypsum saturation, indicating possibly that insufficient sulphate was generated by the mass of rock oxidizing. Dilution of contact waters is also commonly a factor that lowers concentrations.

Saturation indices for malachite ($Cu_2CO_3(OH)_2$) were well above zero, showing that copper concentrations were higher than would be predicted if malachite is controlling copper (Figure 25).

Tenorite (CuO) saturation indices were between zero and one at higher copper concentrations, indicating that copper oxide is more likely to control copper concentrations (Figure 26).

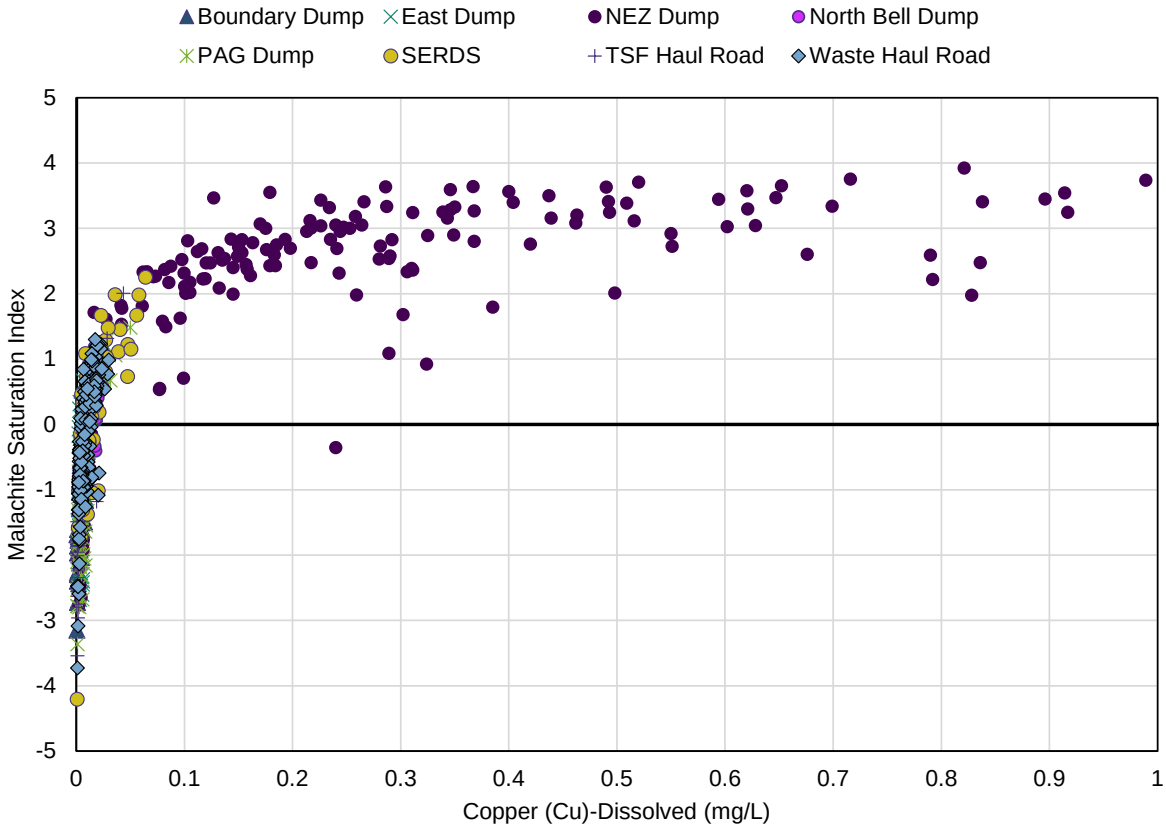
Consistent with findings in SRK (2023b), higher molybdenum concentrations indicate possible calcium molybdate control ($CaMoO_4$) (Figure 27). Dissolved iron and manganese concentrations remained low in waste rock seepages.

Figure 24: Relationship between Calcite ($CaCO_3$) Saturation Indices and Partial Pressure of Carbon Dioxide (pCO_2)



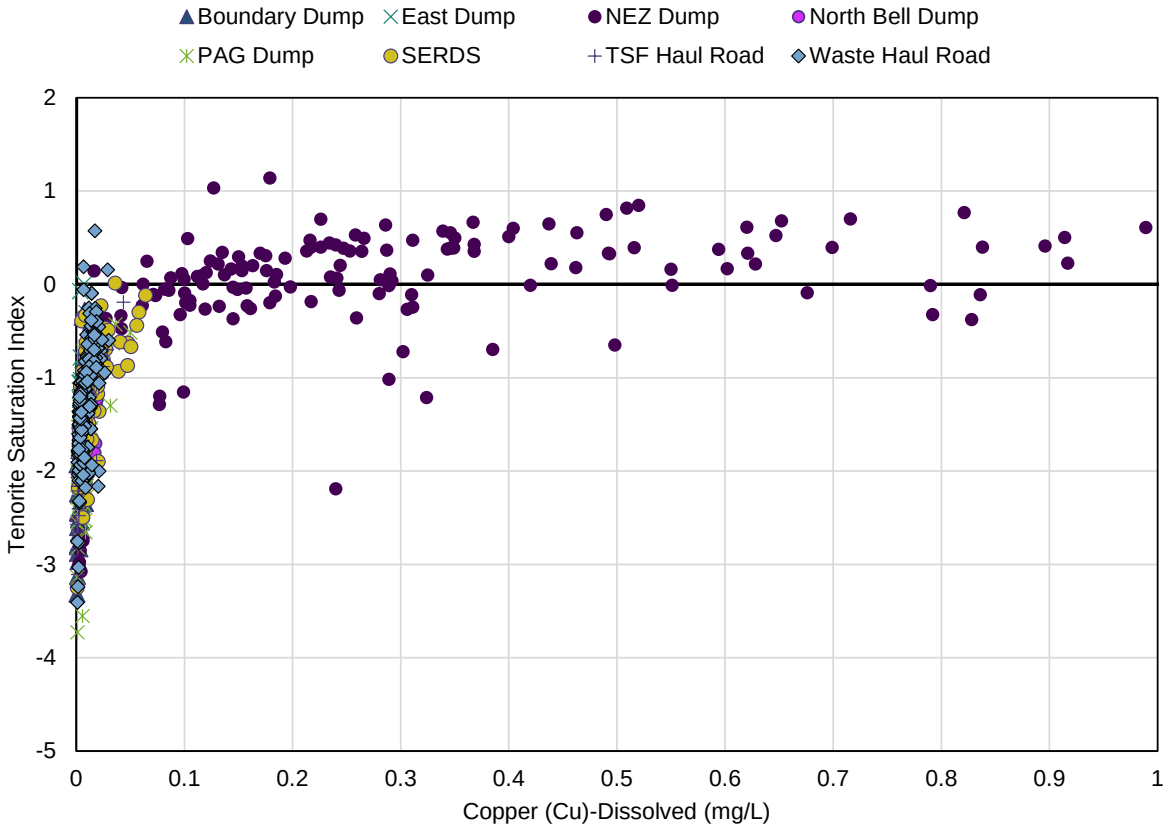
Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Figure 25: Relationship between Malachite ($Cu_2CO_3(OH)_2$) Saturation Indices and Dissolved Copper Concentrations



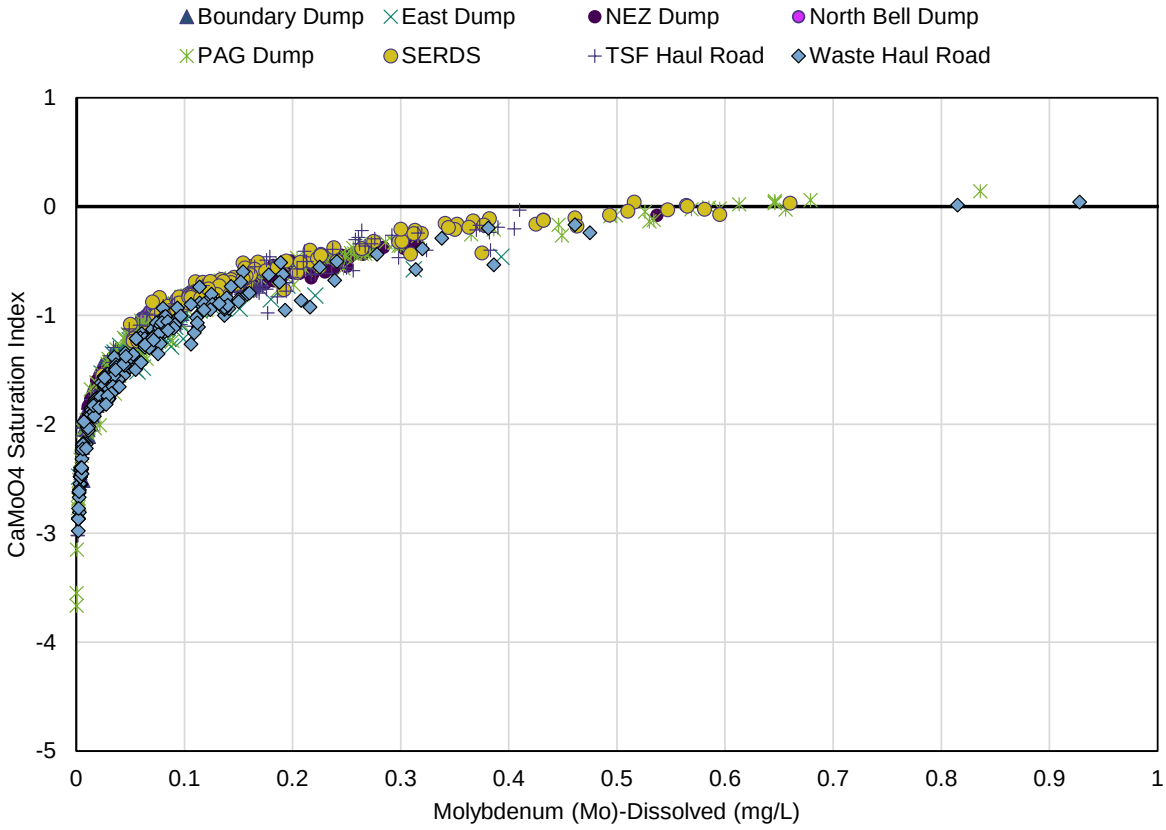
Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Figure 26: Relationship between Tenorite (CuO) Saturation Indices and Dissolved Copper Concentrations



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Figure 27: Relationship between Calcium Molybdate ($CaMoO_4$) Saturation Indices and Dissolved Molybdenum Concentrations

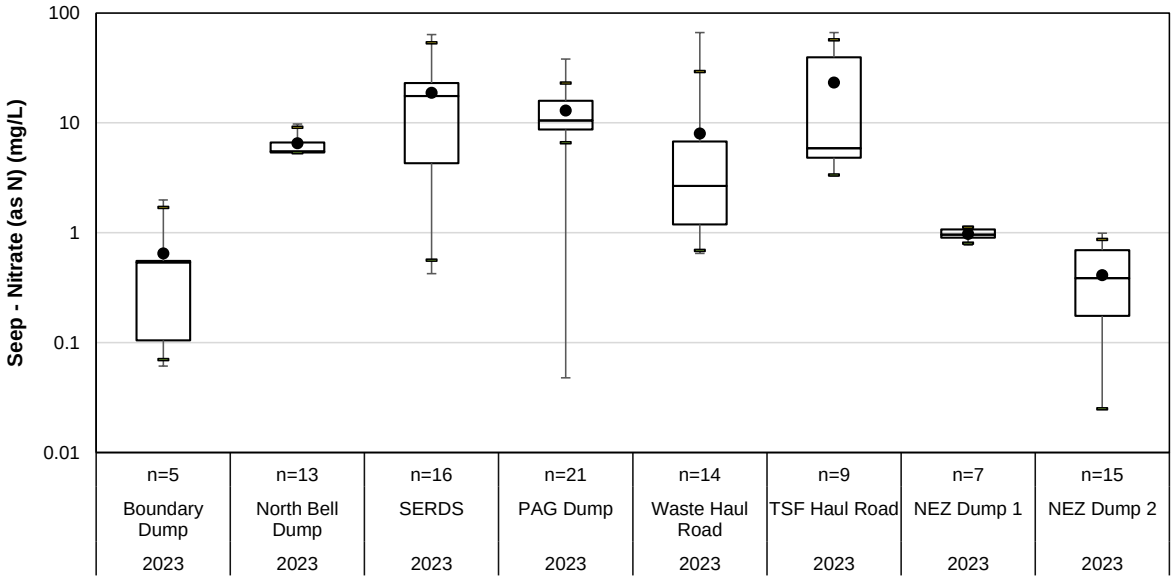


Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

11.1.3 Nitrogen Leaching

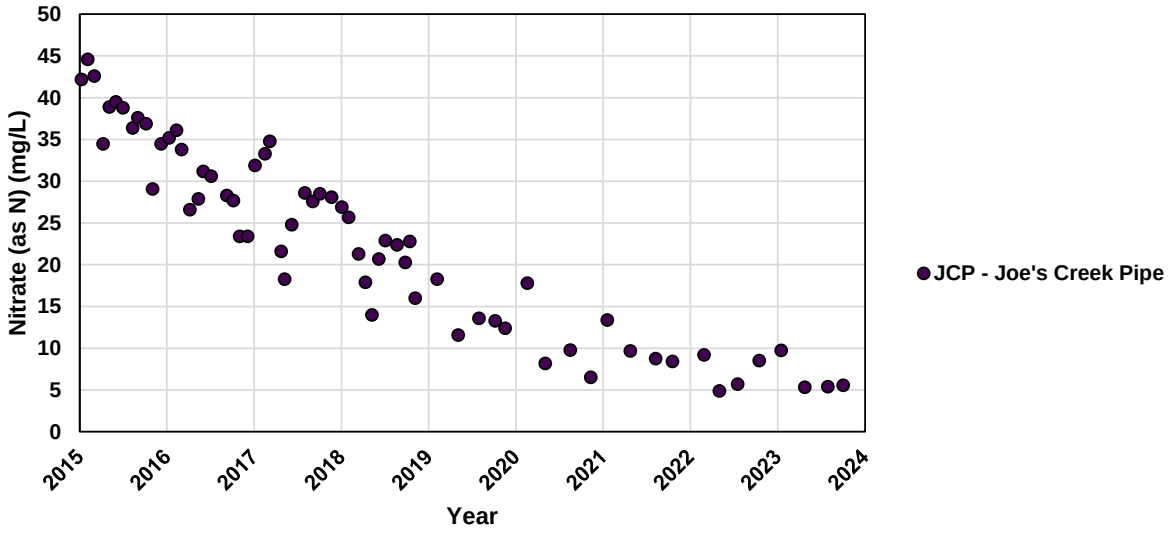
Nitrate concentrations varied considerably by source area in 2023 (Figure 28). Distinctively higher concentrations were found for the SERDS, the Temporary NW PAG Stockpile, TSF Haul Road, and the North Bell Dump. The differences are linked to placement activity with lowest concentrations for dumps less recently active. Notably, nitrate concentrations in the North Bell Dump have continued decreasing in 2023 (Figure 29) and have significantly decreased in seepage there and from the NEZ Dump in 2023 compared to 2022 (see Section 4.5.5 for method to determine significance).

Figure 28: Box and Whisker Plot of Nitrate Concentrations from Waste Rock Dump Seepage in 2023



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Figure 29: Timeseries of Nitrate Concentrations from the North Bell Dump



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

11.1.4 Interannual Trends by Area

Timeseries of POIs for all seeps are provided in Appendix G. Key interannual trends identified by area are described below:

- PAG Dump:
  - Sulphate concentrations have been increasing in the PAG Dump seeps since at least 2015 (average 700 mg/L in 2015 to 820 mg/L in 2023) as the waste rock pile continues to grow larger.
  - The increasing trend first identified in the previous year's report for dissolved aluminum continued in 2023 and was significantly higher in 2023 compared to previous years. No other parameters were significantly higher or lower in PAG Dump seepage in 2023.
- Waste Haul Road:
  - Dissolved cobalt concentrations significantly decreased again in 2023 compared to previous years. No other parameters were significantly higher or lower in Waste Haul Road seepage in 2023.
- TSF Haul Road:
  - No parameters were significantly higher or lower in TSF Haul Road seepage in 2023. The previous significant decrease of dissolved iron identified in previous reports was an artifact of changes to the detection limit.
- Boundary Dump:
  - Qualitative decreasing trends identified previously for ammonia, dissolved iron, dissolved manganese, total phosphorus, and sulphate have possibly ceased and have either plateaued or qualitatively increased in 2023 compared to 2022. Dissolved selenium also qualitatively increased in 2023.
  - Dissolved copper was significantly higher in 2023 compared to previous years while dissolved arsenic was significantly lower. No other parameters were significantly higher or lower in Boundary Dump seepage.
- North Bell Dump:
  - Dissolved selenium concentrations were significantly higher in 2023 compared to previous years, but concentrations have stabilized (annual average in 2015 was 0.052 mg/L compared to 0.084 mg/L in 2023).
  - Nitrate, dissolved calcium, and dissolved magnesium concentrations were significantly lower in 2023 compared to previous years. No other parameters were significantly higher or lower in North Bell Dump seepage.
- East RDS:

  - No parameters were significantly higher or lower in East RDS seepage in 2023 compared to previous years.
- NEZ Dump:
  - NEZ Dump 1 (NEZ Dump Seep 1 and NEZ Dump Seep 2):
    - A previously decreasing pH trend coupled with an increasing copper concentration trend appears to have plateaued after the sulphur pile removal in 2018 at NEZ Seep 1 and NEZ Seep 2 (Figure 1 in Appendix G).
    - The previously decreasing trend in field pH measurements between 2015 and 2020 (7.8 in 2015 towards 7.1 in 2020) stopped in 2021 (the average field pH in 2021 was 7.5) and was 7.7 on average in 2023. Since peaking in 2019 (average 2.3 mg/L), dissolved copper concentrations in NEZ Seep 1 and NEZ Seep 2 have decreased to an average of 0.099 mg/L in 2023 (Figure 16 1 in Appendix G). Other divalent metals (e.g., cadmium, cobalt, nickel, zinc) showed similar decreases and sulphate decreased to an annual average of 700 mg/L in 2023 from a peak of 1100 mg/L in 2017.
    - Compared to previous years, chloride, fluoride, nitrate, sulphate, dissolved cadmium, dissolved calcium, dissolved cobalt, dissolved coper, dissolved magnesium, dissolved manganese, dissolved nickel, dissolved selenium, and dissolved zinc concentrations were significantly lower in 2023 at NEZ Dump Seep 1 and 2. Total alkalinity, pH, and dissolved molybdenum were significantly higher in 2023 at these two seeps.
  - NEZ Dump 2 (remaining NEZ Dump seeps):
    - Nitrate, dissolved cadmium, and dissolved zinc concentrations were significantly lower in 2023 compared to previous years. No parameters were significantly higher.
- SERDS:
  - The increasing trend first identified in the previous year's report for dissolved aluminum continued in 2023 and the concentrations were significantly higher in 2023 compared to previous years. Dissolved zinc concentrations were significantly lower in 2023 compared to previous years.
  - Annual average sulphate concentrations decreased to 850 mg/L in 2023 compared to 1000 mg/L in 2021 and 950 mg/L in 2022. Dissolved selenium concentrations averaged 0.11 mg/L in 2023 compared to 0.15 mg/L in 2021 and 0.14 mg/L in 2022.
  - The influence of co-disposed tailings in the SERDS is not reflective in the water chemistry in 2023. The influence of drain down of water contained in the tailings is not evident in the seepage from the SERDS and TSS has not significantly increased in 2023 compared to previous years (Figure 5 in Appendix G).

11.2 Pit Sumps

11.2.1 Conceptual Geochemical Model

Pit Walls

Exposed pit walls remain in the Springer-Cariboo Pit, Wight Pit, and Boundary Pit. All other pits have been backfilled resulting in pit wall reactive surfaces becoming part of the backfill.

Pit walls are composed of fractured walls and rubble resulting from over-blast and physical weathering. Localized wall failures will contribute additional talus. Reactive surface area for pit walls is contained primarily in the broken rock rather than fractured walls.

Pit walls are assumed to perform the same as waste rock dumps composed of PAG and NAG waste but flow paths are much shorter. During flooding of pit walls, accumulated soluble weathering products will be flushed into pit walls. Following submergence, oxidation of walls is effectively stopped due to reduction in availability of oxygen. Highwalls above final flood levels continue to weather.

Direct precipitation (rain and snow) will dilute the pit sump. Surface water and groundwater that flows into the pit will also influence the water chemistry in the sump.

Nitrogen Leaching

Nitrogen is the same as described in Section 11.1.1 for waste rock. Sump waters from open pits indicate leaching from pit walls.

11.2.2 Overview

Currently, the Wight Pit is flooded and the Cariboo Pit is partially flooded. Both are storing water from other sources on site. Cariboo Pit has been flooded since March 2019, although it is currently being pumped down. Wight pit has been flooded since May 2021. Springer Pit was flooded in 2014 and tailings were deposited between August 2015 and June 2016. Springer Pit is now dewatered, but tailings still remain at the lower elevations and dewatering wells were installed in 2022 to remove pore water from the tailings. Water collected from these pits is most likely not representative of seepage from the pit walls, especially when water from other site areas is stored within the pits or, in the case of Springer Pit, is influenced by tailings. Because the water quality sampled in the flooded pits does not represent pit wall seepage, water chemistry sampling results from the Cariboo, Wight, and Springer pits are not discussed further.

The Boundary Pit is also flooded but is not storing water from other sources on site and was sampled twice in 2023, once in June and once in October. No new trends were observed in 2023 except for dissolved copper concentrations, which were significantly higher in 2021 compared to previous years (average 0.036 mg/L in 2021 and 0.014 mg/L before 2021), but may be exhibiting a decreasing trend (average was 0.030 mg/L in 2023) (Figure 16 in Appendix G).

11.3 Tailings Supernatant and Tailings Embankment Seepage

11.3.1 Conceptual Geochemical Model

During operations, tailings are deposited by spigotting from the TSF embankments, resulting in tailings beaches and slimes migrating to the centre of TSF. Cycloned tailings were also used for dam construction.

Under normal operational conditions, slimes in the centre would be fully saturated and below the process pond. Due to the finger drains in the dam, the water table drops from surface at the edge of the pond in the centre of the facility to the finger drains. As a result, tailings near the embankments are partially saturated. Oxygen enters the unsaturated tailings in the beaches and embankments by diffusion resulting in near surface tailings oxidizing most rapidly and consuming oxygen. An oxygen concentration profile will be present in the tailings which decreases most rapidly near surface and eventually results in negligible oxygen concentrations at depth. It is probable that active oxidation at this stage extends no more than a few metres into the tailings.

Due to the acid-consuming characteristics of the tailings, the weathering environment is pH-basic and overall processes are comparable to NAG waste rock (Section 11.1.1). Pore water chemistry during operations is dominated by process water with less effect from weathering processes because tailings are continually deposited, resulting in re-setting of the oxidation profile.

Process water contains low levels of dissolved organic carbon from flotation process reagents (e.g., W22c, a frother that is a blend of alcohols, glycols, and pine oils, and Polyfloat 7150, a mercaptan (CH_3SH) based collector). These compounds may act as a source of reduced carbon to facilitate reductive dissolution processes in the saturated components of the tailings such as dissolution of iron oxides and release of contained trace elements. SRK (2015) assessed this susceptibility and concluded the tailings were stable under chemically-reducing conditions. However, mineral forms that could be susceptible to reductive dissolution may be present in dam construction materials (e.g., till) or in native substrates that comprise the foundation of the TSF, so slightly elevated iron and manganese concentrations in downstream monitoring locations may be observed. If reducing conditions are encountered along the flow path through the dam, species such as nitrate and selenium may be attenuated.

Following the tailings dam failure in August 2014, the water table dropped, allowing more of the tailings to become unsaturated than under operational conditions. Draindown of pore waters will have occurred allowing oxidation processes to influence pore water chemistry.

Reactivation of the tailings pond resulted in the water table rising again into the tailings. As the water table rises, oxidation products formed following partial draindown will be dissolved by process waters. Pore waters can therefore be expected to reflect a mixture of process water effects and flushing of oxidation products, though, due to the limited penetration of oxygen into the tailings, process water will dominate.

Nitrogen Leaching

Leaching of explosive residual from ore will occur due to flushing in the milling process. Tailings solids themselves will not leach nitrogen because flushing during processing is very efficient. Nitrogen leaching from the TSF will reflect the influence of process water.

11.3.2 TSF Supernatant

Since Care and Maintenance began in May 2019, acidic leachate from the heap leach pad was pumped to the TSF until milling restarted in June 2022, when it was pumped to the final tailings box. MPMC indicated that some level of treatment of the leachate was started in 2021 using NaHS. This caused the field pH to be depressed from 2019 to 2020 (average 8.2 in 2019 to 7.6 in 2020), but it has since increased (annual average > 8.0 since 2021). Associated metal concentrations also increased from 2019 to 2020, such as dissolved cadmium, dissolved cobalt, dissolved copper, and dissolved nickel. These concentrations have since decreased (cadmium, copper) or plateaued (cobalt, nickel).

Chloride concentrations at E1a show a possible decreased after 2019 once processing ceased due to care and maintenance. In 2022, chloride increased once processing restarted and continued to increase in 2023. Nitrate concentrations at E1a show a decreasing trend as the TSF volume increased from 2017 and mining ceased in 2019 (average 9.6 mg-N/L in 2017 to 0.70 mg/L-N in 2021). An increasing trend started again since mining restarted in late 2021 (average 3.3 mg-N/L in 2023). Sulphate concentrations decreased since 2017 until 2021 (average 580 mg/L in 2017 to 400 mg/L in 2021) but have increased in 2023 (average 570 mg/L), similar to the trend observed for nitrate.

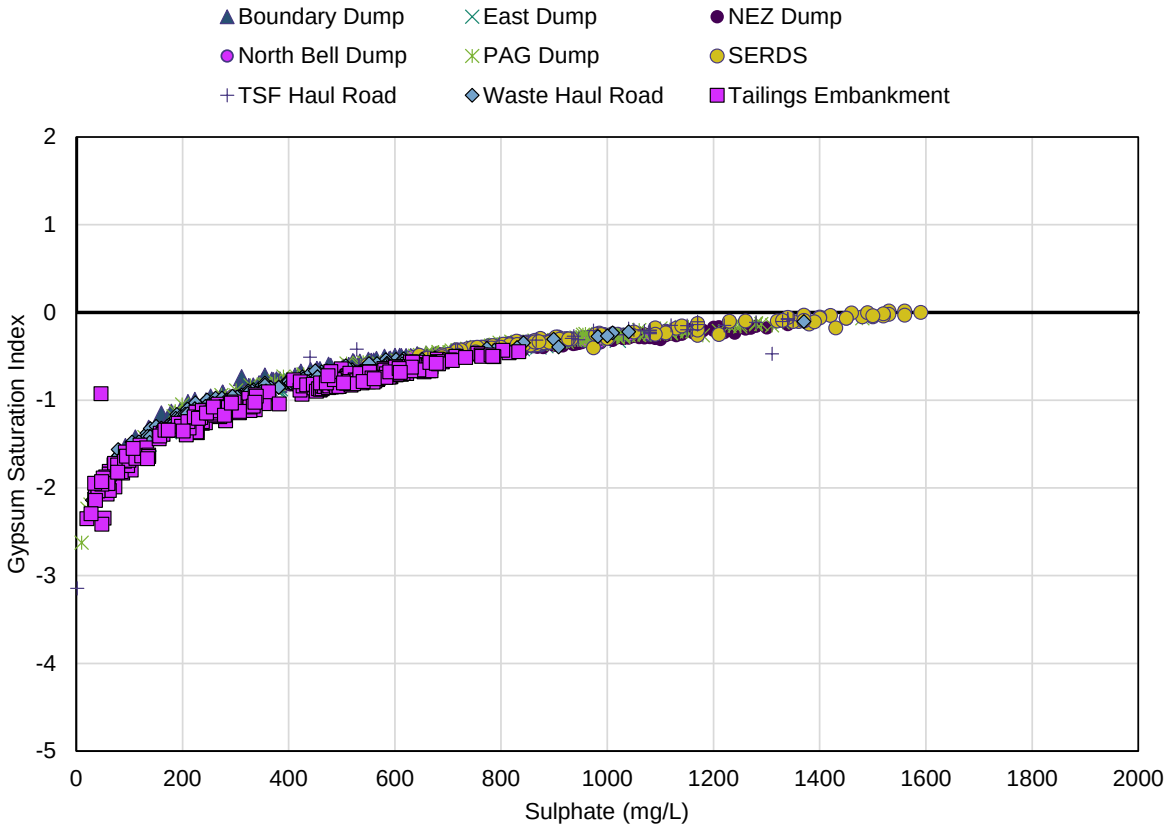
11.3.3 Tailings Embankment Seepage

The water chemistry of the Tailings Embankment monitoring locations, which comprise the East Main Toe Drain (EMTD), the West Main Toe Drain (WMTD), the South Toe Drain (STD) and the Main Embankment Seepage Pond (E4), represents seepage water from the TSF.

Average field pH was significantly lower in 2023 compared to previous years at the Tailings Embankment monitoring locations (average was 7.5 in 2023 compared to an average of 7.8 in previous years). Previously identified increasing trends for sulphate and dissolved molybdenum appear to have stabilized in recent years, indicating that the solubility of secondary minerals may be controlling concentrations.

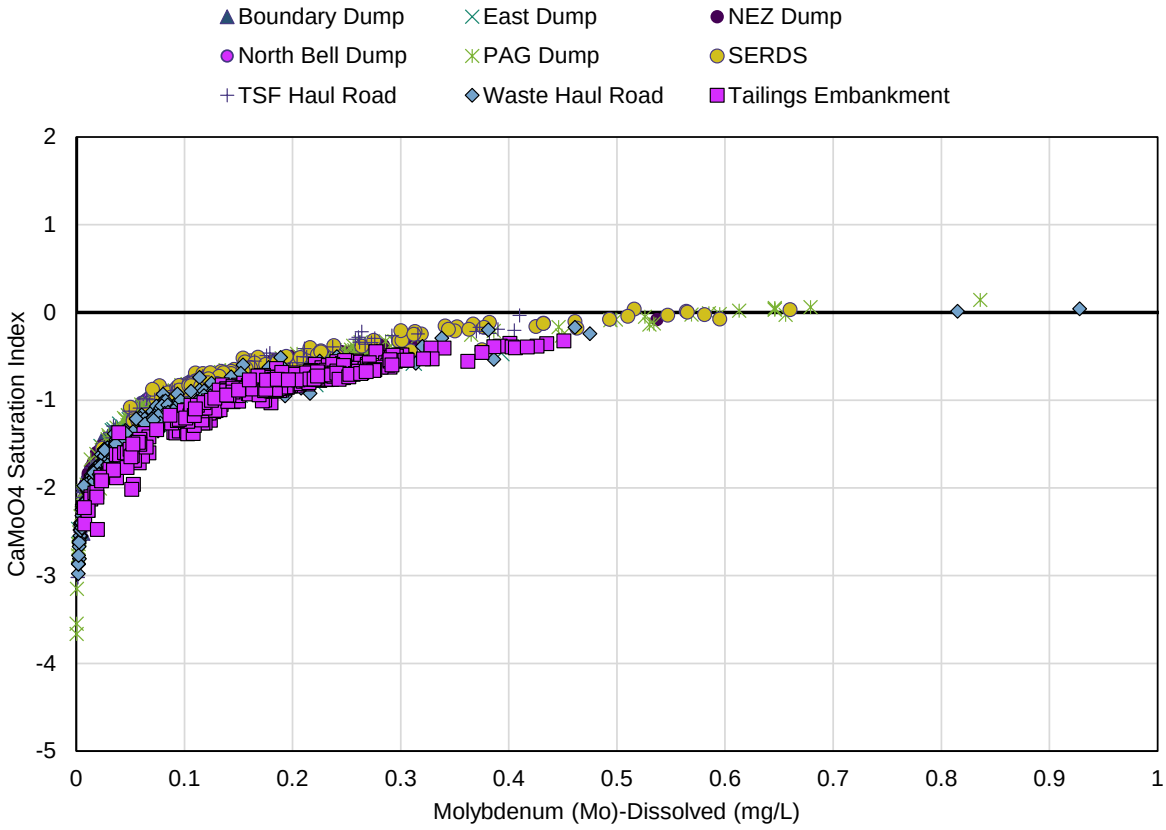
Figure 30 shows the relationship between sulphate and the saturation index for gypsum at the Tailings Embankment monitoring locations compared to the seepage monitoring locations. Similarly, Figure 31 shows the relationship between dissolved molybdenum and $CaMoO_4$. The relationships for the Tailings Embankment monitoring locations are shifted downwards, although this is more obvious for the molybdenum and calcium molybdate relationship and indicates the solubility control is different in the Tailings Embankment seepage than waste rock seepage. At higher molybdenum concentrations, calcium molybdate does not approach zero for tailings monitoring locations like it does in some waste rock seeps.

Figure 30: Relationship between Gypsum ($CaSO_4 \cdot 2H_2O$) Saturation Indices and Sulphate, including Tailings Seepage



Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Figure 31: Relationship between Calcium Molybdate ($CaMoO_4$) Saturation Indices and Dissolved Molybdenum Concentrations, including Tailings Seepage



Sources: https://srk.sharepoint.com/sites/NACAPR002434/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

11.4 Non-Contact Water

Gavin's Ditch, the TSF Clean Water Ditch and the Wight Pit Clean Water Ditch were not sampled in 2023 as no flow was observed at these locations on both monitoring occasions.

11.5 Comparison to Geochemical Source Terms

11.5.1 Background

SRK (2023b) described the development of the geochemical source terms beginning with conceptual geochemical models to describe the anticipated performance of each source of contact water. The main sources of chemical load are the waste rock dumps and tailings. Numerical source terms for waste rock and tailings were developed by statistically summarizing water chemistry monitoring data for near source seeps. The higher concentrations in the monitoring datasets were assumed to

represent contact water with minimal dilution. This approach avoids the limitation of interpreting laboratory test data.

The main assumption when using monitoring data is that the wastes are geochemically stable. As discussed in Sections 5 and 9, results from monitoring of waste rock and tailings in 2023 show that wastes have similar ARD potential and trace element concentrations within historical ranges.

Numerical source terms for pit walls in SRK (2023b) were developed by scaling weathering rates from humidity cell tests and were constrained using the seepage source terms for NAG waste rock.

11.5.2 Method

SRK evaluated whether a statistically significant change in near source concentrations had occurred between data collected up to December 2022 and subsequent data collected from January 2023 to December 2023. December 2022 was the cut-off for data used by SRK (2023b). 95% confidence limits on geometric averages for the two data periods were compared. If the ranges overlapped, it was concluded that no change in near source concentrations had occurred. See Appendix H for the comparison for waste rock seepage and tailings embankment seepage, respectively. Box and whisker plots were prepared to examine the distributions in more detail for selected parameters.

For pit seepage, water chemistry from the pit lakes was compared to the pit wall source terms and was flagged if source terms from SRK (2023b) were potentially underpredicted (i.e., <10 times the monitoring results).

11.5.3 Results

Waste Rock Seepage

Table 21 summarizes findings on statistically significant changes in seepage chemistry of waste rock seeps collected up to the end of 2022 compared to samples collected in 2023. A separate source term was developed for NEZ Dump seeps that were influenced by the sulphur stockpile (i.e., NEZ Dump Seep 1 and NEZ Dump Seep 2), so the significant changes are presented separately from the other seeps. All parameters are expressed as dissolved concentrations.

The changes in seepage chemistry at NEZ Dump (Sulphur Stockpile) reflect continued improvement of water chemistry after removal of the sulphur stockpile in 2018, which previously had decreasing pH and increased concentrations of elements neutralizing sulphuric acid by reaction with calcium and magnesium carbonates and potassic silicates. The depression in pH increased the solubility of several metals (Cd, Cu, Ni, and Zn).

Table 21: Summary of Statistically Significant Changes in Waste Rock Seepage Concentrations

Seeps Included	No Change	Significant Decrease	Significant Increase
NEZ Dump Seeps Influenced by Sulphur Stockpile[1]	Conductivity, pH, Al, Sb, As, Bi, Cr, DOC, Fe, Pb, P, Ag, Sr, Tl, Sn, Ti, V	NH_3, Ba, Be, B, Cd, Ca, Cl, Co, Cu, F, Li, Mg, Mn, Ni, NO_3, NO_2, PO_4, K, Se, Si, Na, SO_4, Zn	Alkalinity, Mo, U
All other seeps	Conductivity, pH, Alkalinity, NH_3, Sb, As, Ba, B, Cd, Ca, Cl, Cr, Co, Cu, DOC, F, Fe, Pb, Li, Mg, Mn, Mo, Ni, NO_3, NO_2, P, K, Se, Si, Ag, Na, Sr, SO4, Tl, Sn, U, V, Zn	Be, Bi, PO_4, Ti	Al

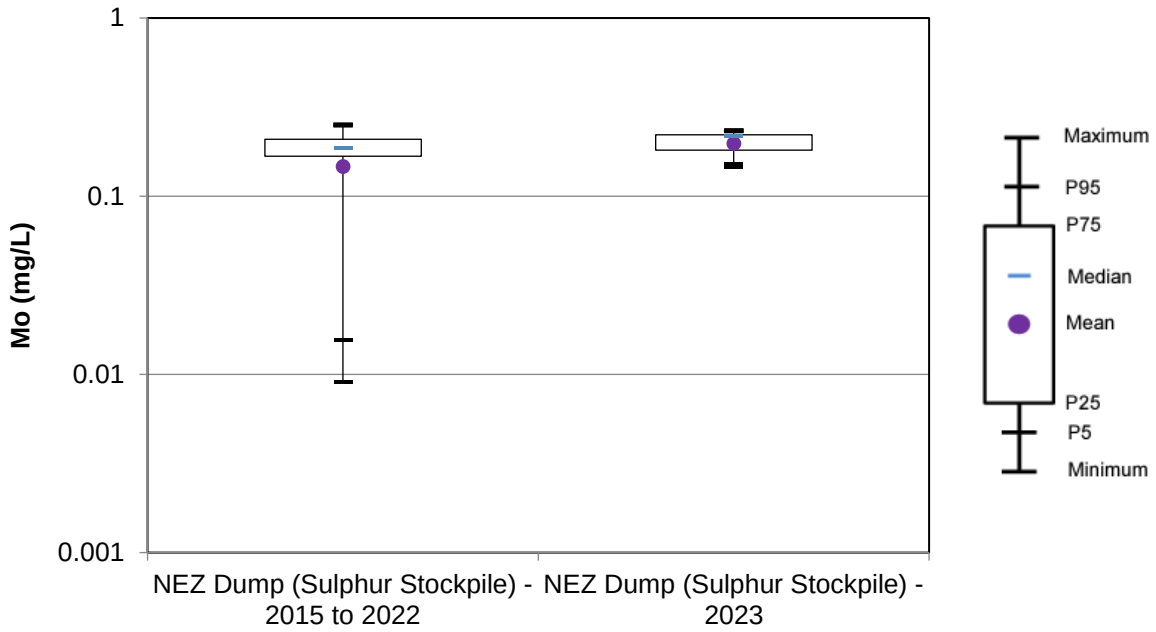
Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[CW_SourceTermReview_CAPR002434_Rev02_SJL_KWJ.xlsx]

Notes:

[1] Seeps that were influenced by the sulphur stockpile were NEZ Dump Seep 1 and NEZ Dump Seep 2

While average dissolved molybdenum concentrations increased as shown in Table 22 for NEZ Dump (Sulphur Stockpile), the statistics used to define the source term (95th and 99th percentiles) did not change markedly (Figure 32).

Figure 32: Dissolved Molybdenum Concentrations Used in SRK (2023b) Compared to Concentrations from 2023 in NEZ Dump (Sulphur Stockpile) Seepages



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[CW_SourceTermReview_CAPR002434_Rev02_SJL_KWJ.xlsx]

Pit Seepage

As described in Section 11.2.2, the water quality sampled in Cariboo, Wight, and Springer pits does not represent pit wall seepage. Therefore, water quality sampling from the Cariboo, Wight, and Springer pits is not discussed further.

Screening with 2023 monitoring data highlighted strontium may be underpredicted, but no POIs were flagged as potentially underpredicted (Appendix H).

Tailings Embankment Seepage

Table 22 shows statistically significant increases for several parameters in the tailing seeps collected up to the end of 2022 compared to samples collected from 2023. Statistics for this period reflect the long-term record of monitoring before the tailings breach in August 2014, the subsequent period when the tailings were drained following the breach, and the re-activation of the TSF after the dam was reconstructed, including during and after no discharge from the mill occurred from May 2019 to June 2022 due to Care and Maintenance.

Table 22: Summary of Statistically Significant Changes in Tailings Seepage Concentrations

No Change	Significant Decrease	Significant Increase
Al, NH_3, As, B, Cd, Cr, Cu, DOC, F, Pb, Mn, PO_4, P, Se, Sn	pH, Sb, Ba, Be, Bi, Cl, Ni, NO_3, NO_2, Ag, Tl, V	Alkalinity, Ca, Co, Fe, Li, Mg, Mo, K, Si, Na, Sr, SO_4, Ti, U, Zn

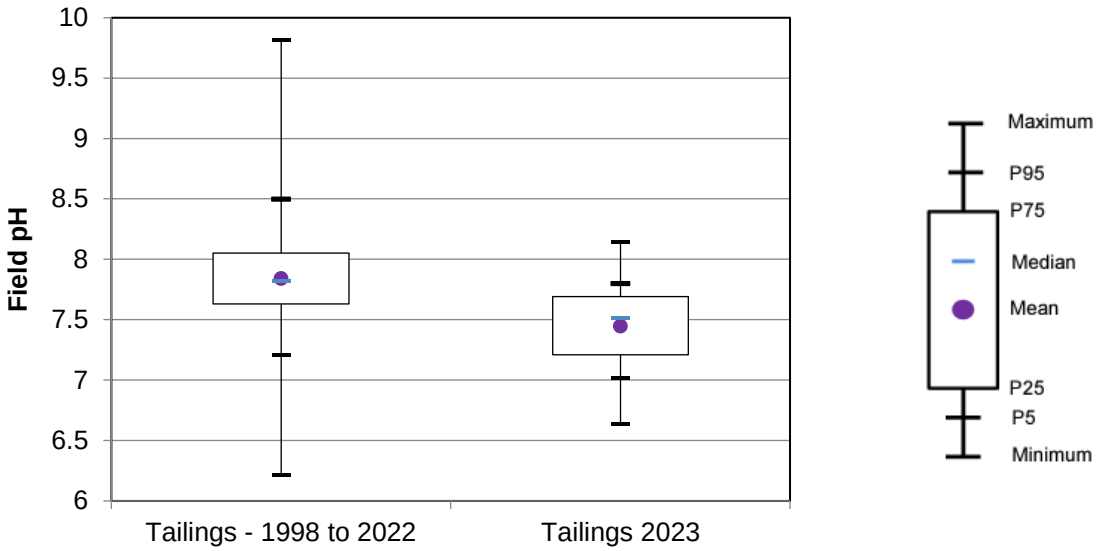
Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[CW_SourceTermReview_CAPR002434_Rev02_SJL_KWJ.xlsx]

Figure 33 shows average field pH measurements of tailings embankments seepages decreased in 2023 compared to historical field pH measurements. Although the average is lower, field pH measurements in 2023 were within the historical range.

Of those parameters shown in Table 22, the more significant increases were apparent for sulphate and molybdenum. Seepage concentrations for these two parameters are correlated, which is consistent with the expectation that they both originate from the oxidation of pyrite as described in the conceptual model since molybdenite is uncommon in the mineralization at Mount Polley. Inspection of sulphate and molybdenum trends for individual seeps shows the upward trend and stabilization of the trend in recent years (see Section 11.3.2).

The extensive list of other parameters that have either increased or decreased with no obvious consistency (e.g., pH decreased but no change or decrease in most cations) suggests other factors, such as drought conditions in 2023, may have affected the seepage chemistry.

Figure 33: Field pH Measurements Used in SRK (2023b) Compared to Measurements from 2023 Tailings Embankment Seepages



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/2023_Reporting/2_WQ Working Files/[CW_SourceTermReview_CAPR002434_Rev02_SJL_KWJ.xlsx]

12 Conclusions

SRK concluded the program is delivering data that are informing current and future waste rock and tailings management.

12.1 Monitoring Commitments

In 2023, MPMC fulfilled all monitoring commitments as established by the Permit, the ML/ARD Procedure Manual, and the Water Management Plan except the following:

- No samples of co-disposed tailings collected in 2023 were sent to external laboratories for further analyses. The target frequency was once per month.

12.2 Waste Rock Characteristics

Conclusions of the waste rock monitoring program are:

- Approximately one quarter of production pit blast hole samples collected in 2023 from the Springer Pit were classified as PAG (26%). This is consistent with past results showing Springer Pit rock as dominantly NAG with some PAG components. Trace element concentrations are within historical ranges.

12.3 Tailings Characteristics

The tailings monitoring program indicated:

- Monthly tailings composite results from 2023 showed the weighted annual average NP/AP was 9.9 and are consistent with past results, showing tailings are generally NAG. Trace element concentrations are within historical ranges.
- Results of tailings co-disposed in the SERDS in 2023 showed that samples were dominantly NAG.

12.4 Water Treatment Plant Waste Characteristics

The WTP waste monitoring program indicated:

- All WTP waste sediment samples collected in 2023 were classified as NAG except for the February sample which could not be classified because there was no TIC result.

12.5 Seepage and Contact Water Monitoring

The results of the seepage and contact water monitoring show the following:

- Seepage from the waste rock dumps shows the influence of waste rock leaching and indicates sulphide oxidation is occurring. Chemistry remains circumneutral to slightly alkaline at all sites,

indicating pH buffering by calcium and magnesium-bearing carbonate minerals is ongoing. These pH conditions limit the mobility of most trace elements except oxyanions such as selenium.

- Stable or decreasing trends in nitrate, ammonia, and nitrite concentrations are consistent with continued flushing of explosives residuals from the pit walls and waste rock seepage during mining activities in 2023.
- Seepage from the tailings embankment indicates concentrations for parameters of interest were similar from 2022 to 2023, with some exceptions including increasing sulphate and molybdenum. These increases may be the result of flushing of oxidation products as the water level rises.

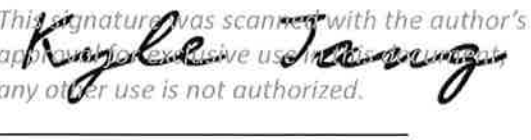
13 Recommendations

The following recommendations are made:

- The frequency of in-house duplicates and off-site confirmatory analysis need to be increased for blast hole and placed material samples. Both should be performed on 10% of all samples until acceptable performance is achieved, after which 5% will be appropriate.
- CRM and blank analysis can be reduced to 5% of samples.
- As recommended in the previous annual report, Pond Zone HCT HC-13 can be stopped.
- Continuation of two humidity cell tests (HC-3, HC-4) containing “grey” tailings released during the dam breach to evaluate the role of breakdown of organic matter on metal mobility.
- As recommended in the previous annual report, the waste rock column tests Column 1, Column 2, and Column 3, can be stopped.
- Continuation of Magnetite Sand Column 1 and Grey Tailings Column 3 to allow comparison of differences in copper leaching, and termination of the Magnetite Sand Column 2.
- Because seepage from NEZ Seep 1 is not representative of seepage from the NEZ Dump, SRK recommends that an additional seep be selected from the NEZ Dump for quarterly monitoring. The selected seep should be known to have sufficient flow throughout the year. NEZ Seep 1 should continue to be monitored quarterly.

Closure

This report, Metal Leaching/Acid Rock Drainage Characterization and Monitoring Program – 2023 Annual Report, was prepared by



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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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Appendix A. Off-Site Confirmatory Analysis Results

Appendix A: QAQC Results

Material	Sample Name	Carbon (%)			Sulphur (%)		
		MPMC	ALS	RPD	MPMC	ALS	RPD
Tailings	January Tailings Composite	0.25	0.37	-40%	0.14	0.15	-8%
Tailings	February Tailings Composite	0.27	0.27	2%	0.18	0.20	-10%
Tailings	March Tailings Composite	0.29	0.36	-21%	0.062	0.11	-55%
Tailings	April Tailings Composite	0.25	0.33	-27%	0.16	0.14	9%
Tailings	May Tailings Composite	0.25	0.31	-21%	0.12	0.17	-32%
Tailings	June Tailings Composite	0.27	0.30	-14%	0.064	0.13	-66%
Tailings	July Tailings Composite	0.28	0.32	-14%	0.075	0.15	-65%
Tailings	August Tailings Composite	0.35	0.40	-13%	0.063	0.10	-45%
Tailings	September Tailings Composite	0.41	0.41	-1%	0.082	0.11	-30%
Tailings	October Tailings Composite	0.35	0.39	-10%	0.091	0.12	-26%
Tailings	November Tailings Composite	0.30	0.39	-26%	0.067	0.074	-10%
Tailings	December Tailings Composite	0.36	0.40	-12%	0.08	0.12	-41%
Waste Rock	S976-0321582	0.45	0.54	-17%	0.038	0.20	-135%
Waste Rock	S952-0215040	0.29	0.35	-19.9%	0.01	0.12	-169%
Waste Rock	S988-0555091	0.75	0.81	-7%	0.050	0.077	-43%
Waste Rock	S964-0435534	0.20	0.23	-13.3%	0.77	0.70	9%
Waste Rock	S964-0472423	0.82	0.87	-7.0%	0.14	0.17	-19%
Waste Rock	S964-0435516	0.21	0.24	-13.7%	0.28	0.30	-8%
Waste Rock	S928-0131435	0.41	0.48	-16.9%	0.14	0.17	-21%
Waste Rock	S928-0131330	0.34	0.36	-6.3%	0.033	0.065	-65%
Waste Rock	S976-0539012	0.12	0.16	-29.4%	0.091	0.10	-6%
Waste Rock	S928-0123042	0.26	0.30	-11.8%	0.7	0.66	6%
Waste Rock	S976-0522673	0.56	0.62	-10.7%	0.016	0.072	-127%

Appendix B. Blast Hole On-Site and External Laboratory Data

Appendix B-1: Blast Hole On-Site ABA Results

Sample ID	Lab	Year	S	C	AP	NP	NP/AP	Classification	Type
			%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-	-	-
S988-0421422	MPMC	2023	0.43	0.17	13	14	1	PAG	Waste
S988-0421482	MPMC	2023	0.42	0.13	13	11	0.85	PAG	Ore
S988-0421549	MPMC	2023	0.46	0.16	14	13	0.91	PAG	Ore
S988-0421592	MPMC	2023	0.36	0.16	11	13	1.2	PAG	Ore
S988-0421599	MPMC	2023	0.18	0.16	5.5	13	2.4	NAG	Ore
S988-0421602	MPMC	2023	0.19	0.16	5.8	13	2.3	NAG	Waste
S988-0421732	MPMC	2023	0.12	0.16	3.6	13	3.7	NAG	Ore
S988-0421735	MPMC	2023	0.11	0.096	3.3	8	2.4	NAG	Waste
S988-0423214	MPMC	2023	0.11	0.13	3.3	11	3.2	NAG	Ore
S1000-0432101	MPMC	2023	0.83	0.33	26	27	1	PAG	Waste
S1000-0432105	MPMC	2023	1.6	0.45	50	37	0.74	PAG	Waste
S1000-0432172	MPMC	2023	0.18	0.14	5.7	12	2.1	NAG	Waste
S1000-0437058	MPMC	2023	1	0.29	33	24	0.75	PAG	Waste
S1000-0437069	MPMC	2023	0.38	0.2	12	16	1.4	PAG	Waste
S1000-0437074	MPMC	2023	0.18	0.55	5.7	46	8	NAG	Waste
S1000-0442073	MPMC	2023	0.096	0.079	3	6.6	2.2	NAG	Waste
S1000-0442078	MPMC	2023	2	0.35	62	29	0.48	PAG	Waste
S1000-0442083	MPMC	2023	0.48	0.091	15	7.6	0.51	PAG	Waste
S1000-0442151	MPMC	2023	1.8	0.11	57	9.1	0.16	PAG	Ore
S1000-0442155	MPMC	2023	2.1	0.43	67	35	0.53	PAG	Waste
S1000-0442159	MPMC	2023	1.5	0.17	46	14	0.3	PAG	Waste
S1000-0442164	MPMC	2023	2.4	0.27	75	23	0.3	PAG	Ore
S1000-0443125	MPMC	2023	0.095	0.076	3	6.3	2.1	NAG	Ore
S988-0414502	MPMC	2023	0.01	0.013	0.31	1.1	3.5	NAG	Waste
S988-0419101	MPMC	2023	0.03	0.077	0.94	6.4	6.8	NAG	Waste
S1000-0442053	MPMC	2023	0.43	0.12	14	10	0.76	PAG	Waste
S1000-0442038	MPMC	2023	0.41	0.15	13	12	0.96	PAG	Waste
S1000-0442024	MPMC	2023	0.015	0.065	0.47	5.4	12	NAG	Ore
S1000-0442021	MPMC	2023	0.15	0.073	4.7	6.1	1.3	PAG	Waste
S1000-0442006	MPMC	2023	0.026	0.027	0.81	2.3	2.8	NAG	Ore
S1000-0447231	MPMC	2023	0.025	0.058	0.78	4.8	6.2	NAG	Waste
S976-0301365	MPMC	2023	0.011	0.068	0.34	5.7	16	NAG	Waste
S976-0301367	MPMC	2023	0.13	0.55	4	46	11	NAG	Waste
S976-0302241	MPMC	2023	0.082	0.53	2.6	44	17	NAG	Waste
S1000-0433105	MPMC	2023	0.24	0.23	7.6	19	2.5	NAG	Waste
S1000-0434103	MPMC	2023	0.16	0.33	4.9	27	5.6	NAG	Waste
S1000-0434107	MPMC	2023	0.16	0.47	5	39	7.9	NAG	Waste
S1000-0434110	MPMC	2023	0.29	0.17	9.1	14	1.5	PAG	Waste
S1000-0434114	MPMC	2023	0.24	0.37	7.5	31	4.2	NAG	Waste
S1000-0434121	MPMC	2023	0.94	0.43	30	36	1.2	PAG	Waste
S976-0307007	MPMC	2023	0.12	0.71	3.8	59	16	NAG	Waste
S976-0301487	MPMC	2023	0.2	0.61	6.2	51	8.3	NAG	Ore
S976-0301483	MPMC	2023	0.23	0.083	7.2	6.9	0.96	PAG	Ore
S976-0301362	MPMC	2023	0.13	0.14	3.9	12	3	NAG	Waste
S976-0301353	MPMC	2023	0.048	0.098	1.5	8.2	5.4	NAG	Waste
S976-0301237	MPMC	2023	0.038	0.24	1.2	20	17	NAG	Waste

S1000-0434132	MPMC	2023	1	0.32	32	27	0.85	PAG	Waste
S1000-0433122	MPMC	2023	1.3	0.21	41	18	0.43	PAG	Waste
S1000-0433114	MPMC	2023	1.5	0.31	48	25	0.53	PAG	Waste
S1000-0432238	MPMC	2023	1.7	0.31	53	26	0.48	PAG	Waste
S1000-0432114	MPMC	2023	2.2	0.38	69	32	0.46	PAG	Waste
S976-0301378	MPMC	2023	0.042	0.13	1.3	11	8	NAG	Waste
S976-0301572	MPMC	2023	0.059	0.15	1.8	12	6.7	NAG	Waste
S976-0301554	MPMC	2023	0.057	0.22	1.8	19	10	NAG	Waste
S976-0301702	MPMC	2023	0.018	0.57	0.56	48	85	NAG	Waste
S976-0309002	MPMC	2023	0.089	0.57	2.8	47	17	NAG	Ore
S976-0309004	MPMC	2023	0.38	0.25	12	21	1.8	PAG	Ore
S976-0302004	MPMC	2023	0.47	0.58	15	49	3.3	NAG	Ore
S976-0301548	MPMC	2023	0.083	0.13	2.6	11	4.1	NAG	Waste
S976-0301575	MPMC	2023	0.34	0.23	10	19	1.8	PAG	Ore
S976-0301628	MPMC	2023	0.87	0.26	27	22	0.8	PAG	Ore
S976-0301657	MPMC	2023	0.3	0.23	9.4	20	2.1	NAG	Ore
S976-0301674	MPMC	2023	0.34	0.33	11	28	2.6	NAG	Ore
S976-0321395	MPMC	2023	0.074	0.24	2.3	20	8.7	NAG	Waste
S976-0321445	MPMC	2023	0.41	0.12	13	10	0.79	PAG	Ore
S976-0321505	MPMC	2023	0.041	0.09	1.3	7.5	5.9	NAG	Waste
S976-0321582	MPMC	2023	0.038	0.45	1.2	38	32	NAG	Waste
S976-0321585	MPMC	2023	0.035	0.17	1.1	14	13	NAG	Waste
S988-0443052	MPMC	2023	0.036	0.37	1.1	31	28	NAG	Waste
S988-0447004	MPMC	2023	0.01	0.21	0.31	18	56	NAG	Waste
S988-0441102	MPMC	2023	0.01	0.18	0.31	15	47	NAG	Waste
S988-0441105	MPMC	2023	0.013	0.16	0.41	14	33	NAG	Waste
S988-0441217	MPMC	2023	0.01	0.17	0.31	14	45	NAG	Waste
S988-0441212	MPMC	2023	0.01	0.082	0.31	6.8	22	NAG	Ore
S988-0441318	MPMC	2023	0.01	0.31	0.31	26	83	NAG	Ore
S988-0441315	MPMC	2023	0.011	0.11	0.34	8.8	26	NAG	Ore
S988-0441489	MPMC	2023	0.014	0.31	0.44	26	58	NAG	Ore
S988-0432187	MPMC	2023	0.27	0.21	8.5	17	2	NAG	Waste
S988-0441015	MPMC	2023	0.012	0.24	0.38	20	54	NAG	Waste
S988-0432212	MPMC	2023	0.24	0.47	7.3	39	5.3	NAG	Waste
S988-0432233	MPMC	2023	2.4	0.24	74	20	0.27	PAG	Waste
S988-0432272	MPMC	2023	0.49	0.43	15	36	2.4	NAG	Waste
S988-0432269	MPMC	2023	2	0.15	63	13	0.2	PAG	Waste
S1048-0971061	MPMC	2023	0.34	0.12	11	10	0.96	PAG	Waste
S1048-0972004	MPMC	2023	0.64	0.2	20	17	0.83	PAG	Waste
S1048-0971058	MPMC	2023	0.36	0.14	11	11	1	PAG	Waste
S1048-0971055	MPMC	2023	0.33	0.068	10	5.7	0.55	PAG	Waste
S1048-0991316	MPMC	2023	1.2	0.44	38	36	0.96	PAG	Waste
S1048-0991359	MPMC	2023	1.6	0.22	51	18	0.36	PAG	Waste
S1048-0991322	MPMC	2023	3	0.37	93	31	0.33	PAG	Waste
S1048-0991326	MPMC	2023	2.5	0.28	77	23	0.3	PAG	Waste
S1048-0991379	MPMC	2023	1.7	0.16	53	13	0.25	PAG	LGO
S1048-0991383	MPMC	2023	1.9	0.21	60	18	0.29	PAG	Waste
S1048-0991408	MPMC	2023	3.3	0.73	100	61	0.59	PAG	Waste

S1048-0991411	MPMC	2023	2	0.13	62	11	0.18	PAG	Waste
S1048-0991404	MPMC	2023	2	0.19	62	16	0.26	PAG	Waste
S1048-0991434	MPMC	2023	0.67	0.18	21	15	0.73	PAG	Waste
S976-0315088	MPMC	2023	0.11	0.2	3.4	17	5	NAG	Waste
S976-0315060	MPMC	2023	0.082	1.4	2.6	120	47	NAG	Waste
S976-0315104	MPMC	2023	0.033	0.37	1	31	30	NAG	Waste
S988-0432316	MPMC	2023	1.2	0.35	38	29	0.77	PAG	Waste
S988-0432302	MPMC	2023	0.73	0.41	23	34	1.5	PAG	Waste
S988-0432289	MPMC	2023	0.39	0.24	12	20	1.6	PAG	Waste
S988-0432239	MPMC	2023	1.4	0.19	42	16	0.38	PAG	Waste
S988-0432205	MPMC	2023	1.5	0.23	46	20	0.42	PAG	Ore
S988-0431865	MPMC	2023	0.4	0.25	12	21	1.7	PAG	Waste
S988-0431862	MPMC	2023	0.87	0.12	27	10	0.38	PAG	Waste
S988-0431832	MPMC	2023	0.089	0.24	2.8	20	7.3	NAG	Waste
S988-0431803	MPMC	2023	0.26	0.12	8.2	9.7	1.2	PAG	Waste
S988-0431778	MPMC	2023	0.087	0.085	2.7	7.1	2.6	NAG	Ore
S988-0455520	MPMC	2023	0.63	0.19	20	16	0.81	PAG	Ore
S1000-0464174	MPMC	2023	1.6	0.054	50	4.5	0.09	PAG	Waste
S1000-0462518	MPMC	2023	1.8	0.061	56	5.1	0.091	PAG	Waste
S988-0344064	MPMC	2023	0.072	0.48	2.3	40	18	NAG	Waste
S988-0351284	MPMC	2023	0.053	0.96	1.7	80	48	NAG	Waste
S988-0361171	MPMC	2023	0.063	0.76	2	63	32	NAG	Waste
S988-0361172	MPMC	2023	0.064	1.2	2	97	48	NAG	Waste
S988-0361450	MPMC	2023	0.11	0.68	3.4	57	17	NAG	Waste
S988-0371462	MPMC	2023	0.44	0.52	14	44	3.1	NAG	Ore
S988-0381651	MPMC	2023	0.34	0.2	11	17	1.6	PAG	Ore
S988-0391509	MPMC	2023	0.053	0.2	1.7	17	10	NAG	Waste
S988-0401872	MPMC	2023	0.16	0.22	5	18	3.7	NAG	Ore
S1000-0422194	MPMC	2023	0.9	0.13	28	11	0.39	PAG	Waste
S976-0321631	MPMC	2023	0.24	0.13	7.4	11	1.5	PAG	Ore
S976-0321679	MPMC	2023	0.82	0.22	26	18	0.72	PAG	Ore
S976-0322007	MPMC	2023	0.19	0.21	5.9	17	2.9	NAG	Ore
S976-0322010	MPMC	2023	0.22	0.37	7	31	4.4	NAG	Ore
S976-0322046	MPMC	2023	0.29	0.36	9.2	30	3.3	NAG	Ore
S976-0322076	MPMC	2023	0.32	0.2	9.9	17	1.7	PAG	Ore
S976-0322102	MPMC	2023	0.34	0.22	11	18	1.7	PAG	Ore
S976-0322130	MPMC	2023	0.3	0.15	9.4	12	1.3	PAG	Ore
S976-0327023	MPMC	2023	0.15	0.36	4.7	30	6.3	NAG	Ore
S988-0443046	MPMC	2023	0.01	0.34	0.31	28	91	NAG	Waste
S988-0441555	MPMC	2023	0.01	0.43	0.31	36	110	NAG	Ore
S988-0441485	MPMC	2023	0.01	0.19	0.31	16	50	NAG	Ore
S988-0441399	MPMC	2023	0.01	0.17	0.31	14	46	NAG	Ore
S988-0441325	MPMC	2023	0.12	0.22	3.7	18	4.9	NAG	Waste
S988-0441220	MPMC	2023	0.01	0.43	0.31	36	110	NAG	Waste
S988-0441203	MPMC	2023	0.01	0.37	0.31	31	98	NAG	Waste
S1000-0463150	MPMC	2023	0.16	0.029	4.9	2.4	0.49	PAG	Waste
S1000-0462524	MPMC	2023	1	0.097	33	8.1	0.25	PAG	Waste
S988-0441396	MPMC	2023	0.11	0.21	3.3	18	5.3	NAG	Waste

S988-0441416	MPMC	2023	0.45	0.19	14	16	1.1	PAG	Waste
S988-0441494	MPMC	2023	0.39	0.84	12	70	5.8	NAG	Waste
S988-0472284	MPMC	2023	2	0.13	62	11	0.17	PAG	Waste
S988-0472263	MPMC	2023	1.8	0.21	55	17	0.31	PAG	Waste
S988-0472227	MPMC	2023	1.3	0.26	41	22	0.54	PAG	Ore
S988-0472181	MPMC	2023	1.6	0.36	49	30	0.6	PAG	Waste
S988-0455536	MPMC	2023	0.99	0.2	31	17	0.54	PAG	Ore
S988-0455564	MPMC	2023	1.4	0.25	44	20	0.46	PAG	Waste
S976-0331272	MPMC	2023	0.026	0.19	0.81	16	19	NAG	Waste
S976-0331387	MPMC	2023	0.042	0.26	1.3	22	17	NAG	Waste
S976-0331452	MPMC	2023	0.01	0.14	0.31	11	36	NAG	Waste
S976-0331493	MPMC	2023	0.33	0.39	10	32	3.2	NAG	Waste
S988-0471834	MPMC	2023	0.24	0.1	7.4	8.6	1.2	PAG	Waste
S988-0472475	MPMC	2023	1.3	0.22	42	18	0.43	PAG	Waste
S988-0474241	MPMC	2023	1.2	0.24	37	20	0.54	PAG	Ore
S988-0474248	MPMC	2023	1.8	0.31	57	26	0.45	PAG	Ore
S988-0474256	MPMC	2023	0.92	0.34	29	28	0.99	PAG	Waste
S976-0331102	MPMC	2023	0.019	0.11	0.59	8.8	15	NAG	Waste
S976-0331108	MPMC	2023	0.24	0.63	7.4	52	7.1	NAG	Ore
S976-0331281	MPMC	2023	0.35	0.12	11	10	0.9	PAG	Ore
S976-0331325	MPMC	2023	0.083	0.11	2.6	8.8	3.4	NAG	LGO
S976-0331333	MPMC	2023	0.46	0.49	14	41	2.8	NAG	Ore
S988-0472486	MPMC	2023	1.3	0.072	40	6	0.15	PAG	Waste
S988-0472520	MPMC	2023	0.37	0.08	12	6.7	0.57	PAG	Ore
S988-0472555	MPMC	2023	0.16	0.14	5.1	12	2.3	NAG	Ore
S988-0482405	MPMC	2023	0.058	0.086	1.8	7.2	4	NAG	Waste
S988-0482419	MPMC	2023	0.01	0.022	0.31	1.8	5.9	NAG	Ore
S988-0482429	MPMC	2023	0.044	0.081	1.4	6.8	4.9	NAG	Ore
S988-0482440	MPMC	2023	0.01	0.23	0.31	19	62	NAG	Ore
S988-0482454	MPMC	2023	0.01	0.27	0.31	23	73	NAG	Ore
S988-0482467	MPMC	2023	0.012	0.052	0.38	4.3	12	NAG	Ore
S988-0482533	MPMC	2023	0.16	0.1	4.9	8.3	1.7	PAG	Ore
S988-0482581	MPMC	2023	0.11	0.11	3.4	8.8	2.6	NAG	Ore
S988-0482590	MPMC	2023	0.11	0.1	3.5	8.7	2.5	NAG	Ore
S988-0483223	MPMC	2023	0.01	0.018	0.31	1.5	4.8	NAG	Ore
S988-0483229	MPMC	2023	0.01	0.092	0.31	7.7	25	NAG	Ore
S988-0462300	MPMC	2023	1.7	0.3	54	25	0.46	PAG	Waste
S988-0462320	MPMC	2023	2.1	0.34	65	28	0.43	PAG	Waste
S988-0462333	MPMC	2023	0.35	0.36	11	30	2.7	NAG	Waste
S988-0462343	MPMC	2023	0.31	0.62	9.8	52	5.2	NAG	Waste
S988-0462348	MPMC	2023	0.18	0.31	5.6	26	4.7	NAG	Waste
S988-0462354	MPMC	2023	0.47	0.4	15	34	2.3	NAG	Waste
S988-0462356	MPMC	2023	0.21	0.33	6.6	27	4.2	NAG	Waste
S988-0464280	MPMC	2023	0.74	0.26	23	21	0.93	PAG	Waste
S988-0464284	MPMC	2023	0.37	0.34	12	28	2.4	NAG	Waste
S988-0464291	MPMC	2023	0.18	0.3	5.7	25	4.3	NAG	Waste
S988-0464301	MPMC	2023	0.15	0.16	4.5	13	2.9	NAG	Waste
S988-0467166	MPMC	2023	0.5	0.44	16	36	2.3	NAG	Waste

S988-0467168	MPMC	2023	0.29	0.58	9.2	48	5.3	NAG	Waste
S988-0462297	MPMC	2023	2.1	0.28	67	24	0.35	PAG	Waste
S988-0462313	MPMC	2023	0.8	0.42	25	35	1.4	PAG	Waste
S988-0462327	MPMC	2023	0.86	0.37	27	31	1.2	PAG	Waste
S988-0462329	MPMC	2023	1.5	0.33	46	27	0.59	PAG	Waste
S988-0462351	MPMC	2023	0.5	0.36	16	30	1.9	PAG	Waste
S988-0464259	MPMC	2023	2.4	0.31	76	26	0.34	PAG	Waste
S988-0464272	MPMC	2023	1.2	0.54	39	45	1.2	PAG	Waste
S988-0464275	MPMC	2023	1.1	0.39	33	33	1	PAG	Waste
S964-0241621	MPMC	2023	0.061	0.25	1.9	21	11	NAG	Ore
S964-0241677	MPMC	2023	0.066	0.2	2.1	17	8.1	NAG	Ore
S964-0241624	MPMC	2023	0.14	0.32	4.5	27	5.9	NAG	Ore
S964-0241528	MPMC	2023	0.052	0.19	1.6	16	9.8	NAG	Ore
S964-0241474	MPMC	2023	0.32	0.24	10	20	2	NAG	Ore
S964-0241524	MPMC	2023	0.27	0.26	8.5	22	2.6	NAG	Ore
S964-0241517	MPMC	2023	0.25	0.49	7.8	40	5.2	NAG	Ore
S964-0241412	MPMC	2023	0.034	0.26	1.1	21	20	NAG	Waste
S964-0241310	MPMC	2023	0.071	0.11	2.2	8.9	4	NAG	Waste
S964-0241459	MPMC	2023	0.36	0.26	11	21	1.9	PAG	Ore
S964-0241313	MPMC	2023	0.16	0.35	5	29	5.9	NAG	Ore
S964-0241462	MPMC	2023	0.16	0.2	4.9	16	3.3	NAG	Ore
S976-0372272	MPMC	2023	0.51	0.3	16	25	1.6	PAG	Waste
S976-0371788	MPMC	2023	0.09	0.16	2.8	14	4.8	NAG	Waste
S976-0371827	MPMC	2023	0.2	0.21	6.3	17	2.8	NAG	Waste
S976-0371831	MPMC	2023	0.31	0.18	9.5	15	1.6	PAG	Waste
S976-0371881	MPMC	2023	0.31	0.2	9.7	17	1.7	PAG	Waste
S976-0371857	MPMC	2023	0.078	0.39	2.4	33	13	NAG	Ore
S976-0371890	MPMC	2023	0.19	0.17	5.9	14	2.4	NAG	Waste
S976-0371912	MPMC	2023	0.22	0.19	6.8	16	2.3	NAG	Ore
S976-0371940	MPMC	2023	0.3	0.27	9.4	23	2.4	NAG	Waste
S976-0371915	MPMC	2023	0.17	0.26	5.4	22	4	NAG	Ore
S976-0372237	MPMC	2023	0.48	0.14	15	11	0.75	PAG	Ore
S976-0372240	MPMC	2023	0.5	0.22	16	18	1.2	PAG	Ore
S976-0372217	MPMC	2023	0.26	0.27	8.2	23	2.8	NAG	Ore
S976-0341063	MPMC	2023	0.01	0.83	0.31	69	220	NAG	Waste
S976-0341066	MPMC	2023	0.01	0.19	0.31	16	52	NAG	Waste
S976-0341081	MPMC	2023	0.01	0.073	0.31	6.1	19	NAG	Waste
S976-0341085	MPMC	2023	0.01	0.086	0.31	7.2	23	NAG	Waste
S976-0341296	MPMC	2023	0.01	0.14	0.31	11	36	NAG	Waste
S976-0341408	MPMC	2023	0.01	0.26	0.31	21	69	NAG	Waste
S976-0341719	MPMC	2023	0.035	0.21	1.1	17	16	NAG	Waste
S976-0341723	MPMC	2023	0.01	0.36	0.31	30	97	NAG	Waste
S976-0341728	MPMC	2023	0.01	0.22	0.31	18	58	NAG	Waste
S976-0341739	MPMC	2023	0.073	0.27	2.3	23	10	NAG	Waste
S976-0341748	MPMC	2023	0.31	0.14	9.6	11	1.2	PAG	Ore
S976-0341751	MPMC	2023	0.01	0.2	0.31	17	54	NAG	Waste
S976-0343255	MPMC	2023	0.01	0.46	0.31	39	120	NAG	Waste
S976-0343259	MPMC	2023	0.01	0.19	0.31	16	50	NAG	Waste

S976-0343262	MPMC	2023	0.01	0.12	0.31	9.9	32	NAG	Waste
S976-0343264	MPMC	2023	0.036	0.19	1.1	16	14	NAG	Waste
S976-0344126	MPMC	2023	0.01	0.83	0.31	69	220	NAG	Waste
S976-0347214	MPMC	2023	0.027	0.22	0.84	19	22	NAG	LGO
S976-0341046	MPMC	2023	0.01	0.46	0.31	38	120	NAG	Waste
S976-0341092	MPMC	2023	0.01	0.28	0.31	24	75	NAG	Waste
S976-0343014	MPMC	2023	0.01	0.26	0.31	21	68	NAG	Waste
S976-0344117	MPMC	2023	0.019	0.21	0.59	17	29	NAG	Waste
S976-0381032	MPMC	2023	0.11	0.2	3.4	17	4.8	NAG	Waste
S976-0381037	MPMC	2023	0.24	0.33	7.4	28	3.7	NAG	Ore
S976-0381051	MPMC	2023	0.012	0.41	0.38	34	91	NAG	Waste
S976-0381058	MPMC	2023	0.027	0.48	0.84	40	47	NAG	Ore
S976-0381086	MPMC	2023	0.01	0.45	0.31	37	120	NAG	Waste
S976-0383020	MPMC	2023	0.01	0.24	0.31	20	63	NAG	Waste
S976-0383035	MPMC	2023	0.03	0.31	0.94	26	28	NAG	Waste
S976-0384069	MPMC	2023	0.12	0.49	3.8	41	11	NAG	Waste
S976-0381040	MPMC	2023	0.18	0.19	5.6	16	2.9	NAG	Waste
S976-0381044	MPMC	2023	0.01	0.22	0.31	18	58	NAG	Waste
S976-0381066	MPMC	2023	0.045	0.34	1.4	28	20	NAG	Waste
S976-0381094	MPMC	2023	0.013	0.39	0.41	32	80	NAG	Waste
S976-0381100	MPMC	2023	0.1	0.084	3.2	7	2.2	NAG	Waste
S976-0381289	MPMC	2023	0.062	0.15	1.9	13	6.6	NAG	Waste
S976-0381401	MPMC	2023	0.044	0.22	1.4	18	13	NAG	Waste
S976-0381438	MPMC	2023	0.064	0.22	2	18	9.1	NAG	Waste
S976-0381762	MPMC	2023	0.12	0.23	3.8	19	5	NAG	Waste
S964-0251531	MPMC	2023	0.52	0.29	16	24	1.5	PAG	Ore
S964-0251619	MPMC	2023	0.21	0.37	6.4	31	4.8	NAG	Ore
S964-0251680	MPMC	2023	0.14	0.25	4.5	21	4.6	NAG	Ore
S964-0251682	MPMC	2023	0.12	0.16	3.8	14	3.6	NAG	Ore
S964-0251721	MPMC	2023	0.58	0.18	18	15	0.85	PAG	Ore
S976-0391907	MPMC	2023	0.59	0.15	18	13	0.7	PAG	Waste
S976-0392227	MPMC	2023	0.2	0.12	6.2	9.6	1.6	PAG	Waste
S976-0392287	MPMC	2023	2.3	0.24	70	20	0.28	PAG	Waste
S976-0392309	MPMC	2023	1.5	0.16	48	13	0.28	PAG	Waste
S976-0397057	MPMC	2023	1.4	0.37	44	31	0.69	PAG	Waste
S964-0251559	MPMC	2023	0.29	0.38	9	32	3.5	NAG	Ore
S964-0251638	MPMC	2023	0.61	0.22	19	18	0.95	PAG	Ore
S964-0251727	MPMC	2023	0.32	0.2	9.9	17	1.7	PAG	Ore
S964-0251757	MPMC	2023	0.33	0.28	10	23	2.2	NAG	Ore
S964-0251777	MPMC	2023	0.15	0.37	4.7	31	6.5	NAG	Ore
S964-0251783	MPMC	2023	0.67	0.3	21	25	1.2	PAG	Ore
S964-0251481	MPMC	2023	0.58	0.23	18	19	1	PAG	Ore
S964-0251504	MPMC	2023	0.37	0.66	11	55	4.8	NAG	Ore
S976-0392303	MPMC	2023	1.6	0.21	49	17	0.35	PAG	Waste
S976-0412402	MPMC	2023	0.18	0.35	5.5	30	5.3	NAG	Ore
S976-0412397	MPMC	2023	0.47	0.65	15	54	3.7	NAG	Waste
S976-0412356	MPMC	2023	0.86	0.39	27	33	1.2	PAG	Waste
S976-0412359	MPMC	2023	0.56	0.22	17	18	1	PAG	Waste

S976-0412341	MPMC	2023	1.3	0.41	41	34	0.84	PAG	Waste
S976-0412377	MPMC	2023	0.82	0.42	26	35	1.4	PAG	Waste
S976-0412381	MPMC	2023	1.2	0.32	38	27	0.71	PAG	Waste
S976-0412333	MPMC	2023	1.2	0.29	36	24	0.68	PAG	Waste
S976-0412314	MPMC	2023	1.4	0.38	43	31	0.73	PAG	Waste
S976-0412367	MPMC	2023	0.3	0.34	9.3	28	3	NAG	Waste
S976-0412389	MPMC	2023	0.24	0.38	7.4	32	4.3	NAG	Waste
S976-0412400	MPMC	2023	0.25	0.47	7.8	39	5.1	NAG	Waste
S976-0414286	MPMC	2023	0.57	0.3	18	25	1.4	PAG	Waste
S976-0417070	MPMC	2023	0.59	0.3	19	25	1.3	PAG	Waste
S976-0417072	MPMC	2023	0.38	0.38	12	31	2.6	NAG	Waste
S976-0391900	MPMC	2023	0.3	0.14	9.3	12	1.3	PAG	Ore
S976-0394236	MPMC	2023	0.36	0.16	11	13	1.2	PAG	Waste
S976-0394242	MPMC	2023	1.8	0.16	55	13	0.24	PAG	Waste
S976-0394245	MPMC	2023	0.36	0.1	11	8.6	0.77	PAG	Waste
S976-0414272	MPMC	2023	1.5	0.22	47	18	0.38	PAG	Waste
S976-0414280	MPMC	2023	1.2	0.43	37	36	0.98	PAG	Waste
S976-0414289	MPMC	2023	0.25	0.36	7.8	30	3.8	NAG	Waste
S976-0414294	MPMC	2023	0.24	0.48	7.5	40	5.4	NAG	Waste
S976-0393236	MPMC	2023	0.53	0.35	16	29	1.8	PAG	Waste
S976-0391846	MPMC	2023	0.076	0.059	2.4	4.9	2.1	NAG	Waste
S976-0394231	MPMC	2023	0.17	0.19	5.3	16	3	NAG	Waste
S976-0421437	MPMC	2023	0.11	0.15	3.4	12	3.6	NAG	Waste
S976-0421532	MPMC	2023	0.085	0.15	2.7	13	4.8	NAG	Waste
S976-0421785	MPMC	2023	0.1	0.051	3.2	4.3	1.3	PAG	Waste
S976-0421797	MPMC	2023	0.27	0.15	8.3	13	1.5	PAG	Waste
S976-0423252	MPMC	2023	0.029	0.095	0.91	7.9	8.7	NAG	Waste
S976-0391850	MPMC	2023	0.18	0.12	5.6	10	1.8	PAG	Waste
S976-0424227	MPMC	2023	0.058	0.074	1.8	6.2	3.4	NAG	Waste
S976-0421770	MPMC	2023	0.16	0.087	4.8	7.3	1.5	PAG	Waste
S976-0391906	MPMC	2023	0.091	0.081	2.8	6.8	2.4	NAG	Waste
S976-0441016	MPMC	2023	0.06	0.19	1.9	15	8.2	NAG	Waste
S976-0441023	MPMC	2023	0.41	0.36	13	30	2.3	NAG	Waste
S976-0441110	MPMC	2023	0.24	0.38	7.3	31	4.3	NAG	Waste
S976-0441141	MPMC	2023	0.41	0.18	13	15	1.2	PAG	Waste
S976-0441148	MPMC	2023	0.37	0.42	11	35	3	NAG	Waste
S976-0443043	MPMC	2023	0.35	0.61	11	51	4.7	NAG	Waste
S976-0443049	MPMC	2023	0.31	0.67	9.8	56	5.7	NAG	Waste
S976-0444047	MPMC	2023	0.05	0.2	1.6	17	11	NAG	Waste
S976-0444064	MPMC	2023	0.11	0.47	3.5	39	11	NAG	Waste
S964-0261229	MPMC	2023	0.093	0.46	2.9	39	13	NAG	Waste
S964-0261271	MPMC	2023	0.15	0.14	4.5	12	2.6	NAG	Ore
S964-0261273	MPMC	2023	0.071	0.26	2.2	21	9.7	NAG	Waste
S964-0261307	MPMC	2023	0.066	0.18	2.1	15	7.4	NAG	Waste
S964-0261445	MPMC	2023	0.41	0.22	13	18	1.4	PAG	Ore
S964-0261450	MPMC	2023	0.17	0.18	5.2	15	2.9	NAG	Ore
S964-0261484	MPMC	2023	0.35	0.16	11	13	1.2	PAG	Ore
S964-0275125	MPMC	2023	0.07	0.41	2.2	35	16	NAG	Waste

S964-0281427	MPMC	2023	0.028	0.11	0.88	8.8	10	NAG	Waste
S964-0281499	MPMC	2023	0.32	0.26	9.8	21	2.2	NAG	Waste
S964-0281595	MPMC	2023	0.7	0.029	22	2.4	0.11	PAG	Ore
S976-0443052	MPMC	2023	0.12	0.35	3.6	29	8	NAG	Waste
S976-0441137	MPMC	2023	0.073	0.51	2.3	43	19	NAG	Waste
S976-0449020	MPMC	2023	0.08	0.2	2.5	16	6.5	NAG	Waste
S976-0443056	MPMC	2023	0.076	0.29	2.4	24	10	NAG	Waste
S964-0275061	MPMC	2023	0.075	0.21	2.3	17	7.4	NAG	Waste
S964-0281205	MPMC	2023	0.086	0.12	2.7	9.7	3.6	NAG	Waste
S964-0281222	MPMC	2023	0.067	0.18	2.1	15	7	NAG	Waste
S964-0281430	MPMC	2023	0.066	0.14	2.1	12	5.8	NAG	Waste
S976-0455370	MPMC	2023	0.027	0.13	0.84	11	13	NAG	Waste
S988-0515743	MPMC	2023	0.51	0.85	16	71	4.5	NAG	Waste
S988-0515779	MPMC	2023	0.27	0.41	8.3	34	4.1	NAG	Waste
S988-0515811	MPMC	2023	0.11	0.084	3.4	7	2.1	NAG	Waste
S988-0515831	MPMC	2023	0.034	0.83	1.1	69	65	NAG	Waste
S976-0441245	MPMC	2023	0.061	0.1	1.9	8.7	4.5	NAG	Waste
S976-0443063	MPMC	2023	0.059	0.092	1.8	7.7	4.2	NAG	Waste
S976-0443068	MPMC	2023	0.12	0.13	3.8	11	2.8	NAG	Ore
S976-0444002	MPMC	2023	0.061	0.095	1.9	7.9	4.2	NAG	Waste
S976-0444023	MPMC	2023	0.056	0.17	1.8	14	8.1	NAG	LGO
S976-0447108	MPMC	2023	0.056	0.14	1.8	11	6.4	NAG	LGO
S976-0447112	MPMC	2023	0.042	0.18	1.3	15	12	NAG	Waste
S964-0291597	MPMC	2023	0.11	0.14	3.3	11	3.4	NAG	Waste
S964-0291497	MPMC	2023	0.29	0.15	9	12	1.4	PAG	Waste
S964-0291608	MPMC	2023	0.27	0.19	8.5	16	1.9	PAG	Waste
S964-0291660	MPMC	2023	0.53	0.13	16	11	0.65	PAG	Ore
S964-0291704	MPMC	2023	0.12	0.14	3.7	12	3.2	NAG	Waste
S964-0301050	MPMC	2023	0.018	0.11	0.56	9	16	NAG	Waste
S964-0301054	MPMC	2023	0.01	0.19	0.31	16	50	NAG	Waste
S964-0291544	MPMC	2023	0.11	0.1	3.4	8.4	2.5	NAG	Waste
S964-0291729	MPMC	2023	0.13	0.16	3.9	13	3.4	NAG	Ore
S964-0301339	MPMC	2023	0.01	0.16	0.31	13	42	NAG	Waste
S964-0301342	MPMC	2023	0.01	0.38	0.31	32	100	NAG	Waste
S964-0303060	MPMC	2023	0.022	0.074	0.69	6.2	9	NAG	Waste
S964-0304104	MPMC	2023	0.016	0.17	0.5	14	28	NAG	Waste
S964-0304113	MPMC	2023	0.01	0.37	0.31	30	97	NAG	Waste
S964-0307062	MPMC	2023	0.026	0.14	0.81	11	14	NAG	Waste
S964-0299003	MPMC	2023	0.27	0.27	8.5	22	2.6	NAG	Ore
S964-0291601	MPMC	2023	0.11	0.094	3.5	7.8	2.2	NAG	Waste
S964-0291657	MPMC	2023	0.14	0.079	4.3	6.6	1.5	PAG	Waste
S964-0299007	MPMC	2023	0.41	0.11	13	8.8	0.68	PAG	Waste
S964-0301367	MPMC	2023	0.063	0.18	2	15	7.4	NAG	Waste
S964-0301370	MPMC	2023	0.016	0.12	0.5	9.8	20	NAG	Waste
S964-0303005	MPMC	2023	0.01	0.13	0.31	11	35	NAG	Waste
S964-0304081	MPMC	2023	0.033	0.51	1	42	41	NAG	Waste
S964-0304095	MPMC	2023	0.073	0.23	2.3	19	8.4	NAG	Waste
S964-0303014	MPMC	2023	0.064	0.23	2	19	9.5	NAG	Waste

S964-0301133	MPMC	2023	0.01	0.37	0.31	31	98	NAG	LGO
S964-0301215	MPMC	2023	0.01	0.89	0.31	74	240	NAG	Waste
S964-0304062	MPMC	2023	0.01	0.21	0.31	17	55	NAG	Waste
S964-0301036	MPMC	2023	0.01	0.31	0.31	26	82	NAG	Waste
S964-0334056	MPMC	2023	0.084	0.26	2.6	22	8.3	NAG	Waste
S964-0333024	MPMC	2023	0.2	0.31	6.3	26	4.1	NAG	Waste
S964-0331033	MPMC	2023	0.13	0.6	3.9	50	13	NAG	Waste
S964-0331146	MPMC	2023	0.053	0.13	1.7	11	6.6	NAG	Waste
S964-0331212	MPMC	2023	0.072	0.14	2.3	12	5.3	NAG	Waste
S964-0331022	MPMC	2023	0.075	0.46	2.3	38	16	NAG	Waste
S964-0331117	MPMC	2023	0.044	0.48	1.4	40	29	NAG	Waste
S964-0331121	MPMC	2023	0.34	0.16	11	13	1.2	PAG	Ore
S964-0331150	MPMC	2023	0.17	0.19	5.2	16	3.1	NAG	Ore
S964-0331155	MPMC	2023	0.028	0.48	0.88	40	46	NAG	Waste
S964-0331158	MPMC	2023	0.47	0.73	15	61	4.2	NAG	Waste
S964-0333028	MPMC	2023	0.11	0.53	3.5	44	13	NAG	Waste
S964-0333032	MPMC	2023	0.078	0.15	2.4	13	5.3	NAG	Waste
S964-0341811	MPMC	2023	0.27	0.28	8.5	24	2.8	NAG	Ore
S964-0315925	MPMC	2023	0.01	0.69	0.31	58	180	NAG	Waste
S964-0315949	MPMC	2023	0.01	0.63	0.31	53	170	NAG	Waste
S964-0315973	MPMC	2023	0.051	0.092	1.6	7.7	4.8	NAG	Waste
S964-0325860	MPMC	2023	0.65	0.1	20	8.6	0.42	PAG	Ore
S964-0325876	MPMC	2023	0.2	0.13	6.3	11	1.8	PAG	Ore
S964-0325892	MPMC	2023	0.33	0.12	10	10	1	PAG	Ore
S964-0365166	MPMC	2023	0.01	0.22	0.31	18	58	NAG	Waste
S964-0365190	MPMC	2023	0.039	0.33	1.2	28	23	NAG	Waste
S964-0381012	MPMC	2023	0.028	0.2	0.88	16	19	NAG	Waste
S964-0381081	MPMC	2023	0.02	0.58	0.63	48	77	NAG	Waste
S964-0341787	MPMC	2023	0.16	0.22	5	18	3.6	NAG	Ore
S964-0341828	MPMC	2023	0.4	0.25	12	20	1.6	PAG	Ore
S964-0341853	MPMC	2023	1	0.31	31	26	0.82	PAG	Waste
S964-0341849	MPMC	2023	1	0.19	32	16	0.48	PAG	Ore
S964-0381166	MPMC	2023	0.13	0.099	4.1	8.3	2	NAG	Waste
S964-0381163	MPMC	2023	0.032	0.15	1	12	12	NAG	Waste
S964-0381109	MPMC	2023	0.029	0.23	0.91	19	21	NAG	Waste
S964-0341792	MPMC	2023	0.23	0.16	7.2	14	1.9	PAG	Waste
S964-0341872	MPMC	2023	0.5	0.34	16	29	1.8	PAG	Waste
S964-0381018	MPMC	2023	0.017	0.22	0.53	18	34	NAG	Waste
S964-0381237	MPMC	2023	0.028	0.18	0.88	15	18	NAG	Waste
S964-0381240	MPMC	2023	0.043	0.049	1.3	4.1	3	NAG	Waste
S964-0381168	MPMC	2023	0.01	#NUM!	0.31	#NUM!	#NUM!	PAG	Waste
S964-0383042	MPMC	2023	0.01	#NUM!	0.31	#NUM!	#NUM!	PAG	Waste
S964-0409011	MPMC	2023	0.51	0.43	16	35	2.2	NAG	Waste
S964-0365250	MPMC	2023	0.062	0.35	1.9	29	15	NAG	Waste
S964-0365222	MPMC	2023	0.016	0.13	0.5	11	21	NAG	Waste
S964-0365234	MPMC	2023	0.041	0.38	1.3	32	25	NAG	Waste
S964-0395736	MPMC	2023	0.48	0.47	15	39	2.6	NAG	Waste
S964-0371770	MPMC	2023	0.32	0.18	10	15	1.5	PAG	Waste

S964-0371691	MPMC	2023	0.081	0.2	2.5	17	6.6	NAG	Waste
S964-0354195	MPMC	2023	1.4	0.28	43	23	0.54	PAG	Waste
S964-0354189	MPMC	2023	0.6	0.52	19	43	2.3	NAG	Waste
S964-0354183	MPMC	2023	0.5	0.32	15	27	1.7	PAG	Waste
S964-0371655	MPMC	2023	0.16	0.15	5.1	13	2.5	NAG	Waste
S964-0371701	MPMC	2023	0.092	0.18	2.9	15	5.3	NAG	Waste
S964-0371739	MPMC	2023	0.45	0.29	14	24	1.7	PAG	Waste
S964-0371768	MPMC	2023	0.31	0.13	9.7	11	1.1	PAG	Waste
S964-0315929	MPMC	2023	0.01	0.26	0.31	22	69	NAG	Waste
S964-0351841	MPMC	2023	0.79	0.39	25	33	1.3	PAG	Waste
S964-0351859	MPMC	2023	0.31	0.13	9.6	11	1.2	PAG	Waste
S964-0351889	MPMC	2023	0.22	0.29	7	24	3.4	NAG	Waste
S964-0351901	MPMC	2023	1.2	0.4	38	34	0.89	PAG	Waste
S964-0351912	MPMC	2023	0.86	0.34	27	28	1.1	PAG	Waste
S964-0351930	MPMC	2023	0.61	0.37	19	31	1.6	PAG	Waste
S964-0353100	MPMC	2023	0.88	0.36	28	30	1.1	PAG	Waste
S964-0353104	MPMC	2023	1.1	0.22	34	19	0.55	PAG	Waste
S964-0354162	MPMC	2023	1.9	0.16	60	13	0.22	PAG	Waste
S964-0354169	MPMC	2023	1.5	0.085	47	7.1	0.15	PAG	Waste
S964-0395756	MPMC	2023	0.54	0.26	17	21	1.3	PAG	Waste
S964-0395772	MPMC	2023	1.7	0.25	53	21	0.4	PAG	Waste
S964-0371492	MPMC	2023	0.19	0.24	5.9	20	3.3	NAG	Waste
S964-0371602	MPMC	2023	0.32	0.21	10	18	1.7	PAG	Waste
S964-0374126	MPMC	2023	0.2	0.076	6.3	6.3	1	PAG	Waste
S964-0374136	MPMC	2023	0.13	0.21	4.2	17	4.1	NAG	Waste
S964-0374146	MPMC	2023	0.43	0.11	14	9.2	0.68	PAG	Waste
S964-0374149	MPMC	2023	0.32	0.15	10	13	1.3	PAG	Waste
S964-0374152	MPMC	2023	0.75	0.18	23	15	0.65	PAG	Waste
S964-0374157	MPMC	2023	0.57	0.42	18	35	2	PAG	Waste
S952-0191456	MPMC	2023	0.68	0.34	21	28	1.3	PAG	Ore
S952-0191477	MPMC	2023	0.11	0.41	3.5	34	9.8	NAG	Ore
S952-0191484	MPMC	2023	0.062	0.26	1.9	22	11	NAG	Ore
S964-0371216	MPMC	2023	0.01	0.33	0.31	28	89	NAG	Waste
S964-0371219	MPMC	2023	0.068	0.12	2.1	10	4.8	NAG	Waste
S964-0374122	MPMC	2023	0.091	0.2	2.8	17	5.9	NAG	Waste
S988-0525683	MPMC	2023	0.14	0.11	4.3	8.8	2.1	NAG	
S964-0371289	MPMC	2023	0.058	0.12	1.8	9.9	5.5	NAG	Waste
S964-0371494A	MPMC	2023	0.12	0.12	3.8	10	2.7	NAG	Waste
S964-0371494B	MPMC	2023	0.07	0.2	2.2	17	7.7	NAG	Waste
S964-0373081	MPMC	2023	0.14	0.089	4.3	7.4	1.7	PAG	Waste
S964-0371653	MPMC	2023	0.52	0.12	16	10	0.62	PAG	Ore
S964-0371697	MPMC	2023	0.35	0.11	11	8.8	0.81	PAG	Ore
S964-0373090	MPMC	2023	0.15	0.18	4.5	15	3.4	NAG	Waste
S988-0525715	MPMC	2023	0.026	0.27	0.81	22	27	NAG	Waste
S988-0525739	MPMC	2023	0.097	0.21	3	18	5.8	NAG	Waste
S964-0371800	MPMC	2023	0.62	0.18	19	15	0.76	PAG	Waste
S964-0373097	MPMC	2023	1.2	0.14	38	12	0.31	PAG	Waste
S964-0421088	MPMC	2023	0.047	0.17	1.5	14	9.4	NAG	Waste

S964-0421171	MPMC	2023	0.057	0.27	1.8	23	13	NAG	Waste
S964-0421180	MPMC	2023	0.086	0.21	2.7	17	6.4	NAG	Ore
S964-0421258	MPMC	2023	0.14	0.39	4.4	32	7.4	NAG	Ore
S964-0421319	MPMC	2023	0.18	0.19	5.6	16	2.8	NAG	Ore
S964-0422046	MPMC	2023	0.13	0.22	4	18	4.6	NAG	Waste
S964-0421252	MPMC	2023	0.033	0.086	1	7.2	6.9	NAG	Waste
S1012-0874005	MPMC	2023	0.12	0.43	3.8	36	9.6	NAG	Ore
S1012-0874013	MPMC	2023	0.01	0.3	0.31	25	80	NAG	Waste
S1012-0874022	MPMC	2023	0.022	0.8	0.69	66	96	NAG	LGO
S964-0422045	MPMC	2023	0.13	0.4	4	33	8.3	NAG	Waste
S964-0422023	MPMC	2023	0.042	0.38	1.3	32	24	NAG	Waste
S964-0421094	MPMC	2023	0.026	0.18	0.81	15	18	NAG	Waste
S964-0421091	MPMC	2023	0.023	0.23	0.72	19	27	NAG	Waste
S1012-0877016	MPMC	2023	0.1	0.42	3.1	35	11	NAG	Waste
S1012-0877008	MPMC	2023	0.072	0.3	2.3	25	11	NAG	Waste
S1012-0873014	MPMC	2023	0.23	0.43	7.2	36	5	NAG	LGO
S1012-0873007	MPMC	2023	0.025	0.31	0.78	26	33	NAG	Waste
S1012-0873002	MPMC	2023	0.084	0.53	2.6	44	17	NAG	Ore
S964-0421001	MPMC	2023	0.061	0.064	1.9	5.3	2.8	NAG	Waste
S964-0421004	MPMC	2023	0.026	0.13	0.81	11	14	NAG	Waste
S964-0422000	MPMC	2023	0.034	0.13	1.1	11	10	NAG	Waste
S964-0422009	MPMC	2023	0.074	0.24	2.3	20	8.5	NAG	Waste
S964-0422027	MPMC	2023	0.13	0.15	3.9	13	3.3	NAG	Waste
S964-0424008	MPMC	2023	0.017	0.16	0.53	13	24	NAG	Waste
S964-0424013	MPMC	2023	0.05	0.076	1.6	6.3	4.1	NAG	Waste
S964-0424251	MPMC	2023	0.047	0.077	1.5	6.4	4.4	NAG	Waste
S964-0424257	MPMC	2023	0.091	0.11	2.8	8.8	3.1	NAG	Waste
S964-0424263	MPMC	2023	0.23	0.32	7.2	27	3.7	NAG	Waste
S952-0231392	MPMC	2023	0.01	0.25	0.31	21	67	NAG	Ore
S952-0237036	MPMC	2023	0.25	0.3	7.7	25	3.2	NAG	Ore
S952-0231491	MPMC	2023	0.12	0.33	3.8	28	7.4	NAG	Ore
S952-0231531	MPMC	2023	0.14	0.47	4.3	39	9	NAG	Ore
S952-0231597	MPMC	2023	0.46	0.14	14	11	0.8	PAG	Ore
S952-0231572	MPMC	2023	0.15	0.26	4.7	21	4.5	NAG	Ore
S952-0231622	MPMC	2023	0.25	0.24	7.9	20	2.5	NAG	Ore
S952-0231628	MPMC	2023	1.1	0.26	33	22	0.66	PAG	Ore
S952-0231589	MPMC	2023	0.099	0.37	3.1	31	9.9	NAG	Ore
S952-0215008	MPMC	2023	0.054	0.19	1.7	16	9.3	NAG	Waste
S952-0215024	MPMC	2023	0.01	0.15	0.31	12	39	NAG	Waste
S952-0215040	MPMC	2023	0.01	0.29	0.31	24	76	NAG	Waste
S952-0215060	MPMC	2023	0.17	0.46	5.2	38	7.4	NAG	Waste
S952-0251507	MPMC	2023	0.18	0.17	5.5	14	2.6	NAG	Ore
S952-0251552	MPMC	2023	0.28	0.3	8.7	25	2.9	NAG	Ore
S952-0251578	MPMC	2023	0.3	0.37	9.2	31	3.4	NAG	Ore
S952-0251613	MPMC	2023	0.34	0.19	11	16	1.5	PAG	Ore
S952-0251638	MPMC	2023	0.71	0.31	22	26	1.2	PAG	Ore
S952-0251659	MPMC	2023	0.52	0.22	16	19	1.1	PAG	Waste
S952-0251673	MPMC	2023	1.6	0.25	50	21	0.42	PAG	Waste

S952-0251678	MPMC	2023	0.28	0.21	8.7	18	2.1	NAG	Ore
S952-0257052	MPMC	2023	0.13	0.39	4.1	32	8	NAG	Ore
S952-0181323	MPMC	2023	0.3	0.23	9.5	19	2	NAG	Ore
S952-0181359	MPMC	2023	0.55	0.31	17	26	1.5	PAG	Ore
S952-0181381	MPMC	2023	0.042	0.14	1.3	12	9.1	NAG	Ore
S952-0181408	MPMC	2023	0.18	0.21	5.6	17	3.1	NAG	Ore
S952-0181435	MPMC	2023	0.052	0.38	1.6	32	19	NAG	Ore
S952-0259020	MPMC	2023	0.19	0.22	5.8	19	3.2	NAG	Waste
S952-0259047	MPMC	2023	0.9	0.26	28	21	0.76	PAG	Waste
S952-0251654	MPMC	2023	1.1	0.18	35	15	0.43	PAG	Ore
S952-0251513	MPMC	2023	0.083	0.14	2.6	11	4.4	NAG	Ore
S952-0252003	MPMC	2023	1.1	0.37	33	31	0.93	PAG	Waste
S952-0259067	MPMC	2023	0.86	0.4	27	33	1.2	PAG	Waste
S952-0253149	MPMC	2023	0.88	1.3	28	110	3.9	NAG	Waste
S952-0253140	MPMC	2023	1.1	0.15	35	13	0.36	PAG	Ore
S952-0253137	MPMC	2023	0.46	0.21	14	17	1.2	PAG	Waste
S952-0251691	MPMC	2023	0.26	0.18	8	15	1.9	PAG	Waste
S952-0251684	MPMC	2023	1.7	0.3	52	25	0.47	PAG	Waste
S952-0251707	MPMC	2023	0.82	0.3	26	25	0.97	PAG	Waste
S952-0251700	MPMC	2023	0.92	0.37	29	31	1.1	PAG	Waste
S952-0261768	MPMC	2023	0.26	0.38	8.1	32	3.9	NAG	Waste
S952-0261777	MPMC	2023	0.16	0.11	4.8	9.3	1.9	PAG	Ore
S952-0261786	MPMC	2023	0.077	0.13	2.4	11	4.4	NAG	Ore
S952-0261806	MPMC	2023	0.39	0.17	12	14	1.2	PAG	Ore
S952-0263020	MPMC	2023	0.1	0.15	3.2	12	3.9	NAG	Waste
S952-0263027	MPMC	2023	0.16	0.12	5.1	10	2	PAG	Ore
S952-0264138	MPMC	2023	0.15	0.092	4.7	7.7	1.6	PAG	Ore
S952-0264155	MPMC	2023	0.066	0.093	2.1	7.8	3.8	NAG	Waste
S952-0271297	MPMC	2023	0.14	0.38	4.4	31	7.1	NAG	Ore
S952-0271227	MPMC	2023	0.062	0.16	1.9	13	6.7	NAG	Waste
S952-0271334	MPMC	2023	0.33	0.85	10	71	6.9	NAG	Ore
S952-0271271	MPMC	2023	0.27	0.19	8.3	16	1.9	PAG	Ore
S952-0271338	MPMC	2023	0.17	0.38	5.2	32	6.1	NAG	Ore
S952-0261782	MPMC	2023	0.1	0.15	3.2	13	4	NAG	Waste
S952-0261812	MPMC	2023	0.083	0.13	2.6	11	4.2	NAG	Ore
S952-0271153	MPMC	2023	0.043	0.088	1.3	7.3	5.5	NAG	Waste
S952-0271198	MPMC	2023	0.035	0.14	1.1	11	10	NAG	Ore
S952-0225904	MPMC	2023	0.079	0.19	2.5	16	6.3	NAG	Waste
S952-0225924	MPMC	2023	0.014	0.51	0.44	42	97	NAG	Waste
S952-0215088	MPMC	2023	0.024	0.44	0.75	36	49	NAG	Waste
S952-0215124	MPMC	2023	0.048	0.25	1.5	21	14	NAG	Waste
S952-0301397	MPMC	2023	0.32	0.38	10	32	3.2	NAG	Ore
S952-0301506	MPMC	2023	0.22	0.5	6.8	41	6.1	NAG	Ore
S952-0301121	MPMC	2023	0.041	0.1	1.3	8.5	6.6	NAG	Waste
S952-0282014	MPMC	2023	0.01	0.12	0.31	9.6	31	NAG	Waste
S952-0301278	MPMC	2023	0.2	0.28	6.3	24	3.7	NAG	Ore
S952-0301075	MPMC	2023	0.04	0.092	1.3	7.7	6.1	NAG	LGO
S952-0284056	MPMC	2023	0.01	0.18	0.31	15	48	NAG	Waste

S952-0283115	MPMC	2023	0.01	0.2	0.31	17	54	NAG	Waste
S952-0284064	MPMC	2023	0.058	0.49	1.8	41	23	NAG	Waste
S952-0283024	MPMC	2023	0.072	0.55	2.3	46	20	NAG	Waste
S952-0281034	MPMC	2023	0.14	0.16	4.3	13	3.1	NAG	Waste
S952-0281092	MPMC	2023	0.078	0.12	2.4	9.7	4	NAG	Waste
S952-0284038	MPMC	2023	0.17	0.42	5.2	35	6.8	NAG	Waste
S952-0284132	MPMC	2023	0.1	0.16	3.2	13	4.1	NAG	Waste
S952-0281041	MPMC	2023	0.017	0.14	0.53	12	22	NAG	Ore
S952-0281084	MPMC	2023	0.059	0.25	1.8	21	11	NAG	Waste
S952-0281179	MPMC	2023	0.075	0.26	2.3	21	9.1	NAG	Waste
S952-0281184	MPMC	2023	0.29	0.11	9	9.4	1	PAG	Waste
S952-0282031	MPMC	2023	0.031	0.13	0.97	11	11	NAG	Waste
S952-0284082	MPMC	2023	0.041	0.25	1.3	21	16	NAG	Waste
S952-0283101	MPMC	2023	0.036	0.22	1.1	18	16	NAG	Ore
S952-0284076	MPMC	2023	0.035	0.25	1.1	20	19	NAG	Waste
S952-0282027	MPMC	2023	0.01	0.12	0.31	9.8	31	NAG	Waste
S952-0283105	MPMC	2023	0.01	0.061	0.31	5.1	16	NAG	Waste
S952-0287001	MPMC	2023	0.051	0.095	1.6	7.9	5	NAG	Ore
S952-0284116	MPMC	2023	0.011	0.19	0.34	16	46	NAG	Waste
S952-0282036	MPMC	2023	0.016	0.27	0.5	22	44	NAG	Ore
S952-0282024	MPMC	2023	0.016	0.26	0.5	22	44	NAG	Waste
S940-0161639	MPMC	2023	0.8	0.29	25	24	0.96	PAG	Ore
S940-0171593	MPMC	2023	0.33	0.44	10	37	3.6	NAG	Ore
S940-0171603	MPMC	2023	0.25	0.48	7.8	40	5.1	NAG	Ore
S952-0291263	MPMC	2023	0.13	0.43	4.2	36	8.5	NAG	Ore
S952-0291189	MPMC	2023	0.074	0.65	2.3	54	23	NAG	Waste
S952-0291160	MPMC	2023	0.022	0.13	0.69	10	15	NAG	Waste
S952-0291113	MPMC	2023	0.014	0.62	0.44	51	120	NAG	Waste
S952-0291048	MPMC	2023	0.14	0.36	4.5	30	6.6	NAG	Waste
S952-0291051	MPMC	2023	0.01	0.3	0.31	25	80	NAG	Waste
S952-0293031	MPMC	2023	0.066	0.55	2.1	46	22	NAG	Waste
S952-0293036	MPMC	2023	0.01	0.21	0.31	17	55	NAG	Waste
S988-0534349	MPMC	2023	0.061	0.23	1.9	19	10	NAG	Waste
S988-0534341	MPMC	2023	0.76	0.11	24	9.3	0.39	PAG	Waste
S988-0534330	MPMC	2023	0.074	0.43	2.3	36	16	NAG	Waste
S988-0544371	MPMC	2023	0.24	0.2	7.5	17	2.2	NAG	Waste
S988-0544359	MPMC	2023	0.19	0.26	5.8	22	3.8	NAG	LGO
S940-0181673	MPMC	2023	0.22	0.29	6.8	24	3.6	NAG	Ore
S940-0181589	MPMC	2023	0.1	0.26	3.2	22	6.7	NAG	Ore
S940-0181644	MPMC	2023	0.062	0.43	1.9	36	18	NAG	Ore
S988-0543129	MPMC	2023	0.066	0.31	2.1	26	13	NAG	Waste
S988-0542706	MPMC	2023	0.94	0.25	29	21	0.72	PAG	Ore
S988-0547241	MPMC	2023	0.5	0.5	16	42	2.7	NAG	Waste
S988-0543121	MPMC	2023	1.1	0.21	33	18	0.53	PAG	Waste
S988-0534381	MPMC	2023	0.75	0.27	23	23	0.97	PAG	Waste
S988-0537247	MPMC	2023	0.17	0.22	5.3	19	3.6	NAG	Waste
S988-0543114	MPMC	2023	0.63	0.53	20	44	2.3	NAG	Waste
S988-0537233	MPMC	2023	0.47	0.2	15	16	1.1	PAG	Waste

S988-0543111	MPMC	2023	0.11	0.42	3.3	35	11	NAG	Waste
S988-0542699	MPMC	2023	0.016	0.36	0.5	30	60	NAG	Waste
S988-0544395	MPMC	2023	0.22	0.49	6.8	41	6	NAG	Waste
S988-0542686	MPMC	2023	0.098	0.56	3.1	47	15	NAG	Waste
S952-0311055B	MPMC	2023	0.06	0.28	1.9	24	13	NAG	Waste
S952-0313042	MPMC	2023	0.01	0.36	0.31	30	97	NAG	Waste
S952-0314009	MPMC	2023	0.029	0.19	0.91	16	18	NAG	Waste
S952-0314019	MPMC	2023	0.056	0.28	1.8	24	13	NAG	Waste
S952-0311059	MPMC	2023	0.041	0.15	1.3	13	10	NAG	Waste
S952-0311124	MPMC	2023	0.01	0.15	0.31	13	40	NAG	Waste
S952-0311002	MPMC	2023	0.015	0.051	0.47	4.3	9.1	NAG	Waste
S940-0201498	MPMC	2023	0.083	0.14	2.6	11	4.3	NAG	Ore
S940-0201420	MPMC	2023	0.048	0.3	1.5	25	17	NAG	Ore
S940-0201572	MPMC	2023	0.05	0.29	1.6	24	15	NAG	Ore
S940-0201544	MPMC	2023	0.16	0.13	5.1	10	2.1	NAG	Ore
S988-0534355	MPMC	2023	0.088	0.2	2.8	16	6	NAG	Waste
S988-0537228	MPMC	2023	0.082	0.18	2.6	15	6	NAG	Waste
S988-0537222	MPMC	2023	0.27	0.093	8.5	7.8	0.91	PAG	Waste
S988-0537218	MPMC	2023	0.22	0.41	7	34	4.9	NAG	Waste
S988-0534316	MPMC	2023	0.01	0.27	0.31	23	72	NAG	Waste
S940-0201581	MPMC	2023	0.34	0.23	11	19	1.8	PAG	Ore
S940-0201653	MPMC	2023	0.26	0.19	8	16	2	PAG	Ore
S940-0201681	MPMC	2023	0.64	0.22	20	19	0.93	PAG	Ore
S940-0201718	MPMC	2023	0.92	0.36	29	30	1.1	PAG	Ore
S940-0201704	MPMC	2023	0.26	0.4	8	33	4.2	NAG	Ore
S940-0195029	MPMC	2023	1.1	0.43	34	36	1.1	PAG	Waste
S940-0195053	MPMC	2023	1.4	0.32	44	27	0.6	PAG	Waste
S952-0315068	MPMC	2023	1.3	0.14	40	12	0.3	PAG	
S952-0195086	MPMC	2023	0.32	0.27	10	23	2.3	NAG	
S988-0537225	MPMC	2023	0.52	0.29	16	24	1.5	PAG	Waste
S988-0534335	MPMC	2023	3.6	0.63	110	53	0.47	PAG	Waste
S940-0223262	MPMC	2023	0.56	0.14	18	11	0.64	PAG	Ore
S940-0223268	MPMC	2023	0.11	0.44	3.4	36	11	NAG	Waste
S940-0221826	MPMC	2023	0.11	0.39	3.3	33	9.9	NAG	Waste
S940-0221003	MPMC	2023	0.067	0.3	2.1	25	12	NAG	Waste
S940-0224388	MPMC	2023	0.044	0.14	1.4	11	8.3	NAG	Waste
S940-0224394	MPMC	2023	0.032	0.097	1	8.1	8.1	NAG	Waste
S940-0224400	MPMC	2023	0.017	0.41	0.53	34	64	NAG	Waste
S940-0221097	MPMC	2023	0.29	0.3	9.1	25	2.7	NAG	Ore
S940-0221092	MPMC	2023	0.6	0.3	19	25	1.3	PAG	Ore
S940-0221183	MPMC	2023	0.04	0.11	1.3	8.9	7.1	NAG	Waste
S940-0231722	MPMC	2023	0.18	0.27	5.6	22	4	NAG	Ore
S940-0231737	MPMC	2023	0.16	0.3	4.9	25	5.1	NAG	Ore
S940-0231767	MPMC	2023	0.49	0.21	15	18	1.2	PAG	Waste
S940-0231794	MPMC	2023	0.46	0.15	14	13	0.87	PAG	Ore
S940-0231797	MPMC	2023	0.72	0.29	22	24	1.1	PAG	Waste
S940-0234343	MPMC	2023	1.2	0.15	36	12	0.34	PAG	Waste
S940-0233042	MPMC	2023	0.27	0.37	8.4	31	3.7	NAG	Waste

S940-0233034	MPMC	2023	0.19	0.38	5.9	32	5.4	NAG	Waste
S940-0231853	MPMC	2023	0.89	0.24	28	20	0.71	PAG	Waste
S940-0234333	MPMC	2023	0.62	0.36	20	30	1.5	PAG	Waste
S940-0231856	MPMC	2023	0.38	0.37	12	31	2.6	NAG	Waste
S940-0243030	MPMC	2023	0.66	0.19	21	16	0.76	PAG	Ore
S940-0241847	MPMC	2023	0.16	0.36	5.1	30	5.9	NAG	Waste
S940-0234365	MPMC	2023	0.44	0.12	14	10	0.75	PAG	
S940-0244360	MPMC	2023	0.37	0.39	11	32	2.8	NAG	Ore
S940-0244365	MPMC	2023	0.46	0.13	14	11	0.74	PAG	Waste
S940-0241843	MPMC	2023	0.17	0.11	5.2	9.1	1.8	PAG	Waste
S940-0244370	MPMC	2023	0.12	0.17	3.8	14	3.7	NAG	Waste
S940-0243019	MPMC	2023	0.27	0.25	8.3	21	2.5	NAG	Waste
S940-0241840	MPMC	2023	0.093	0.15	2.9	13	4.3	NAG	Waste
S940-0244377	MPMC	2023	0.24	0.59	7.4	49	6.6	NAG	Waste
S940-0241838	MPMC	2023	0.37	0.54	12	45	3.9	NAG	Waste
S940-0241835	MPMC	2023	0.075	0.15	2.3	12	5.3	NAG	Waste
S940-0241821	MPMC	2023	0.029	0.11	0.91	9.4	10	NAG	Waste
S940-0241354	MPMC	2023	0.06	0.38	1.9	32	17	NAG	Ore
S988-0537206	MPMC	2023	0.22	0.45	7	37	5.3	NAG	Waste
S988-0537201	MPMC	2023	0.22	0.25	6.9	21	3	NAG	Waste
S988-0534305	MPMC	2023	0.14	0.13	4.4	10	2.3	NAG	Waste
S988-0532719	MPMC	2023	0.01	0.14	0.31	12	37	NAG	Waste
S940-0251282	MPMC	2023	0.01	0.23	0.31	19	62	NAG	Ore
S940-0251262	MPMC	2023	0.068	0.19	2.1	16	7.5	NAG	Waste
S940-0251414	MPMC	2023	0.02	0.61	0.63	51	82	NAG	Ore
S940-0251525	MPMC	2023	0.24	0.47	7.4	39	5.2	NAG	Ore
S1000-0474029	MPMC	2023	0.18	0.3	5.8	25	4.4	NAG	Waste
S1000-0477019	MPMC	2023	0.057	0.32	1.8	26	15	NAG	Waste
S1000-0471004	MPMC	2023	0.06	0.28	1.9	23	12	NAG	Waste
S1000-0477015	MPMC	2023	0.11	0.61	3.5	51	15	NAG	Waste
S1000-0471017	MPMC	2023	0.054	0.58	1.7	48	28	NAG	Ore
S940-0261207	MPMC	2023	0.15	0.2	4.8	17	3.5	NAG	Ore
S940-0261245	MPMC	2023	0.066	0.13	2.1	11	5.2	NAG	Ore
S940-0261380	MPMC	2023	0.084	0.31	2.6	26	9.7	NAG	Waste
S940-0261376	MPMC	2023	0.49	0.26	15	21	1.4	PAG	Ore
S940-0261409	MPMC	2023	0.36	0.29	11	24	2.2	NAG	Ore
S940-0261470	MPMC	2023	0.43	0.26	13	22	1.6	PAG	Ore
S940-0261502	MPMC	2023	0.36	0.12	11	9.7	0.87	PAG	Ore
S940-0261601	MPMC	2023	0.22	0.62	6.8	51	7.6	NAG	Ore
S940-0267060	MPMC	2023	0.41	0.52	13	43	3.4	NAG	Ore
S940-0261668	MPMC	2023	0.48	0.18	15	15	1	PAG	Ore
S940-0261174	MPMC	2023	0.096	0.13	3	11	3.6	NAG	Waste
S940-0261286	MPMC	2023	0.046	0.11	1.4	9.1	6.3	NAG	Waste
S940-0261257	MPMC	2023	0.035	0.26	1.1	22	20	NAG	Waste
S988-0555013	MPMC	2023	0.12	0.29	3.7	24	6.4	NAG	Ore
S988-0555037	MPMC	2023	0.38	0.7	12	59	5	NAG	Ore
S988-0555064	MPMC	2023	0.17	0.4	5.3	34	6.4	NAG	Ore
S988-0555091	MPMC	2023	0.05	0.75	1.6	63	40	NAG	Waste

S988-0555148	MPMC	2023	0.057	0.47	1.8	39	22	NAG	Waste
S976-0477110	MPMC	2023	0.22	0.12	7	10	1.5	PAG	Ore
S976-0477123	MPMC	2023	0.12	0.13	3.8	11	2.9	NAG	Waste
S976-0477130	MPMC	2023	0.064	0.22	2	18	9.2	NAG	Waste
S976-0474367	MPMC	2023	0.29	0.17	9.2	14	1.5	PAG	Waste
S988-0554611	MPMC	2023	0.095	0.29	3	24	8.1	NAG	Waste
S988-0553673	MPMC	2023	0.14	0.36	4.5	30	6.7	NAG	Waste
S988-0554620	MPMC	2023	0.11	0.54	3.3	45	14	NAG	Waste
S988-0553669	MPMC	2023	0.18	0.5	5.5	42	7.5	NAG	Waste
S988-0554630	MPMC	2023	0.18	0.51	5.7	43	7.4	NAG	Ore
S988-0553663	MPMC	2023	0.12	0.33	3.8	27	7.2	NAG	Ore
S988-0554643	MPMC	2023	0.089	0.31	2.8	26	9.3	NAG	Waste
S988-0552822	MPMC	2023	0.086	0.35	2.7	29	11	NAG	Waste
S988-0554655	MPMC	2023	0.037	0.94	1.2	78	68	NAG	Waste
S988-0554666	MPMC	2023	0.085	0.18	2.7	15	5.5	NAG	Ore
S988-0552829	MPMC	2023	0.12	0.44	3.7	37	10	NAG	Ore
S976-0477117	MPMC	2023	0.15	0.18	4.8	15	3.1	NAG	Waste
S976-0474396	MPMC	2023	0.059	0.22	1.8	19	10	NAG	Waste
S976-0482402	MPMC	2023	0.19	0.41	5.9	35	5.8	NAG	Waste
S976-0487082	MPMC	2023	0.094	0.2	2.9	16	5.6	NAG	Waste
S976-0495107	MPMC	2023	0.26	0.38	8.1	32	4	NAG	Waste
S976-0495128	MPMC	2023	0.086	0.47	2.7	39	15	NAG	Waste
S976-0495191	MPMC	2023	0.26	0.25	8	21	2.6	NAG	Waste
S976-0487092	MPMC	2023	0.01	0.13	0.31	11	34	NAG	Waste
S976-0487098	MPMC	2023	0.53	0.25	17	21	1.2	PAG	Waste
S976-0484333	MPMC	2023	0.25	0.38	7.9	31	4	NAG	Waste
S976-0495161	MPMC	2023	0.21	0.29	6.6	24	3.6	NAG	Waste
S976-0484342	MPMC	2023	0.23	0.29	7	24	3.4	NAG	Waste
S976-0487103	MPMC	2023	0.94	0.29	29	24	0.82	PAG	Waste
S976-0484351	MPMC	2023	0.43	0.21	13	18	1.3	PAG	Waste
S976-0514402	MPMC	2023	0.091	0.38	2.8	32	11	NAG	Waste
S976-0514412	MPMC	2023	0.047	0.31	1.5	26	17	NAG	Waste
S976-0514424	MPMC	2023	0.11	0.43	3.4	36	11	NAG	Ore
S976-0505313	MPMC	2023	0.14	0.46	4.2	38	9	NAG	Waste
S976-0505343	MPMC	2023	0.2	0.44	6.2	37	5.9	NAG	Ore
S928-0105076	MPMC	2023	0.12	0.41	3.6	34	9.5	NAG	Waste
S928-0105055	MPMC	2023	1.7	0.41	53	34	0.64	PAG	Waste
S928-0105037	MPMC	2023	0.94	0.29	29	24	0.82	PAG	Waste
S976-0512578	MPMC	2023	0.035	0.61	1.1	50	46	NAG	Waste
S976-0512574	MPMC	2023	0.095	0.33	3	27	9.2	NAG	Waste
S976-0512511	MPMC	2023	0.12	0.75	3.7	63	17	NAG	Waste
S976-0512660	MPMC	2023	0.22	0.53	7	44	6.3	NAG	Waste
S976-0512685	MPMC	2023	0.17	0.32	5.3	26	5	NAG	Ore
S976-0524449	MPMC	2023	0.11	0.2	3.3	17	5.1	NAG	Waste
S976-0524452	MPMC	2023	0.093	0.19	2.9	16	5.3	NAG	Waste
S976-0522529	MPMC	2023	0.12	0.16	3.6	14	3.7	NAG	Ore
S976-0522536	MPMC	2023	0.05	0.51	1.6	42	27	NAG	Waste
S976-0524466	MPMC	2023	0.072	0.29	2.3	24	11	NAG	Waste

S976-0522547	MPMC	2023	0.015	0.55	0.47	46	98	NAG	Waste
S976-0522610	MPMC	2023	0.27	0.32	8.5	27	3.2	NAG	Ore
S976-0522608	MPMC	2023	0.084	0.4	2.6	33	13	NAG	Ore
S976-0522520	MPMC	2023	0.45	0.46	14	38	2.7	NAG	Ore
S976-0522677	MPMC	2023	0.036	0.1	1.1	8.6	7.6	NAG	Waste
S976-0522644	MPMC	2023	0.02	0.15	0.63	13	21	NAG	Waste
S976-0522559	MPMC	2023	0.13	0.19	4.2	16	3.8	NAG	Ore
S976-0522673	MPMC	2023	0.016	0.56	0.5	47	93	NAG	Waste
S976-0522545	MPMC	2023	0.019	0.26	0.59	22	37	NAG	Waste
S928-0121170	MPMC	2023	0.053	0.31	1.7	26	15	NAG	Ore
S928-0124084	MPMC	2023	0.83	0.31	26	26	0.99	PAG	Ore
S928-0121125	MPMC	2023	0.024	0.22	0.75	18	24	NAG	LGO
S928-0121128	MPMC	2023	0.17	0.2	5.4	17	3.1	NAG	Ore
S928-0123042	MPMC	2023	0.7	0.26	22	22	1	PAG	Waste
S928-0123046	MPMC	2023	0.27	0.39	8.5	33	3.9	NAG	Waste
S928-0124076	MPMC	2023	0.12	0.37	3.8	31	8.1	NAG	Waste
S976-0539001	MPMC	2023	0.076	0.093	2.4	7.8	3.3	NAG	Ore
S976-0539012	MPMC	2023	0.091	0.12	2.8	9.7	3.4	NAG	Waste
S976-0539017	MPMC	2023	0.18	0.3	5.6	25	4.5	NAG	Ore
S976-0539040	MPMC	2023	0.14	0.34	4.4	29	6.5	NAG	Ore
S976-0539068	MPMC	2023	0.08	0.39	2.5	33	13	NAG	
S976-0539080	MPMC	2023	0.21	0.28	6.5	23	3.6	NAG	
S976-0539025	MPMC	2023	0.09	0.21	2.8	17	6.1	NAG	Waste
S976-0539032	MPMC	2023	0.11	0.31	3.4	26	7.7	NAG	Waste
S976-0539065	MPMC	2023	0.033	0.49	1	41	40	NAG	Ore
S976-0539063	MPMC	2023	0.11	0.28	3.5	24	6.7	NAG	Ore
S928-0131330	MPMC	2023	0.033	0.34	1	28	27	NAG	Ore
S928-0131435	MPMC	2023	0.14	0.41	4.2	34	8	NAG	Ore
S964-0435567	MPMC	2023	0.75	0.32	23	26	1.1	PAG	Waste
S964-0435555	MPMC	2023	0.12	0.29	3.9	25	6.3	NAG	Waste
S964-0435534	MPMC	2023	0.77	0.2	24	17	0.71	PAG	Waste
S964-0445578	MPMC	2023	0.25	0.15	7.8	12	1.6	PAG	Waste
S928-0141437	MPMC	2023	0.1	0.61	3.2	51	16	NAG	Ore
S928-0151435	MPMC	2023	0.13	0.45	4.1	37	9.1	NAG	Ore
S928-0151510	MPMC	2023	0.088	0.23	2.8	19	7	NAG	Waste
S928-0151497	MPMC	2023	0.12	0.9	3.9	75	19	NAG	Ore
S928-0151470	MPMC	2023	0.24	0.3	7.5	25	3.3	NAG	Waste
S964-0435492	MPMC	2023	0.18	0.22	5.7	18	3.2	NAG	Waste
S964-0435516	MPMC	2023	0.28	0.21	8.6	18	2	NAG	Waste
S964-0445593	MPMC	2023	0.11	0.38	3.3	31	9.6	NAG	Waste
S964-0445610	MPMC	2023	0.07	0.82	2.2	68	31	NAG	Waste
S964-0455482	MPMC	2023	0.053	0.21	1.7	17	10	NAG	Waste
S964-0455458	MPMC	2023	0.13	0.22	4	18	4.5	NAG	Ore
S964-0455431	MPMC	2023	0.22	0.67	6.8	55	8.1	NAG	Waste
S964-0445632	MPMC	2023	0.077	0.33	2.4	27	11	NAG	Waste
S964-0445650	MPMC	2023	0.37	0.37	11	31	2.7	NAG	Waste
S964-0472429	MPMC	2023	0.4	0.5	13	42	3.3	NAG	Waste
S964-0477050	MPMC	2023	0.21	0.53	6.6	44	6.8	NAG	Waste

S964-0472423	MPMC	2023	0.14	0.82	4.3	68	16	NAG	Waste
S964-0472502	MPMC	2023	0.088	0.4	2.8	33	12	NAG	Waste
S964-0472418	MPMC	2023	0.099	0.6	3.1	50	16	NAG	Waste
S964-0444198	MPMC	2023	0.4	0.29	13	24	1.9	PAG	
S964-0474203	MPMC	2023	0.25	0.59	7.9	49	6.2	NAG	Waste
S964-0474210	MPMC	2023	0.075	0.23	2.3	19	8.1	NAG	Waste
S964-0477500	MPMC	2023	0.15	0.32	4.5	26	5.8	NAG	Waste
S964-0473141	MPMC	2023	0.59	0.18	19	15	0.82	PAG	Waste
S964-0472402	MPMC	2023	0.12	0.086	3.8	7.2	1.9	PAG	Waste
S964-0474227	MPMC	2023	0.074	0.66	2.3	55	24	NAG	Waste
S964-0473144	MPMC	2023	0.53	0.16	16	13	0.8	PAG	Waste
S964-0477165	MPMC	2023	0.17	0.17	5.3	14	2.7	NAG	Waste
S964-0455407	MPMC	2023	0.17	0.25	5.3	20	3.8	NAG	
S964-0465359	MPMC	2023	0.021	0.54	0.66	45	68	NAG	Waste
S964-0465332	MPMC	2023	0.06	0.17	1.9	14	7.4	NAG	Waste
S964-0465314	MPMC	2023	0.033	0.12	1	9.7	9.4	NAG	Waste
S964-0465284	MPMC	2023	0.096	0.16	3	13	4.4	NAG	Waste
S964-0493235	MPMC	2023	0.11	0.12	3.3	10	3.1	NAG	Waste
S964-0497124	MPMC	2023	0.019	0.14	0.59	12	20	NAG	Waste
S964-0494385	MPMC	2023	0.076	0.15	2.4	12	5.1	NAG	LGO
S964-0492107	MPMC	2023	0.22	0.21	6.9	17	2.5	NAG	Ore
S964-0492208	MPMC	2023	0.11	0.36	3.5	30	8.4	NAG	Waste
S964-0494376	MPMC	2023	0.041	0.2	1.3	16	13	NAG	Waste
S964-0492182	MPMC	2023	0.098	0.31	3.1	26	8.5	NAG	Waste
S964-0492233	MPMC	2023	0.1	0.28	3.1	23	7.5	NAG	Waste
S964-0492264	MPMC	2023	0.1	0.19	3.3	15	4.7	NAG	Waste
S964-0492266	MPMC	2023	0.064	0.14	2	12	5.9	NAG	Waste
S964-0492267	MPMC	2023	0.058	0.35	1.8	29	16	NAG	Waste
S964-0504348	MPMC	2023	0.024	0.72	0.75	60	80	NAG	Ore
S964-0502119	MPMC	2023	0.17	0.38	5.2	32	6.1	NAG	Ore
S964-0502260	MPMC	2023	0.14	0.27	4.4	22	5.1	NAG	Ore
S916-011575	MPMC	2023	0.031	0.95	0.97	79	81	NAG	Waste
S964-0504335	MPMC	2023	0.19	0.21	5.9	17	2.9	NAG	Ore
S964-0502218	MPMC	2023	0.19	0.88	5.8	73	13	NAG	Ore
S916-011501	MPMC	2023	0.044	0.4	1.4	33	24	NAG	Waste
S916-011500	MPMC	2023	0.14	0.56	4.3	47	11	NAG	Waste
S964-0483153	MPMC	2023	0.22	0.11	6.9	9	1.3	PAG	Waste
S964-0504355	MPMC	2023	0.025	0.21	0.78	17	22	NAG	Waste
S964-0504371	MPMC	2023	0.1	0.2	3.2	17	5.2	NAG	Ore
S964-0529002	MPMC	2023	0.18	0.33	5.5	27	4.9	NAG	Waste
S964-0529008	MPMC	2023	0.13	0.27	4	22	5.5	NAG	Ore
S964-0503194	MPMC	2023	0.12	0.59	3.6	49	14	NAG	Waste
S964-0502294	MPMC	2023	0.11	0.69	3.3	58	18	NAG	LGO
S964-0502312	MPMC	2023	0.13	0.39	3.9	32	8.2	NAG	LGO
S964-0507137	MPMC	2023	0.1	0.57	3.2	48	15	NAG	Ore
S964-0482393	MPMC	2023	0.086	0.13	2.7	11	4.1	NAG	Waste
S964-0483161	MPMC	2023	0.47	0.53	15	44	3	NAG	Waste
S964-0487154	MPMC	2023	0.38	0.26	12	21	1.8	PAG	Waste

S964-0484283	MPMC	2023	0.2	0.12	6.2	9.9	1.6	PAG	Waste
S964-0487149	MPMC	2023	0.097	0.25	3	21	6.8	NAG	Waste
S964-0484294	MPMC	2023	0.41	0.21	13	18	1.4	PAG	Waste
S964-0482354	MPMC	2023	0.15	0.22	4.7	18	4	NAG	Waste
S964-0482334	MPMC	2023	0.13	0.3	4	25	6.3	NAG	Waste
S952-0335182	MPMC	2023	0.059	0.39	1.8	32	17	NAG	Waste
S952-0335200	MPMC	2023	0.048	0.097	1.5	8.1	5.4	NAG	Waste
S952-0335221	MPMC	2023	0.083	0.16	2.6	13	5.1	NAG	Waste
S940-0271691	MPMC	2023	0.15	0.12	4.6	9.9	2.2	NAG	Ore
S940-0277068	MPMC	2023	0.29	0.33	9.2	27	3	NAG	Ore
S952-0357175	MPMC	2023	0.13	0.32	4	27	6.7	NAG	Waste
S952-0352203	MPMC	2023	0.21	0.38	6.4	31	4.9	NAG	Waste
S952-0354526	MPMC	2023	0.11	0.29	3.3	25	7.3	NAG	Waste
S952-0352213	MPMC	2023	0.28	0.51	8.8	42	4.8	NAG	Waste
S952-0359006	MPMC	2023	0.81	0.42	25	35	1.4	PAG	Waste
S952-0353301	MPMC	2023	0.91	0.43	28	36	1.3	PAG	Waste
S952-0341814	MPMC	2023	0.23	0.14	7.1	12	1.7	PAG	Ore
S952-0341817	MPMC	2023	0.24	0.62	7.6	51	6.7	NAG	Ore
S952-0341825	MPMC	2023	0.068	0.18	2.1	15	7.1	NAG	Waste
S952-0341829	MPMC	2023	0.035	0.24	1.1	20	18	NAG	Waste
S952-0341832	MPMC	2023	0.031	0.11	0.97	9.2	9.5	NAG	Waste
S952-0341850	MPMC	2023	0.065	0.27	2	22	11	NAG	Ore
S952-0341867	MPMC	2023	0.047	0.1	1.5	8.4	5.7	NAG	Waste
S952-0341878	MPMC	2023	0.11	0.19	3.3	16	4.7	NAG	Waste
S952-0341894	MPMC	2023	0.077	0.12	2.4	10	4.3	NAG	Waste
S952-0341900	MPMC	2023	0.15	0.22	4.8	18	3.9	NAG	Ore
S952-0341905	MPMC	2023	0.16	0.21	4.9	17	3.5	NAG	Ore
S952-0341908	MPMC	2023	0.11	0.3	3.6	25	6.9	NAG	Ore
S952-0343233	MPMC	2023	0.086	0.086	2.7	7.2	2.7	NAG	Ore
S952-0343239	MPMC	2023	0.084	0.14	2.6	11	4.3	NAG	Waste
S952-0343242	MPMC	2023	0.028	0.11	0.88	8.8	10	NAG	Waste
S952-0347107	MPMC	2023	0.16	0.21	5	18	3.5	NAG	Ore
S952-0423224	MPMC	2023	0.12	0.38	3.7	31	8.4	NAG	Waste
S952-0421949	MPMC	2023	0.048	0.33	1.5	27	18	NAG	Waste
S952-0421983	MPMC	2023	0.056	0.25	1.8	21	12	NAG	Waste
S952-0421966	MPMC	2023	0.19	0.21	5.8	17	3	NAG	Waste
S952-0421969	MPMC	2023	0.48	0.24	15	20	1.3	PAG	Ore
S952-0421937	MPMC	2023	0.38	0.57	12	48	4	NAG	Ore
S952-0424365	MPMC	2023	0.032	0.1	1	8.4	8.4	NAG	Waste
S952-0424370	MPMC	2023	0.065	0.17	2	14	6.8	NAG	Waste
S952-0424409	MPMC	2023	0.15	0.4	4.5	33	7.3	NAG	Ore
S952-0422120	MPMC	2023	0.29	0.48	9.1	40	4.3	NAG	Ore
S952-0424425	MPMC	2023	0.14	0.36	4.5	30	6.6	NAG	Ore
S952-0422114	MPMC	2023	0.12	0.24	3.7	20	5.4	NAG	Waste
S952-0422059	MPMC	2023	0.21	0.55	6.7	46	6.9	NAG	Ore
S952-0422145	MPMC	2023	0.27	0.27	8.4	23	2.7	NAG	Ore
S952-0424442	MPMC	2023	0.13	0.39	4	32	8	NAG	Waste
S952-0427121	MPMC	2023	0.15	0.24	4.8	20	4.2	NAG	Waste

S952-0424417	MPMC	2023	0.18	0.52	5.6	43	7.7	NAG	Ore
S940-0281382	MPMC	2023	0.079	0.31	2.5	26	10	NAG	Ore
S940-0287051	MPMC	2023	0.24	0.32	7.3	27	3.6	NAG	Ore
S940-0305271	MPMC	2023	0.044	0.092	1.4	7.7	5.6	NAG	Waste
S940-0305286	MPMC	2023	0.022	0.15	0.69	13	19	NAG	Waste
S940-0305304	MPMC	2023	0.29	0.21	8.9	18	2	NAG	Waste
S940-0305322	MPMC	2023	0.015	0.32	0.47	26	56	NAG	Waste
S952-0412148	MPMC	2023	0.1	0.16	3.2	13	4.2	NAG	Waste
S952-0414451	MPMC	2023	0.034	0.1	1.1	8.7	8.2	NAG	Waste
S952-0412012	MPMC	2023	0.057	0.15	1.8	12	6.8	NAG	Waste
S940-0291105	MPMC	2023	0.026	0.14	0.81	12	14	NAG	Waste
S940-0291017	MPMC	2023	0.072	0.24	2.3	20	8.8	NAG	Waste
S940-0294025	MPMC	2023	0.022	0.51	0.69	42	61	NAG	Waste
S940-0293257	MPMC	2023	0.029	0.45	0.91	37	41	NAG	Waste
S940-0291084	MPMC	2023	0.06	0.2	1.9	17	8.9	NAG	Waste
S940-0291177	MPMC	2023	0.059	0.41	1.8	34	18	NAG	Waste
S940-0294036	MPMC	2023	0.13	0.58	3.9	48	12	NAG	Waste
S940-0291080	MPMC	2023	0.14	0.091	4.3	7.6	1.8	PAG	Waste
S940-0291027	MPMC	2023	0.098	0.1	3.1	8.4	2.7	NAG	Waste
S940-0291118	MPMC	2023	0.044	0.22	1.4	18	13	NAG	Waste
S952-0414444	MPMC	2023	0.079	0.17	2.5	14	5.6	NAG	Waste
S952-0414455	MPMC	2023	0.23	0.23	7.1	19	2.7	NAG	Waste
S952-0417137	MPMC	2023	0.18	0.26	5.7	21	3.8	NAG	Waste
S952-0385599	MPMC	2023	0.1	0.69	3.2	58	18	NAG	Waste
S952-0385575	MPMC	2023	0.19	0.21	5.8	17	3	NAG	Waste
S952-0385527	MPMC	2023	0.099	0.18	3.1	15	4.9	NAG	Waste
S928-0175095 A	MPMC	2023	0.16	0.28	4.9	23	4.7	NAG	Waste
S928-0175104	MPMC	2023	0.071	0.61	2.2	51	23	NAG	Waste
S928-0181233	MPMC	2023	0.15	0.29	4.6	24	5.3	NAG	Ore
S928-0181080	MPMC	2023	0.12	0.13	3.7	11	2.9	NAG	Waste
S928-0184069	MPMC	2023	0.26	0.31	8.1	26	3.2	NAG	Waste
S928-0184064	MPMC	2023	0.32	0.63	10	53	5.3	NAG	Waste
S928-0184057	MPMC	2023	0.16	0.19	5	16	3.2	NAG	Waste
S928-0183069	MPMC	2023	0.07	0.2	2.2	17	7.8	NAG	Waste
S928-0181338	MPMC	2023	0.068	0.24	2.1	20	9.3	NAG	Waste
S940-0321041	MPMC	2023	0.13	0.08	4.1	6.7	1.6	PAG	Ore
S940-0321121	MPMC	2023	0.044	0.12	1.4	9.9	7.2	NAG	Waste
S940-0321124	MPMC	2023	0.082	0.15	2.6	13	4.9	NAG	Waste
S940-0321215	MPMC	2023	0.12	0.3	3.8	25	6.6	NAG	Ore
S940-0323239	MPMC	2023	0.041	0.15	1.3	12	9.7	NAG	Waste
S940-0323244	MPMC	2023	0.17	0.26	5.2	22	4.2	NAG	Waste
S928-0161215	MPMC	2023	0.23	0.31	7.3	26	3.6	NAG	Ore
S928-0161217	MPMC	2023	0.19	0.4	6	33	5.6	NAG	Ore
S928-0161318	MPMC	2023	0.046	0.18	1.4	15	10	NAG	Ore
S928-0161405	MPMC	2023	0.21	0.65	6.5	54	8.3	NAG	Ore
S928-0161450	MPMC	2023	0.29	0.49	8.9	41	4.6	NAG	Ore
S928-0161515	MPMC	2023	0.52	0.17	16	14	0.85	PAG	Ore
S928-0161518	MPMC	2023	0.091	0.31	2.8	26	9	NAG	Ore

S928-0161714	MPMC	2023	0.67	0.18	21	15	0.74	PAG	Ore
S928-0167017	MPMC	2023	0.16	0.22	4.9	18	3.7	NAG	Ore
S940-0315243	MPMC	2023	0.051	0.13	1.6	11	7	NAG	Waste
S940-0315228	MPMC	2023	0.14	0.14	4.4	12	2.7	NAG	Ore
S940-0315213	MPMC	2023	0.13	0.27	4	22	5.6	NAG	Ore
S940-0315198	MPMC	2023	0.046	0.27	1.4	22	16	NAG	Waste
S940-0315186	MPMC	2023	0.094	0.21	2.9	17	5.8	NAG	Waste
S928-0181075	MPMC	2023	0.13	0.25	4.2	20	4.9	NAG	Ore
S928-0181434	MPMC	2023	0.17	0.38	5.3	31	5.9	NAG	Ore
S928-0175128	MPMC	2023	0.3	0.31	9.4	26	2.8	NAG	Ore
S928-0175134	MPMC	2023	0.089	0.21	2.8	18	6.3	NAG	Waste
S928-0175149	MPMC	2023	0.36	0.3	11	25	2.2	NAG	Ore
S952-0374519	MPMC	2023	0.25	0.33	7.8	27	3.5	NAG	Waste
S952-0377171	MPMC	2023	0.09	0.61	2.8	51	18	NAG	Waste
S940-0331217	MPMC	2023	0.045	0.097	1.4	8.1	5.7	NAG	Waste
S940-0331062	MPMC	2023	0.034	0.18	1.1	15	14	NAG	Waste
S952-0377155	MPMC	2023	0.086	0.31	2.7	25	9.5	NAG	Waste
S952-0377151	MPMC	2023	0.12	0.24	3.9	20	5.2	NAG	Waste
S952-0372084	MPMC	2023	0.19	0.25	5.8	21	3.6	NAG	Waste
S952-0374468	MPMC	2023	0.094	0.6	2.9	50	17	NAG	Waste
S952-0372158	MPMC	2023	0.72	0.35	23	29	1.3	PAG	Waste

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5236**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Mar-2023 10:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 14-Mar-2023
C-O-C number	: M0004	Issue Date	: 16-Mar-2023 14:07
Sampler	: AL		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Metals, Saskatoon, Saskatchewan
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	S-964 DH 1462	----	----	----	----
					Client sampling date / time	09-Mar-2023 12:22	----	----	----	----
					VA23A5236-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108	0.10	pH units		9.19	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351	0.050	%		0.206	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399	500	mg/kg		2130	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		13700	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		0.67	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		8.38	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		297	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.55	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		5.3	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		0.079	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		18900	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		86.9	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		22.6	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		2700	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg		60200	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		4.16	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		12.2	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		12800	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		497	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.144	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		2.95	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		23.6	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		1320	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		1900	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		2.64	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-964 DH 1462	----	----	----	----
					Client sampling date / time	09-Mar-2023 12:22	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5236-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440	0.10	mg/kg		0.65	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		715	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		113	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		1700	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		1620	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		<0.50	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		0.540	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		220	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		47.0	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		7.0	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A5236**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Mar-2023 10:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 14-Mar-2023
C-O-C number	: M0004	Issue Date	: 16-Mar-2023 14:07
Sampler	: AL 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Saskatoon Metals, Saskatoon, Saskatchewan
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 863179)											
SK2300977-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	9.71	9.85	1.43%	10%	----
Organic / Inorganic Carbon (QC Lot: 864566)											
VA23A5236-001	S-964 DH 1462	Carbon, total [TC]	----	E351	0.050	%	0.206	0.216	0.010	Diff <2x LOR	----
Inorganics (QC Lot: 864567)											
VA23A5236-001	S-964 DH 1462	Sulfur, total	7704-34-9	E399	0.050	%	2130 mg/kg	0.211	0.002	Diff <2x LOR	----
Metals (QC Lot: 862778)											
SK2300972-001	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0427	0.0373	13.4%	40%	----
Metals (QC Lot: 862779)											
SK2300972-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	12100	12100	0.359%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.40	0.34	0.06	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	4.86	4.52	7.18%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	75.1	72.9	2.98%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.34	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	11.3	12.1	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.118	0.120	0.002	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	107000	106000	0.992%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	29.3	27.8	5.41%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	8.08	7.58	6.46%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	19.5	19.8	1.27%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	17800	17800	0.0219%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	14.8	19.1	25.8%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	16.5	16.2	1.71%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	66800	65600	1.80%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	508	501	1.54%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.63	0.52	18.5%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	16.6	16.5	0.406%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	611	584	4.59%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2470	2410	2.48%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 862779) - continued											
SK2300972-001	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.22	0.18	0.04	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	163	161	2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	31.5	30.4	3.38%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.120	0.128	0.007	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	445	439	1.34%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.530	0.547	3.07%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	32.0	31.6	1.20%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	85.2	87.7	2.90%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.2	2.1	0.07	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 864566)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 864567)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 862778)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 862779)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 862779) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 863179)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	99.7	97.0	103	----
Organic / Inorganic Carbon (QCLot: 864566)									
Carbon, total [TC]	----	E351	0.05	%	48 %	100	90.0	110	----
Inorganics (QCLot: 864567)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	99.9	90.0	110	----
Metals (QCLot: 862778)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.6	80.0	120	----
Metals (QCLot: 862779)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	100	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.5	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.0	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.1	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.7	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.6	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	96.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	93.0	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	110	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	101	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.1	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.5	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	119	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.5	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 862779) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	100	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	96.7	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.1	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.0	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.8	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	97.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	95.6	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.8	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	107	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 863179)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	98.4	96.0	104	----
Organic / Inorganic Carbon (QCLot: 864566)									
	RM	Carbon, total [TC]	----	E351	1.4 %	93.6	80.0	120	----
Inorganics (QCLot: 864567)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	119	70.0	130	----
Metals (QCLot: 862778)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
Metals (QCLot: 862779)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	104	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	100	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	109	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	104	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	113	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	108	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	103	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	102	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	94.8	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	113	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	106	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	102	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	108	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	103	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	106	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 862779) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	102	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	107	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	126	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	100	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	93.2	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	98.0	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	118	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: M0004

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference VA23A5236

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minir
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mini
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mini
Street:	PO BOX 12	Email 1 or Fax On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mini
City/Province:	Likely, BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surchar
Postal Code:	V0L 1N0	Email 3	Additional fees may apply to rush requests on weeker
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	Date and Time Required for all E&P TATs:
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please c
Company:		Email 1 or Fax On File	
Contact:	On File	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590008044 Q2 2022	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	5236	ALS Contact: Can Dang	Sampler: Assay lab

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (LECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-964 DH 1462	9-Mar-23	12:22	Sediment/Soil	1	R	R	R	R			

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				3			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Maea Johnson	Date: March 9, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: MAR 10 2023	Time: 10 20 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7302**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 05-Apr-2023 11:40
PO	: 5590012190	Date Analysis Commenced	: 08-Apr-2023
C-O-C number	: D0067	Issue Date	: 13-Apr-2023 16:12
Sampler	: AL		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Laboratory Supervisor	Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	S-976 DH 4272	----	----	----	----
					Client sampling date / time	05-Apr-2023	----	----	----	----
						VA23A7302-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108	0.10	pH units		9.20	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351	0.050	%		0.281	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399	500	mg/kg		14100	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		26700	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		0.34	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		26.8	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		304	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.62	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		18.7	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		0.449	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		17200	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		25.5	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		22.6	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		876	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg		57300	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		10.3	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		26.3	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		17300	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		691	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.158	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		53.7	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		9.54	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		1720	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		3660	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		4.00	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		0.48	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-976 DH 4272	----	----	----	----
					Client sampling date / time	05-Apr-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7302-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440	50	mg/kg		7440	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		173	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		16700	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		2450	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		1.14	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		0.866	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		223	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		80.8	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		5.5	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A7302**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 05-Apr-2023 11:40
PO	: 5590012190	Date Analysis Commenced	: 08-Apr-2023
C-O-C number	: D0067	Issue Date	: 13-Apr-2023 16:12
Sampler	: AL 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Saskatoon Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Laboratory Supervisor	Saskatoon Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 890543)											
VA23A7302-001	S-976 DH 4272	pH (1:2 soil:water)	----	E108	0.10	pH units	9.20	9.20	0.00%	10%	----
Organic / Inorganic Carbon (QC Lot: 892544)											
WP2304290-002	Anonymous	Carbon, total [TC]	----	E351	0.050	%	40.9	40.6	0.970%	20%	----
Inorganics (QC Lot: 892545)											
VA23A7302-001	S-976 DH 4272	Sulfur, total	7704-34-9	E399	0.050	%	14100 mg/kg	1.56	10.1%	20%	----
Metals (QC Lot: 892418)											
SK2301380-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0418	0.0463	10.1%	40%	----
Metals (QC Lot: 892419)											
SK2301380-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	8540	8630	0.968%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.36	0.33	0.02	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	6.08	5.91	2.84%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	173	164	4.84%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.42	0.01	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	8.3	8.7	0.4	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.196	0.200	2.08%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	4180	3690	12.4%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	15.8	16.2	2.36%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	6.39	6.39	0.0667%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	12.5	12.2	2.03%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	12200	12100	0.721%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	10.3	8.63	17.4%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	8.0	8.1	0.05	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	3320	3260	2.07%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	360	363	0.929%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.84	0.79	5.25%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	12.9	13.0	0.857%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	504	455	10.3%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2120	2170	2.21%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.28	0.002	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 892419) - continued											
SK2301380-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	521	494	5.32%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	48.9	43.5	11.6%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.148	0.145	0.003	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	134	150	11.1%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.607	0.558	8.42%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	24.2	24.3	0.335%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	43.9	43.1	1.69%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	3.1	3.0	0.1	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 892544)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 892545)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 892418)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 892419)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 892419) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 890543)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 892544)									
Carbon, total [TC]	----	E351	0.05	%	48 %	102	90.0	110	----
Inorganics (QCLot: 892545)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	102	90.0	110	----
Metals (QCLot: 892418)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.2	80.0	120	----
Metals (QCLot: 892419)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	97.6	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	94.4	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	90.3	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.5	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.4	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.6	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.1	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	95.2	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.7	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.0	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.0	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.1	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.5	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 892419) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	93.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.2	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	96.8	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.9	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	97.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	93.4	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	96.7	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	92.1	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	94.4	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 890543)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	98.3	96.0	104	----
Organic / Inorganic Carbon (QCLot: 892544)									
	RM	Carbon, total [TC]	----	E351	1.4 %	100	80.0	120	----
Inorganics (QCLot: 892545)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	101	70.0	130	----
Metals (QCLot: 892418)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
Metals (QCLot: 892419)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.3	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	91.5	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	100	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	99.8	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	88.4	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	98.0	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	97.2	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.9	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	90.5	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	99.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	98.0	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	95.4	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.0	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	97.5	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	96.7	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	96.0	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	91.3	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 892419) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	79.8	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	90.5	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	99.0	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	86.1	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	99.7	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	89.7	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	89.6	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	93.6	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	95.2	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	88.8	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0067

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590008044 Q2 2022
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 7302

ALS Contact: Can Dang

Sampler: Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-976 DH 4272	4-Apr-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23A7302

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

tion by selecting from drop-down below
OC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C		
				2	4	

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: April 4, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: JV	Date: APR - 5 2023	Time: 1140am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A9516**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 03-May-2023 08:03
PO	: 5590012190	Date Analysis Commenced	: 04-May-2023
C-O-C number	: D0084	Issue Date	: 09-May-2023 15:58
Sampler	: Assay Lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	S-964 DH 5234	----	----	----	----
					Client sampling date / time	02-May-2023	----	----	----	----
						VA23A9516-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108	0.10	pH units		9.56	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351	0.050	%		0.430	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399	500	mg/kg		<500	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		13500	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		0.40	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		8.69	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		305	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.42	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		13.8	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		0.094	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		20800	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		63.2	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		17.4	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		605	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg		41600	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		4.16	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		17.4	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		11600	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		534	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		2.34	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		24.6	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		1230	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		1220	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		0.36	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		0.18	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-964 DH 5234	----	----	----	----
					Client sampling date / time	02-May-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A9516-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440	50	mg/kg		674	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		76.1	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		<1000	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		1090	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		0.93	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		0.382	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		156	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		69.4	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		7.2	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

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QUALITY CONTROL REPORT

Work Order	: **VA23A9516**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 03-May-2023 08:03
PO	: 5590012190	Date Analysis Commenced	: 04-May-2023
C-O-C number	: D0084	Issue Date	: 09-May-2023 15:57
Sampler	: Assay Lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Saskatoon Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 924613)											
CG2305476-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.97	7.97	0.00%	10%	----
Organic / Inorganic Carbon (QC Lot: 923932)											
CG2305476-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	20.4	20.4	0.380%	20%	----
Inorganics (QC Lot: 923933)											
VA23A9516-001	S-964 DH 5234	Sulfur, total	7704-34-9	E399	0.050	%	<500 mg/kg	<0.050	0	Diff <2x LOR	----
Metals (QC Lot: 926423)											
CG2305476-001	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0465	0.0421	9.82%	40%	----
Metals (QC Lot: 926424)											
CG2305476-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	4580	4030	12.9%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.62	0.54	0.08	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.31	2.94	12.0%	30%	----
		Barium	7440-39-3	E440	0.90	mg/kg	1060	973	8.86%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.33	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	8.4	7.5	0.9	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	10.9	9.73	11.3%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	205000	186000	9.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	9.24	7.99	14.5%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	7.43	6.63	11.3%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	14.6	13.1	10.4%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	6240	5710	8.80%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	6.31	5.72	9.73%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	12.0	10.8	1.2	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	10800	9660	11.6%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	200	179	11.2%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.68	1.54	8.53%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	75.2	67.2	11.3%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	674	582	14.6%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1420	1200	16.8%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	6.39	5.91	7.78%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 926424) - continued											
CG2305476-001	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.19	0.17	0.02	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	143	125	18	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	140	125	11.4%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	3200	3000	100	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.158	0.139	0.019	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	26.1	24.8	5.25%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.32	2.20	5.35%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	20.8	18.1	13.7%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	469	421	10.8%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.0	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 923932)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 923933)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 926423)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 926424)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 926424) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 924613)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	100	97.0	103	----
Organic / Inorganic Carbon (QCLot: 923932)									
Carbon, total [TC]	----	E351	0.05	%	48 %	98.9	90.0	110	----
Inorganics (QCLot: 923933)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	104	90.0	110	----
Metals (QCLot: 926423)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
Metals (QCLot: 926424)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.2	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	103	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.1	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	104	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	92.6	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	97.2	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.6	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	105	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.7	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 926424) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.9	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.6	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	101	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	107	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	104	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.7	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	107	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 924613)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	99.6	96.0	104	----
Organic / Inorganic Carbon (QCLot: 923932)									
	RM	Carbon, total [TC]	----	E351	1.4 %	100	80.0	120	----
Inorganics (QCLot: 923933)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	93.0	70.0	130	----
Metals (QCLot: 926423)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
Metals (QCLot: 926424)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	102	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	108	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	126	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	97.1	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	98.2	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	98.5	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	103	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	100.0	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	109	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	101	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	102	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	99.8	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	111	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 926424) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.4	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	109	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	100.0	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	107	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	98.5	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	107	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	101	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	114	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: D0084

Page 1 of 1

Environmental Division Vancouver
Work Order Reference
VA23A9516

Telephone : +1 604 263 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: On File
Email 2:
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: On File
Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends, s...
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Can Dang **Sampler:** Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-964 DH 5234	2-May-23		Sediment/Soil	1	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only).

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4	4	6	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Dave Stanley	May 2, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JC	MAY - 3 2023	740 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B8036**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 04-Aug-2023 11:30
PO	: 5590012190	Date Analysis Commenced	: 09-Aug-2023
C-O-C number	: A0267	Issue Date	: 14-Aug-2023 14:37
Sampler	: AL		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: S-940 DH 5068	----	----	----	----
					Client sampling date / time: 03-Aug-2023 00:00	----	----	----	----
					VA23B8036-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
pH (1:2 soil:water)	----	E108/SK	0.10	pH units	9.09	----	----	----	----
Organic / Inorganic Carbon									
Carbon, total [TC]	----	E351/SK	0.050	%	0.220	----	----	----	----
Inorganics									
Sulfur, total	7704-34-9	E399/SK	500	mg/kg	7170	----	----	----	----
Metals									
Aluminum	7429-90-5	E440/SK	50	mg/kg	24600	----	----	----	----
Antimony	7440-36-0	E440/SK	0.10	mg/kg	0.44	----	----	----	----
Arsenic	7440-38-2	E440/SK	0.10	mg/kg	19.1	----	----	----	----
Barium	7440-39-3	E440/SK	0.50	mg/kg	74.3	----	----	----	----
Beryllium	7440-41-7	E440/SK	0.10	mg/kg	0.57	----	----	----	----
Bismuth	7440-69-9	E440/SK	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	5.0	mg/kg	15.1	----	----	----	----
Cadmium	7440-43-9	E440/SK	0.020	mg/kg	0.058	----	----	----	----
Calcium	7440-70-2	E440/SK	50	mg/kg	24900	----	----	----	----
Chromium	7440-47-3	E440/SK	0.50	mg/kg	18.0	----	----	----	----
Cobalt	7440-48-4	E440/SK	0.10	mg/kg	17.6	----	----	----	----
Copper	7440-50-8	E440/SK	0.50	mg/kg	444	----	----	----	----
Iron	7439-89-6	E440/SK	50	mg/kg	46400	----	----	----	----
Lead	7439-92-1	E440/SK	0.50	mg/kg	4.12	----	----	----	----
Lithium	7439-93-2	E440/SK	2.0	mg/kg	22.1	----	----	----	----
Magnesium	7439-95-4	E440/SK	20	mg/kg	13200	----	----	----	----
Manganese	7439-96-5	E440/SK	1.0	mg/kg	514	----	----	----	----
Mercury	7439-97-6	E510/SK	0.0500	mg/kg	0.0508	----	----	----	----
Molybdenum	7439-98-7	E440/SK	0.10	mg/kg	26.4	----	----	----	----
Nickel	7440-02-0	E440/SK	0.50	mg/kg	3.68	----	----	----	----
Phosphorus	7723-14-0	E440/SK	50	mg/kg	1080	----	----	----	----
Potassium	7440-09-7	E440/SK	100	mg/kg	1660	----	----	----	----
Selenium	7782-49-2	E440/SK	0.20	mg/kg	4.52	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-940 DH 5068	----	----	----	----
					Client sampling date / time	03-Aug-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B8036-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	0.10	mg/kg		0.23	----	----	----	----
Sodium	7440-23-5	E440/SK	50	mg/kg		1280	----	----	----	----
Strontium	7440-24-6	E440/SK	0.50	mg/kg		161	----	----	----	----
Sulfur	7704-34-9	E440/SK	1000	mg/kg		12300	----	----	----	----
Thallium	7440-28-0	E440/SK	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	1.0	mg/kg		1810	----	----	----	----
Tungsten	7440-33-7	E440/SK	0.50	mg/kg		1.70	----	----	----	----
Uranium	7440-61-1	E440/SK	0.050	mg/kg		0.903	----	----	----	----
Vanadium	7440-62-2	E440/SK	0.20	mg/kg		164	----	----	----	----
Zinc	7440-66-6	E440/SK	2.0	mg/kg		36.3	----	----	----	----
Zirconium	7440-67-7	E440/SK	1.0	mg/kg		4.8	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B8036**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 04-Aug-2023 11:30
PO	: 5590012190	Date Analysis Commenced	: 09-Aug-2023
C-O-C number	: A0267	Issue Date	: 14-Aug-2023 14:35
Sampler	: AL 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1083622)											
VA23B8036-001	S-940 DH 5068	pH (1:2 soil:water)	----	E108	0.10	pH units	9.09	9.11	0.220%	10%	----
Organic / Inorganic Carbon (QC Lot: 1082458)											
SK2304029-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	36.9	35.3	4.51%	20%	----
Inorganics (QC Lot: 1082460)											
SK2304020-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1960 mg/kg	0.207	0.011	Diff <2x LOR	----
Metals (QC Lot: 1078717)											
VA23B8036-001	S-940 DH 5068	Aluminum	7429-90-5	E440	50	mg/kg	24600	24900	1.21%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.44	0.45	0.007	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	19.1	19.1	0.0827%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	74.3	71.2	4.20%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.57	0.58	0.008	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	15.1	15.7	0.5	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.058	0.058	0.0001	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	24900	25400	1.90%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	18.0	17.7	1.28%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	17.6	17.4	0.941%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	444	440	0.930%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	46400	46400	0.112%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	4.12	4.24	2.89%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	22.1	22.7	2.55%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	13200	12900	1.66%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	514	527	2.32%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	26.4	27.7	4.91%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	3.68	3.67	0.447%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1080	1180	8.17%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1660	1840	10.4%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	4.52	4.50	0.538%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.23	0.24	0.004	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1280	1260	2.03%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1078717) - continued											
VA23B8036-001	S-940 DH 5068	Strontium	7440-24-6	E440	0.50	mg/kg	161	165	2.75%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12300	13100	6.36%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1810	1790	1.12%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	1.70	1.73	0.02	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.903	0.994	9.64%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	164	164	0.443%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	36.3	36.5	0.512%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	4.8	4.9	0.1	Diff <2x LOR	----
Metals (QC Lot: 1078718)											
VA23B8036-001	S-940 DH 5068	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0508	0.0547	0.0040	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1082458)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1082460)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1078717)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1078717) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1078718)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1083622)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1082458)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.7	90.0	110	----
Inorganics (QCLot: 1082460)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.4	90.0	110	----
Metals (QCLot: 1078717)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	97.1	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.0	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	99.1	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	104	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	93.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	100	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	91.9	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	103	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	98.6	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.9	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.5	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.7	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1078717) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.9	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.2	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	106	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	108	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	109	80.0	120	----
Metals (QCLot: 1078718)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.5	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1083622)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	102	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1082458)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1082460)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	95.0	70.0	130	----
Metals (QCLot: 1078717)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	92.3	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	100	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	95.1	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	103	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	108	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	93.2	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	91.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	98.9	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.1	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	98.0	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	95.9	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	98.5	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	94.3	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	100.0	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	98.7	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	90.0	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	90.1	70.0	130	----
	RM	Silver	7440-22-4	E440	4.06 mg/kg	110	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	93.4	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1078717) - continued									
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	99.2	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	94.1	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	98.2	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	88.3	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	95.2	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	94.8	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	96.3	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	88.5	70.0	130	----
Metals (QCLot: 1078718)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	97.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: A0267

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Can Dang **Sampler:** Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-940 DH 5068	3-Aug-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23B8036

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

...by selecting from drop-down below ...only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				10	9		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Amanda Nicholson	Aug 3, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JC	AUG - 4 2023	11:30am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9653**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Aug-2023 11:20
PO	: 5590012190	Date Analysis Commenced	: 25-Aug-2023
C-O-C number	: D0116	Issue Date	: 30-Aug-2023 18:11
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	S-940 DH 1639	----	----	----	----
					Client sampling date / time	01-Jun-2023 00:00	----	----	----	----
					VA23B9653-001	--------	--------	--------	--------	
					Result	----	----	----	----	
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	0.10	pH units		8.84	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%		0.345	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	500	mg/kg		6960	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	50	mg/kg		14900	----	----	----	----
Antimony	7440-36-0	E440/SK	0.10	mg/kg		0.37	----	----	----	----
Arsenic	7440-38-2	E440/SK	0.10	mg/kg		10.6	----	----	----	----
Barium	7440-39-3	E440/SK	0.50	mg/kg		99.4	----	----	----	----
Beryllium	7440-41-7	E440/SK	0.10	mg/kg		0.69	----	----	----	----
Bismuth	7440-69-9	E440/SK	0.20	mg/kg		0.23	----	----	----	----
Boron	7440-42-8	E440/SK	5.0	mg/kg		<5.0	----	----	----	----
Cadmium	7440-43-9	E440/SK	0.020	mg/kg		0.316	----	----	----	----
Calcium	7440-70-2	E440/SK	50	mg/kg		22300	----	----	----	----
Chromium	7440-47-3	E440/SK	0.50	mg/kg		11.5	----	----	----	----
Cobalt	7440-48-4	E440/SK	0.10	mg/kg		19.7	----	----	----	----
Copper	7440-50-8	E440/SK	0.50	mg/kg		10200	----	----	----	----
Iron	7439-89-6	E440/SK	50	mg/kg		76800	----	----	----	----
Lead	7439-92-1	E440/SK	0.50	mg/kg		5.92	----	----	----	----
Lithium	7439-93-2	E440/SK	2.0	mg/kg		9.5	----	----	----	----
Magnesium	7439-95-4	E440/SK	20	mg/kg		8110	----	----	----	----
Manganese	7439-96-5	E440/SK	1.0	mg/kg		432	----	----	----	----
Mercury	7439-97-6	E510/SK	0.0500	mg/kg		0.533	----	----	----	----
Molybdenum	7439-98-7	E440/SK	0.10	mg/kg		2.89	----	----	----	----
Nickel	7440-02-0	E440/SK	0.50	mg/kg		4.66	----	----	----	----
Phosphorus	7723-14-0	E440/SK	50	mg/kg		1200	----	----	----	----
Potassium	7440-09-7	E440/SK	100	mg/kg		1830	----	----	----	----
Selenium	7782-49-2	E440/SK	0.20	mg/kg		9.53	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-940 DH 1639	----	----	----	----
					Client sampling date / time	01-Jun-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9653-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	0.10	mg/kg		1.74	----	----	----	----
Sodium	7440-23-5	E440/SK	50	mg/kg		1070	----	----	----	----
Strontium	7440-24-6	E440/SK	0.50	mg/kg		75.5	----	----	----	----
Sulfur	7704-34-9	E440/SK	1000	mg/kg		8200	----	----	----	----
Thallium	7440-28-0	E440/SK	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	2.0	mg/kg		2.3	----	----	----	----
Titanium	7440-32-6	E440/SK	1.0	mg/kg		1530	----	----	----	----
Tungsten	7440-33-7	E440/SK	0.50	mg/kg		0.63	----	----	----	----
Uranium	7440-61-1	E440/SK	0.050	mg/kg		1.20	----	----	----	----
Vanadium	7440-62-2	E440/SK	0.20	mg/kg		206	----	----	----	----
Zinc	7440-66-6	E440/SK	2.0	mg/kg		73.9	----	----	----	----
Zirconium	7440-67-7	E440/SK	1.0	mg/kg		6.0	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL REPORT

Work Order	: **VA23B9653**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Aug-2023 11:20
PO	: 5590012190	Date Analysis Commenced	: 25-Aug-2023
C-O-C number	: D0116	Issue Date	: 30-Aug-2023 18:11
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Saskatoon Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1105569)											
VA23B9849-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.90	6.94	0.578%	10%	----
Organic / Inorganic Carbon (QC Lot: 1105841)											
VA23B9653-001	S-940 DH 1639	Carbon, total [TC]	----	E351	0.050	%	0.345	0.339	0.006	Diff <2x LOR	----
Inorganics (QC Lot: 1105842)											
VA23B9653-001	S-940 DH 1639	Sulfur, total	7704-34-9	E399	0.050	%	6960 mg/kg	0.711	2.13%	20%	----
Metals (QC Lot: 1107287)											
VA23B9653-001	S-940 DH 1639	Aluminum	7429-90-5	E440	50	mg/kg	14900	15200	1.91%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.37	0.38	0.01	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	10.6	10.9	2.73%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	99.4	100	0.966%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.69	0.73	4.72%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.23	0.24	0.006	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	5.2	0.2	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.316	0.319	0.819%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	22300	22800	2.38%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	11.5	12.1	5.18%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	19.7	19.8	0.757%	30%	----
		Copper	7440-50-8	E440	1.89	mg/kg	10200	9930	2.66%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	76800	80700	4.99%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	5.92	6.10	3.09%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	9.5	10.1	0.7	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	8110	7840	3.45%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	432	441	2.18%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	2.89	2.90	0.512%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	4.66	4.73	1.68%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1200	1190	1.35%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1830	1920	4.71%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	9.53	9.80	2.85%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	1.74	1.75	0.462%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	1070	1020	4.82%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1107287) - continued											
VA23B9653-001	S-940 DH 1639	Strontium	7440-24-6	E440	0.50	mg/kg	75.5	73.0	3.39%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	8200	8900	7.98%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	2.3	2.3	0.06	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1530	1580	3.48%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.63	0.68	0.05	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.20	1.23	2.41%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	206	208	1.16%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	73.9	75.2	1.63%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.0	6.1	0.1	Diff <2x LOR	----
Metals (QC Lot: 1107288)											
VA23B9653-001	S-940 DH 1639	Mercury	7439-97-6	E510	0.0500	mg/kg	0.533	0.505	5.40%	40%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1105841)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1105842)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1107287)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1107287) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1107288)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1105569)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1105841)									
Carbon, total [TC]	----	E351	0.05	%	48 %	101	90.0	110	----
Inorganics (QCLot: 1105842)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	101	90.0	110	----
Metals (QCLot: 1107287)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.7	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	103	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	104	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	106	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.1	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	108	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	106	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.9	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	94.1	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	110	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1107287) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	100	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	107	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	105	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.6	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	106	80.0	120	----
Metals (QCLot: 1107288)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1105569)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	99.1	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1105841)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.1	80.0	120	----
Inorganics (QCLot: 1105842)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1107287)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	103	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	99.3	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	113	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	119	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	100	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	126	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	101	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	101	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	104	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	106	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	107	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	110	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
	RM	Silver	7440-22-4	E440	4.06 mg/kg	84.9	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1107287) - continued									
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	102	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	91.0	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	109	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	101	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	96.2	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	100	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	102	70.0	130	----
Metals (QCLot: 1107288)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	98.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0116

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Environmental Division
Vancouver
Work Order Reference
VA23B9653

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minim
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minin
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim
Street:	PO BOX 12	Email 1 or Fax On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim
City/Province:	Likely, BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge
Postal Code:	V0L 1N0	Email 3	Additional fees may apply to rush requests on weekend
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	Date and Time Required for all E&P TATs:
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please c
Company:		Email 1 or Fax On File	Analysis Req
Contact:	On File	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	9653	ALS Contact: Can Dang	Sampler: Assay lab

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below: ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-940 DH 1639	1-Jun-23		Sediment/Soil	1	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Aug 22, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: VP	Date: 8/23/23	Time: 11:20 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0878**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0118	Issue Date	: 15-Sep-2023 13:52
Sampler	: DS		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	S-940 DH 1282	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
					VA23C0878-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	0.10	pH units		9.13 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%		0.271	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	500	mg/kg		1660	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	50	mg/kg		27500	----	----	----	----
Antimony	7440-36-0	E440/SK	0.10	mg/kg		0.57	----	----	----	----
Arsenic	7440-38-2	E440/SK	0.10	mg/kg		6.66	----	----	----	----
Barium	7440-39-3	E440/SK	0.50	mg/kg		465	----	----	----	----
Beryllium	7440-41-7	E440/SK	0.10	mg/kg		1.03	----	----	----	----
Bismuth	7440-69-9	E440/SK	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	5.0	mg/kg		<5.0	----	----	----	----
Cadmium	7440-43-9	E440/SK	0.020	mg/kg		0.050	----	----	----	----
Calcium	7440-70-2	E440/SK	50	mg/kg		20800	----	----	----	----
Chromium	7440-47-3	E440/SK	0.50	mg/kg		102	----	----	----	----
Cobalt	7440-48-4	E440/SK	0.10	mg/kg		30.4	----	----	----	----
Copper	7440-50-8	E440/SK	0.50	mg/kg		431	----	----	----	----
Iron	7439-89-6	E440/SK	50	mg/kg		46800	----	----	----	----
Lead	7439-92-1	E440/SK	0.50	mg/kg		3.68	----	----	----	----
Lithium	7439-93-2	E440/SK	2.0	mg/kg		25.5	----	----	----	----
Magnesium	7439-95-4	E440/SK	20	mg/kg		44700	----	----	----	----
Manganese	7439-96-5	E440/SK	1.0	mg/kg		726	----	----	----	----
Mercury	7439-97-6	E510/SK	0.0500	mg/kg		<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440/SK	0.10	mg/kg		1.26	----	----	----	----
Nickel	7440-02-0	E440/SK	0.50	mg/kg		273	----	----	----	----
Phosphorus	7723-14-0	E440/SK	50	mg/kg		1600	----	----	----	----
Potassium	7440-09-7	E440/SK	100	mg/kg		1730	----	----	----	----
Selenium	7782-49-2	E440/SK	0.20	mg/kg		1.02	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-940 DH 1282	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0878-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	0.10	mg/kg		0.11	----	----	----	----
Sodium	7440-23-5	E440/SK	50	mg/kg		695	----	----	----	----
Strontium	7440-24-6	E440/SK	0.50	mg/kg		239	----	----	----	----
Sulfur	7704-34-9	E440/SK	1000	mg/kg		<1000	----	----	----	----
Thallium	7440-28-0	E440/SK	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	1.0	mg/kg		2670	----	----	----	----
Tungsten	7440-33-7	E440/SK	0.50	mg/kg		<0.50	----	----	----	----
Uranium	7440-61-1	E440/SK	0.050	mg/kg		0.665	----	----	----	----
Vanadium	7440-62-2	E440/SK	0.20	mg/kg		136	----	----	----	----
Zinc	7440-66-6	E440/SK	2.0	mg/kg		53.4	----	----	----	----
Zirconium	7440-67-7	E440/SK	1.0	mg/kg		11.6	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0878**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0118	Issue Date	: 15-Sep-2023 13:39
Sampler	: DS 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0118

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): C0878

ALS Contact: Can Dang **Sampler:** Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (TLECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-940 DH 1282	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0878

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				10			

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: JC	Date: SEP 0 6 2023	Time: 815am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0882**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0119	Issue Date	: 15-Sep-2023 13:37
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: S-940 DH 1502	----	----	----	----
						Client sampling date / time: 05-Sep-2023 00:00	----	----	----	----
						VA23C0882-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units	9.50 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.134	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	3070	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	A	50	mg/kg	16000	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg	0.26	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg	8.08	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg	351	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg	0.67	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg	0.23	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg	6.4	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg	0.174	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg	18500	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg	21.9	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg	20.3	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg	4880	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg	71000	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg	4.51	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg	8.7	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg	7350	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg	426	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg	<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg	3.47	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg	5.33	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg	1220	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg	1840	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg	5.24	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-940 DH 1502	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0882-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.92	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	752	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	149	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	3600	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1640	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	<0.50	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	0.812	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	289	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	50.3	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	6.1	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0882**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0119	Issue Date	: 15-Sep-2023 13:45
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0119

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): C0882

ALS Contact: Can Dang Sampler: Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-940 DH 1502	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0882

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							10

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Dave Stanley	Sept. 5, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JC	SEP 0 6 2023	815

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0883**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0120	Issue Date	: 15-Sep-2023 13:46
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: S-940 DH 1257	----	----	----	----
						Client sampling date / time: 05-Sep-2023 00:00	----	----	----	----
						VA23C0883-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units	9.45 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.291	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	1220	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	A	50	mg/kg	17000	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg	0.29	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg	5.44	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg	258	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg	0.62	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg	<5.0	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg	0.164	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg	17800	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg	45.6	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg	11.2	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg	534	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg	23600	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg	5.97	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg	10.0	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg	15900	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg	368	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg	0.0545	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg	2.94	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg	76.1	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg	905	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg	1330	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg	0.58	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-940 DH 1257	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0883-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.15	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	994	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	125	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	<1000	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1370	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	<0.50	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	0.422	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	79.8	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	49.3	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	6.7	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0883**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0120	Issue Date	: 15-Sep-2023 13:37
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	S-940 DH 1257	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	S-940 DH 1257	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0120

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): C0883

ALS Contact: Can Dang Sampler: Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (tLECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-940 DH 1257	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0883

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					10		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Dave Stanley	Sept. 5, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JL	SEP 0 6 2023	815am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0885**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0121	Issue Date	: 15-Sep-2023 13:46
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: Soil
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID	S-976 DH 4319	----	----	----	----
						Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
							VA23C0885-001	--------	--------	--------	--------
							Result	----	----	----	----
Physical Tests											
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units		9.50 FR5	----	----	----	----
Organic / Inorganic Carbon											
Carbon, total [TC]	----	E351/SK	A	0.050	%		0.380	----	----	----	----
Inorganics											
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg		1260	----	----	----	----
Metals											
Aluminum	7429-90-5	E440/SK	A	50	mg/kg		24600	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg		0.70	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg		15.4	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg		179	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg		0.56	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg		14.3	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg		0.771	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg		32900	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg		19.1	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg		13.7	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg		409	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg		36100	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg		14.0	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg		44.0	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg		8020	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg		1530	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg		<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg		33.6	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg		4.82	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg		1120	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg		2030	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg		0.58	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-976 DH 4319	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0885-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.70	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	5460	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	384	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	1000	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1530	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	2.50	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	0.953	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	122	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	255	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	15.8	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL REPORT

Work Order	: **VA23C0885**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0121	Issue Date	: 15-Sep-2023 13:50
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0121

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ ~~Same day [E2] if received by 10am M-S - 200% rush surcharge.~~

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): C0885

ALS Contact: Can Dang **Sampler:** Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-976 DH 4319	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division Vancouver

Work Order Reference

VA23C0885

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							10

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: SEP 0 6 2023	Time: 8150am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0887**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0122	Issue Date	: 15-Sep-2023 13:38
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: S-976 DH 7092	----	----	----	----
						Client sampling date / time: 05-Sep-2023 00:00	----	----	----	----
						VA23C0887-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units	9.42 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.144	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	690	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	A	50	mg/kg	22000	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg	1.42	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg	13.0	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg	216	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg	0.72	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg	10.0	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg	0.253	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg	21500	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg	17.7	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg	14.1	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg	473	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg	28600	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg	5.56	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg	18.7	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg	12400	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg	1100	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg	0.0504	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg	1.53	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg	6.99	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg	1320	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg	1110	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg	0.28	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-976 DH 7092	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0887-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.17	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	476	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	452	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	<1000	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1080	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	0.75	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	0.978	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	114	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	70.5	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	7.6	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0887**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0122	Issue Date	: 15-Sep-2023 13:46
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0122

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	PO BOX 12	Email 1 or Fax On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Likely, BC	Email 2	☐ ~~Same day [E2] if received by 10am M-S - 200% rush surcharge.~~
Postal Code:	V0L 1N0	Email 3	Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Recipients**	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.
Company:		Email 1 or Fax On File	
Contact:	On File	Email 2	

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only): C0887 **ALS Contact:** Can Dang **Sampler:** Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-976 DH 7092	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0887

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				10			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: SEP 0 6 2023	Time: 815 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0888**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0123	Issue Date	: 15-Sep-2023 13:46
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: S-976 DH 5128	----	----	----	----
						Client sampling date / time: 05-Sep-2023 00:00	----	----	----	----
						VA23C0888-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units	9.56 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.499	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	1010	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	A	50	mg/kg	21000	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg	0.88	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg	15.9	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg	148	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg	0.57	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg	13.4	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg	0.750	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg	35900	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg	23.6	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg	13.2	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg	388	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg	35700	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg	14.5	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg	39.5	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg	8400	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg	1570	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg	<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg	48.4	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg	4.31	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg	1110	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg	1690	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg	0.49	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-976 DH 5128	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0888-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.80	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	3520	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	375	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	<1000	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1560	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	2.60	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	1.01	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	118	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	225	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	15.6	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0888**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0123	Issue Date	: 15-Sep-2023 13:38
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0123

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ ~~Same day [E2] if received by 10am M-S - 200% rush surcharge.~~

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): C0888

ALS Contact: Can Dang **Sampler:** Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-976 DH 5128	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0888

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				10			

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: JC	Date: SEP 0 6 2023	Time: 815am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0889**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0124	Issue Date	: 15-Sep-2023 13:38
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: S-976 DH 7117	----	----	----	----
						Client sampling date / time: 05-Sep-2023 00:00	----	----	----	----
						VA23C0889-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units	9.17 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.196	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	1710	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	A	50	mg/kg	19300	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg	0.58	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg	13.4	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg	87.2	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg	0.76	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg	12.1	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg	0.833	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg	25200	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg	10.8	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg	10.2	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg	908	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg	45900	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg	16.4	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg	18.1	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg	6480	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg	932	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg	<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg	16.2	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg	2.41	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg	1080	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg	2280	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg	1.08	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-976 DH 7117	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0889-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.81	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	734	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	439	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	1800	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1210	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	1.95	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	0.978	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	104	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	152	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	11.8	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0889**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0124	Issue Date	: 15-Sep-2023 13:51
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0124

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

- ☑ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): C0889

ALS Contact: Can Dang Sampler: Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-976 DH 7117	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0889

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					10		

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: JC	Date: SEP 0 6 2023	Time: 815am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0890**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0125	Issue Date	: 15-Sep-2023 13:39
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID	S-988 DH 4655	----	----	----	----
						Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
						VA23C0890-001	--------	--------	--------	--------	--------
						Result	----	----	----	----	----
Physical Tests											
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units		9.30 FR5	----	----	----	----
Organic / Inorganic Carbon											
Carbon, total [TC]	----	E351/SK	A	0.050	%		1.02	----	----	----	----
Inorganics											
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg		800	----	----	----	----
Metals											
Aluminum	7429-90-5	E440/SK	A	50	mg/kg		6880	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg		0.43	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg		6.82	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg		353	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg		0.54	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg		<5.0	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg		0.062	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg		35000	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg		31.7	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg		11.7	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg		906	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg		25100	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg		2.60	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg		6.5	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg		6200	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg		312	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg		<0.0500	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg		8.34	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg		3.73	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg		1080	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg		2750	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg		0.57	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-988 DH 4655	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0890-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.12	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	459	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	54.2	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	<1000	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1030	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	1.36	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	0.927	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	265	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	23.2	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	6.8	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0890**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0125	Issue Date	: 15-Sep-2023 13:51
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0125

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): Co890

ALS Contact: Can Dang Sampler: Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water	Total Carbon (LECO)	Total Sulphur (LECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-988 DH 4655	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0890

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
					10

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: JC	Date: SEP 06 2023	Time: 815am

SEP 06 2023

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0893**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0126	Issue Date	: 15-Sep-2023 13:51
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: S-928 DH 5055	----	----	----	----
						Client sampling date / time: 05-Sep-2023 00:00	----	----	----	----
						VA23C0893-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	A	0.10	pH units	9.27 FR5	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.435	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	11800	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/SK	A	50	mg/kg	19700	----	----	----	----
Antimony	7440-36-0	E440/SK	A	0.10	mg/kg	0.61	----	----	----	----
Arsenic	7440-38-2	E440/SK	A	0.10	mg/kg	20.6	----	----	----	----
Barium	7440-39-3	E440/SK	A	0.50	mg/kg	130	----	----	----	----
Beryllium	7440-41-7	E440/SK	A	0.10	mg/kg	0.72	----	----	----	----
Bismuth	7440-69-9	E440/SK	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/SK	A	5.0	mg/kg	6.2	----	----	----	----
Cadmium	7440-43-9	E440/SK	A	0.020	mg/kg	0.137	----	----	----	----
Calcium	7440-70-2	E440/SK	A	50	mg/kg	25700	----	----	----	----
Chromium	7440-47-3	E440/SK	A	0.50	mg/kg	30.7	----	----	----	----
Cobalt	7440-48-4	E440/SK	A	0.10	mg/kg	17.1	----	----	----	----
Copper	7440-50-8	E440/SK	A	0.50	mg/kg	923	----	----	----	----
Iron	7439-89-6	E440/SK	A	50	mg/kg	46800	----	----	----	----
Lead	7439-92-1	E440/SK	A	0.50	mg/kg	5.02	----	----	----	----
Lithium	7439-93-2	E440/SK	A	2.0	mg/kg	15.1	----	----	----	----
Magnesium	7439-95-4	E440/SK	A	20	mg/kg	13000	----	----	----	----
Manganese	7439-96-5	E440/SK	A	1.0	mg/kg	509	----	----	----	----
Mercury	7439-97-6	E510/SK	A	0.0500	mg/kg	0.0601	----	----	----	----
Molybdenum	7439-98-7	E440/SK	A	0.10	mg/kg	16.4	----	----	----	----
Nickel	7440-02-0	E440/SK	A	0.50	mg/kg	25.4	----	----	----	----
Phosphorus	7723-14-0	E440/SK	A	50	mg/kg	1420	----	----	----	----
Potassium	7440-09-7	E440/SK	A	100	mg/kg	1410	----	----	----	----
Selenium	7782-49-2	E440/SK	A	0.20	mg/kg	6.05	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	S-928 DH 5055	----	----	----	----
					Client sampling date / time	05-Sep-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0893-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/SK	A	0.10	mg/kg	0.49	----	----	----	----
Sodium	7440-23-5	E440/SK	A	50	mg/kg	2050	----	----	----	----
Strontium	7440-24-6	E440/SK	A	0.50	mg/kg	494	----	----	----	----
Sulfur	7704-34-9	E440/SK	A	1000	mg/kg	15900	----	----	----	----
Thallium	7440-28-0	E440/SK	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/SK	A	1.0	mg/kg	1710	----	----	----	----
Tungsten	7440-33-7	E440/SK	A	0.50	mg/kg	1.15	----	----	----	----
Uranium	7440-61-1	E440/SK	A	0.050	mg/kg	1.04	----	----	----	----
Vanadium	7440-62-2	E440/SK	A	0.20	mg/kg	154	----	----	----	----
Zinc	7440-66-6	E440/SK	A	2.0	mg/kg	45.7	----	----	----	----
Zirconium	7440-67-7	E440/SK	A	1.0	mg/kg	7.3	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C0893**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 06-Sep-2023 08:15
PO	: 5590012190	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: D0126	Issue Date	: 15-Sep-2023 13:39
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Maria Painchaud	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1128403)											
CG2311777-036	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.07	0.330%	10%	----
Organic / Inorganic Carbon (QC Lot: 1126160)											
VA23C0883-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.291	0.312	0.021	Diff <2x LOR	----
Inorganics (QC Lot: 1126161)											
VA23C0883-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	1220 mg/kg	0.097	0.025	Diff <2x LOR	----
Metals (QC Lot: 1127881)											
RG2301441-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0461	0.0466	0.957%	40%	----
Metals (QC Lot: 1127882)											
RG2301441-002	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	11900	11800	0.145%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.59	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	9.64	9.08	5.98%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	197	8.71%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.84	0.474%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.25	0.26	0.009	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	25.9	26.7	0.8	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.457	0.433	5.38%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	10400	10100	3.35%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.6	27.0	5.27%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.1	11.0	1.03%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	22.3	22.6	1.36%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22200	21200	4.82%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.9	13.2	2.19%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.2	3.13%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6870	6730	2.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1010	985	2.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.89	1.94	2.29%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	33.0	33.3	0.804%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	658	653	0.823%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2390	2400	0.473%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.58	0.02	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1127882) - continued											
RG2301441-002	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	172	172	0.2	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.6	46.5	4.06%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.347	0.345	0.514%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	67.8	78.8	14.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.48	1.50	1.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	48.4	48.1	0.619%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	87.0	87.4	0.548%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.1	6.5	0.4	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1126160)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1126161)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1127881)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1127882)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1127882) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1128403)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1126160)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.6	90.0	110	----
Inorganics (QCLot: 1126161)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.9	90.0	110	----
Metals (QCLot: 1127881)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 1127882)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.2	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	90.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Reference Material (RM) Report									
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Physical Tests (QCLot: 1128403)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	101	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1126160)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Inorganics (QCLot: 1126161)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1127881)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100.0	70.0	130	----
Metals (QCLot: 1127882)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	93.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	96.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	91.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.0	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	97.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	92.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.0	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	95.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.4	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.2	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	97.9	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	94.6	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	93.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.2	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	94.4	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	93.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1127882) - continued									
	RM	Silver	7440-22-4	E440	4.06 mg/kg	93.0	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	91.2	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.1	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	92.2	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	98.3	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	94.7	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0126

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): CO 893

ALS Contact: Can Dang Sampler: Assay lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water	Total Carbon (LECO)	Total Sulphur (LECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-928 DH 5055	5-Sep-23		Sediment/Soil	1	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23C0893

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				10			

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: Sept. 5, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: JC	Date: SEP 0 6 2023	Time: 9:15 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C7563**	Page	: 1 of 8
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Nov-2023 11:05
PO	: 5590012190	Date Analysis Commenced	: 18-Nov-2023
C-O-C number	: D0165	Issue Date	: 22-Nov-2023 17:19
Sampler	: Assay Lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Jeremy Greuel	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	S-952 DH 3301	S-952 DH 4526	S-952 DH 5182	S-964 DH 4355	S-964 DH 4294
					Client sampling date / time	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00
						VA23C7563-001	VA23C7563-002	VA23C7563-003	VA23C7563-004	VA23C7563-005
						Result	Result	Result	Result	Result
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	0.10	pH units		9.15	9.51	9.46	9.66	9.16
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%		0.432	0.300	0.411	0.236	0.249
Inorganics										
Sulfur, total	7704-34-9	E399/SK	500	mg/kg		8390	1120	1050	720	3960
Metals										
Aluminum	7429-90-5	E440/SK	50	mg/kg		17500	7700	13700	7340	18100
Antimony	7440-36-0	E440/SK	0.10	mg/kg		0.69	0.30	0.33	0.34	0.37
Arsenic	7440-38-2	E440/SK	0.10	mg/kg		20.3	5.72	6.84	8.28	11.6
Barium	7440-39-3	E440/SK	0.50	mg/kg		142	236	427	253	97.5
Beryllium	7440-41-7	E440/SK	0.10	mg/kg		0.57	0.48	0.42	0.71	0.97
Bismuth	7440-69-9	E440/SK	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Boron	7440-42-8	E440/SK	5.0	mg/kg		8.1	7.9	6.9	48.8	7.9
Cadmium	7440-43-9	E440/SK	0.020	mg/kg		0.344	0.358	0.212	0.065	0.134
Calcium	7440-70-2	E440/SK	50	mg/kg		24500	14900	22700	13500	20100
Chromium	7440-47-3	E440/SK	0.50	mg/kg		17.8	37.9	65.9	42.9	20.0
Cobalt	7440-48-4	E440/SK	0.10	mg/kg		20.2	3.97	14.5	7.88	16.8
Copper	7440-50-8	E440/SK	0.50	mg/kg		906	65.9	971	336	772
Iron	7439-89-6	E440/SK	50	mg/kg		45000	9430	36700	24100	41300
Lead	7439-92-1	E440/SK	0.50	mg/kg		11.3	12.8	5.00	4.15	5.51
Lithium	7439-93-2	E440/SK	2.0	mg/kg		27.2	6.5	11.2	5.0	12.4
Magnesium	7439-95-4	E440/SK	20	mg/kg		9790	2810	9170	4700	7980
Manganese	7439-96-5	E440/SK	1.0	mg/kg		1150	1070	603	411	418
Mercury	7439-97-6	E510/SK	0.0500	mg/kg		0.0652	<0.0500	<0.0500	<0.0500	0.186
Molybdenum	7439-98-7	E440/SK	0.10	mg/kg		34.8	250	1.94	3.65	7.28
Nickel	7440-02-0	E440/SK	0.50	mg/kg		4.51	3.41	16.5	9.53	2.33
Phosphorus	7723-14-0	E440/SK	50	mg/kg		1150	519	1130	633	1000
Potassium	7440-09-7	E440/SK	100	mg/kg		3120	2490	2100	1670	2510
Selenium	7782-49-2	E440/SK	0.20	mg/kg		2.84	0.40	0.52	0.26	4.68

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	S-952 DH 3301	S-952 DH 4526	S-952 DH 5182	S-964 DH 4355	S-964 DH 4294
					Client sampling date / time	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00
						VA23C7563-001	VA23C7563-002	VA23C7563-003	VA23C7563-004	VA23C7563-005
						Result	Result	Result	Result	Result
Metals										
Silver	7440-22-4	E440/SK	0.10	mg/kg		0.73	0.23	0.22	0.12	0.28
Sodium	7440-23-5	E440/SK	50	mg/kg		1340	712	1070	1080	1170
Strontium	7440-24-6	E440/SK	0.50	mg/kg		467	103	70.9	32.3	115
Sulfur	7704-34-9	E440/SK	1000	mg/kg		9500	<1000	<1000	<1000	4200
Thallium	7440-28-0	E440/SK	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/SK	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	7440-32-6	E440/SK	1.0	mg/kg		1820	844	1340	1220	1070
Tungsten	7440-33-7	E440/SK	0.50	mg/kg		1.16	1.20	0.96	1.01	0.92
Uranium	7440-61-1	E440/SK	0.050	mg/kg		1.23	1.05	0.487	0.846	0.933
Vanadium	7440-62-2	E440/SK	0.20	mg/kg		142	43.6	143	106	139
Zinc	7440-66-6	E440/SK	2.0	mg/kg		99.7	86.5	74.3	38.3	35.6
Zirconium	7440-67-7	E440/SK	1.0	mg/kg		11.6	6.3	8.4	17.4	7.5

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	S-964 DH 7154	S-964 DH 4348	S-964 DH 5359	S-964 DH 3144	S-916 DH 1575
					Client sampling date / time	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00
						VA23C7563-006	VA23C7563-007	VA23C7563-008	VA23C7563-010	VA23C7563-011
						Result	Result	Result	Result	Result
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	0.10	pH units		8.93	9.78	9.72	8.95	8.66
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%		0.286	0.758	0.558	0.199	0.991
Inorganics										
Sulfur, total	7704-34-9	E399/SK	500	mg/kg		3820	770	670	4920	1150
Metals										
Aluminum	7429-90-5	E440/SK	50	mg/kg		28600	12600	8700	36600	26200
Antimony	7440-36-0	E440/SK	0.10	mg/kg		0.41	0.61	0.36	0.59	2.65
Arsenic	7440-38-2	E440/SK	0.10	mg/kg		16.5	6.11	7.24	21.3	6.69
Barium	7440-39-3	E440/SK	0.50	mg/kg		122	503	553	112	421
Beryllium	7440-41-7	E440/SK	0.10	mg/kg		0.87	0.60	0.68	0.97	1.39
Bismuth	7440-69-9	E440/SK	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Boron	7440-42-8	E440/SK	5.0	mg/kg		13.8	11.5	39.5	13.3	5.5
Cadmium	7440-43-9	E440/SK	0.020	mg/kg		0.416	0.037	0.043	0.535	0.089
Calcium	7440-70-2	E440/SK	50	mg/kg		33000	41300	30100	47000	65300
Chromium	7440-47-3	E440/SK	0.50	mg/kg		34.7	101	73.5	25.7	327
Cobalt	7440-48-4	E440/SK	0.10	mg/kg		15.8	11.8	8.38	25.6	44.6
Copper	7440-50-8	E440/SK	0.50	mg/kg		979	478	254	744	893
Iron	7439-89-6	E440/SK	50	mg/kg		61800	33000	28700	63800	66300
Lead	7439-92-1	E440/SK	0.50	mg/kg		8.32	1.96	2.35	15.9	5.86
Lithium	7439-93-2	E440/SK	2.0	mg/kg		21.7	4.1	3.2	35.0	37.3
Magnesium	7439-95-4	E440/SK	20	mg/kg		7830	7330	5900	14700	62800
Manganese	7439-96-5	E440/SK	1.0	mg/kg		847	571	656	1330	903
Mercury	7439-97-6	E510/SK	0.0500	mg/kg		0.118	0.0585	<0.0500	0.151	0.0583
Molybdenum	7439-98-7	E440/SK	0.10	mg/kg		13.5	2.94	6.04	43.0	1.63
Nickel	7440-02-0	E440/SK	0.50	mg/kg		4.23	5.48	6.07	14.2	347
Phosphorus	7723-14-0	E440/SK	50	mg/kg		1230	691	624	2270	2480
Potassium	7440-09-7	E440/SK	100	mg/kg		3090	3850	3160	4700	2510
Selenium	7782-49-2	E440/SK	0.20	mg/kg		1.48	0.55	<0.20	4.20	1.04
Silver	7440-22-4	E440/SK	0.10	mg/kg		0.58	0.14	0.10	0.57	0.25

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-964 DH 7154	S-964 DH 4348	S-964 DH 5359	S-964 DH 3144	S-916 DH 1575
					Client sampling date / time	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00	14-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7563-006	VA23C7563-007	VA23C7563-008	VA23C7563-010	VA23C7563-011
						Result	Result	Result	Result	Result
Metals										
Sodium	7440-23-5	E440/SK	50	mg/kg		2240	3260	2230	10000	1110
Strontium	7440-24-6	E440/SK	0.50	mg/kg		495	67.5	57.0	981	215
Sulfur	7704-34-9	E440/SK	1000	mg/kg		3900	<1000	<1000	9200	<1000
Thallium	7440-28-0	E440/SK	0.050	mg/kg		<0.050	<0.050	<0.050	0.063	<0.050
Tin	7440-31-5	E440/SK	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	7440-32-6	E440/SK	1.0	mg/kg		1900	420	818	1590	2610
Tungsten	7440-33-7	E440/SK	0.50	mg/kg		0.95	7.28	2.34	1.62	0.89
Uranium	7440-61-1	E440/SK	0.050	mg/kg		0.997	0.956	1.11	1.60	1.23
Vanadium	7440-62-2	E440/SK	0.20	mg/kg		201	142	120	260	212
Zinc	7440-66-6	E440/SK	2.0	mg/kg		87.0	30.8	38.2	150	72.1
Zirconium	7440-67-7	E440/SK	1.0	mg/kg		12.2	16.2	22.0	13.2	14.9

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-964 DH 2267	----	----	----	----
					Client sampling date / time	14-Nov-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C7563-012	--------	--------	--------	--------	
					Result	----	----	----	----	
Physical Tests										
pH (1:2 soil:water)	----	E108/SK	0.10	pH units	9.38	----	----	----	----	
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%	0.352	----	----	----	----	
Inorganics										
Sulfur, total	7704-34-9	E399/SK	500	mg/kg	1000	----	----	----	----	
Metals										
Aluminum	7429-90-5	E440/SK	50	mg/kg	32400	----	----	----	----	
Antimony	7440-36-0	E440/SK	0.10	mg/kg	0.66	----	----	----	----	
Arsenic	7440-38-2	E440/SK	0.10	mg/kg	21.7	----	----	----	----	
Barium	7440-39-3	E440/SK	0.50	mg/kg	407	----	----	----	----	
Beryllium	7440-41-7	E440/SK	0.10	mg/kg	1.20	----	----	----	----	
Bismuth	7440-69-9	E440/SK	0.20	mg/kg	<0.20	----	----	----	----	
Boron	7440-42-8	E440/SK	5.0	mg/kg	11.7	----	----	----	----	
Cadmium	7440-43-9	E440/SK	0.020	mg/kg	0.063	----	----	----	----	
Calcium	7440-70-2	E440/SK	50	mg/kg	39300	----	----	----	----	
Chromium	7440-47-3	E440/SK	0.50	mg/kg	69.0	----	----	----	----	
Cobalt	7440-48-4	E440/SK	0.10	mg/kg	26.8	----	----	----	----	
Copper	7440-50-8	E440/SK	0.50	mg/kg	1390	----	----	----	----	
Iron	7439-89-6	E440/SK	50	mg/kg	90500	----	----	----	----	
Lead	7439-92-1	E440/SK	0.50	mg/kg	4.25	----	----	----	----	
Lithium	7439-93-2	E440/SK	2.0	mg/kg	25.6	----	----	----	----	
Magnesium	7439-95-4	E440/SK	20	mg/kg	16400	----	----	----	----	
Manganese	7439-96-5	E440/SK	1.0	mg/kg	550	----	----	----	----	
Mercury	7439-97-6	E510/SK	0.0500	mg/kg	0.0747	----	----	----	----	
Molybdenum	7439-98-7	E440/SK	0.10	mg/kg	4.12	----	----	----	----	
Nickel	7440-02-0	E440/SK	0.50	mg/kg	9.85	----	----	----	----	
Phosphorus	7723-14-0	E440/SK	50	mg/kg	2080	----	----	----	----	
Potassium	7440-09-7	E440/SK	100	mg/kg	4790	----	----	----	----	
Selenium	7782-49-2	E440/SK	0.20	mg/kg	1.01	----	----	----	----	
Silver	7440-22-4	E440/SK	0.10	mg/kg	0.26	----	----	----	----	

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	S-964 DH 2267	----	----	----	----
					Client sampling date / time	14-Nov-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7563-012	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440/SK	50	mg/kg		6370	----	----	----	----
Strontium	7440-24-6	E440/SK	0.50	mg/kg		195	----	----	----	----
Sulfur	7704-34-9	E440/SK	1000	mg/kg		<1000	----	----	----	----
Thallium	7440-28-0	E440/SK	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440/SK	2.0	mg/kg		3.1	----	----	----	----
Titanium	7440-32-6	E440/SK	1.0	mg/kg		1860	----	----	----	----
Tungsten	7440-33-7	E440/SK	0.50	mg/kg		1.37	----	----	----	----
Uranium	7440-61-1	E440/SK	0.050	mg/kg		1.05	----	----	----	----
Vanadium	7440-62-2	E440/SK	0.20	mg/kg		467	----	----	----	----
Zinc	7440-66-6	E440/SK	2.0	mg/kg		37.8	----	----	----	----
Zirconium	7440-67-7	E440/SK	1.0	mg/kg		13.3	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23C7563**	Page	: 1 of 10
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Nov-2023 11:05
PO	: 5590012190	Date Analysis Commenced	: 18-Nov-2023
C-O-C number	: D0165	Issue Date	: 22-Nov-2023 17:19
Sampler	: Assay Lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Saskatoon Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Jeremy Greuel	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1245006)											
FJ2303044-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.84	8.86	0.226%	10%	----
Organic / Inorganic Carbon (QC Lot: 1246386)											
VA23C7563-001	S-952 DH 3301	Carbon, total [TC]	----	E351	0.050	%	0.432	0.434	0.002	Diff <2x LOR	----
Inorganics (QC Lot: 1246387)											
VA23C7563-001	S-952 DH 3301	Sulfur, total	7704-34-9	E399	0.050	%	8390 mg/kg	0.857	2.12%	20%	----
Metals (QC Lot: 1246064)											
SK2306578-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	4580	4240	7.61%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.23	0.23	0.0007	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	5.83	5.86	0.433%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	82.8	81.5	1.68%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.27	0.27	0.002	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.080	0.082	0.001	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	13800	14300	2.93%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	10.1	8.61	15.9%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	3.97	3.92	1.11%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	4.32	4.25	1.46%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	9040	8840	2.18%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	4.39	4.12	6.23%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	3.8	3.8	0.07	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	3650	3450	5.62%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	132	128	2.73%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.48	0.44	0.04	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	10.9	10.2	6.59%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	330	315	15	Diff <2x LOR	----
		Potassium	7440-09-7	E440	100	mg/kg	760	690	8.62%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	85	106	20	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1246064) - continued											
SK2306578-001	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	20.3	20.6	1.72%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.087	0.084	0.003	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	106	93.7	12.3%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.572	0.462	21.3%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	16.6	15.9	4.08%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	25.7	25.3	1.74%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.8	2.6	0.2	Diff <2x LOR	----
Metals (QC Lot: 1246065)											
SK2306578-001	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0082	0.0076	0.0006	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1246386)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1246387)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1246064)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1246064) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1246065)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1245006)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	101	97.0	103	----
Organic / Inorganic Carbon (QCLot: 1246386)									
Carbon, total [TC]	----	E351	0.05	%	48 %	102	90.0	110	----
Inorganics (QCLot: 1246387)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	101	90.0	110	----
Metals (QCLot: 1246064)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	112	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	106	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	104	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.0	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	106	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	104	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	110	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	98.7	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	105	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1246064) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	105	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
Metals (QCLot: 1246065)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.5	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 1245006)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	99.9	96.0	104	----
Organic / Inorganic Carbon (QCLot: 1246386)									
	RM	Carbon, total [TC]	----	E351	1.4 %	107	80.0	120	----
Inorganics (QCLot: 1246387)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	85.5	70.0	130	----
Metals (QCLot: 1246064)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	95.2	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	93.7	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	98.1	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.2	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	98.9	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	108	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	90.8	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	97.1	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	97.9	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	98.1	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	96.1	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	94.1	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	97.4	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	96.2	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	116	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	97.6	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
	RM	Silver	7440-22-4	E440	4.06 mg/kg	96.4	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	99.8	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1246064) - continued									
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	97.6	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	97.3	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	92.0	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	97.7	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	97.2	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	98.2	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	85.7	70.0	130	----
Metals (QCLot: 1246065)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0165

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Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference VA23C7563

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	
Email 3	
Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends,
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please con

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only): VA23C7563

ALS Contact: Can Dang Sampler: Assay lab

Analysis Requ

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	ICP-MS	pH (1:2) soil:water)	Total Carbon (LECO)	Total Sulphur (ILECO)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	S-952 DH 3301	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-952 DH 4526	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-952 DH 5182	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 4355	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 4294	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 7154	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 4348	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 5359	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 2267	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-964 DH 3144	14-Nov-23		Sediment/Soil	1	R	R	R	R			
	S-916 DH1575	14-Nov-23		Sediment/Soil	1	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
						2	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Nov. 14, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JL	Date: 15-11-23	Time: 1105

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Appendix C. Placed Waste Rock ABA Data

Date	Location	Sample Type	Tag #	Easting	Northing	Elevation	Total Carbon	Total Sulphur	NP	AP	NP/AP	Classification
							%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-	
Jan-5-23	SERD RAMP	Grab	2282	593461	5822137	1100	0.242	0.111	20.168	3.469	5.81	Non-PAG
Jan-12-23	NAG DUMP	Grab	2283	590613	5824360	1176	0.309	0.056	25.752	1.766	14.59	Non-PAG
Jan-19-23	NEZ DUMP	Grab	2284	594055	5821877	1178	0.598	0.089	49.837	2.772	17.98	Non-PAG
Jan-26-23	NAG DUMP	Grab	2285	590621	5824412	1034	0.516	0.274	43.003	8.562	5.02	Non-PAG
Jan-26-23	NAG DUMP	Dup	2286	590621	5824412	1034	0.545	0.295	45.420	9.219	4.93	Non-PAG
Feb-2-23	NAG DUMP	Grab	2287	590604	5824506	1029	0.199	0.030	16.584	0.953	17.40	Non-PAG
Feb-9-23	NAG DUMP	Grab	2288	590641	5824392	1025	0.435	0.005	36.252	0.167	217.24	Non-PAG
Feb-15-23	NAG DUMP	Grab	2289	590626	5824512	1029	0.248	0.454	20.668	14.188	1.46	PAG
Feb-15-23	NAG DUMP	Dup	2289 Dup	590626	5824512	1029	0.224	0.380	18.668	11.875	1.57	PAG
Feb-22-23	NAG DUMP	Grab	2290	590629	5824652	1021	0.303	0.182	25.252	5.688	4.44	Non-PAG
Mar-8-23	SERD DUMP	Grab	2291	593515	5821725	1116	0.456	0.260	38.003	8.125	4.68	Non-PAG
Mar-9-23	LOWER SERD DUMP	Grab	2292	593729	5821485	1023	0.458	0.009	38.169	0.266	143.53	Non-PAG
Mar-15-23	LOWER SERD DUMP	Grab	2293	593878	5821554	1031	0.498	0.492	41.503	15.375	2.70	Non-PAG
Mar-21-23	LOWER SERD DUMP	Grab	2294	594240	5821662	1003	0.563	0.008	46.920	0.238	197.04	Non-PAG
Mar-30-23	SERD Dump	Grab	2295	593651	5821990	1327	0.17	0.15	14.33	4.59	3.12	Non-PAG
Apr-5-23	N Edge of SERD	Grab	2296	593717	5822001	1237	0.276	0.146	23.002	4.562	5.04	Non-PAG
Apr-12-23	N Edge of SERD	Grab	2297	594006	5821907	1113	0.554	0.087	46.170	2.706	17.06	Non-PAG
Apr-17-23	LOWER SERD DUMP	Grab	2298	594322	5821832	1215	0.425	0.047	35.419	1.481	23.91	Non-PAG
Apr-26-23	S Edge of SERD	Grab	2299	593659	5822318	1109	0.286	0.094	23.835	2.947	8.09	Non-PAG
May-3-23	N Edge Lower SERD	Grab	2300	594345	5821752	1000	0.337	0.075	28.085	2.350	11.95	Non-PAG
May-8-23	N Edge Lower SERD	Grab	2301	594247	5822071	1010	0.513	0.033	42.753	1.019	41.97	Non-PAG
May-18-23	Upper SERD	Grab	2302	593658	5822306	1114	0.191	0.213	15.918	6.656	2.39	Non-PAG
May-25-23	Upper SERD	Grab	2303	593773	5822244	1112	0.331	0.252	27.585	7.875	3.5	Non-PAG
May-31-23	Upper SERD	Grab	2305	593887	5822209	1231	0.415	0.054	34.586	1.678	20.61	Non-PAG
Jun-7-23	Upper SERDS	Grab	2306	593547	5822172	1203	0.311	0.18	25.918	5.625	4.61	Non-PAG
Jun-12-23	Upper SERDS	Grab	2307	593542	5822148	1098	0.264	0.224	22.001	7	3.14	Non-PAG
Jun-22-23	SERD	Grab	2308	593537	5822169	1184	0.226	0.205	18.835	6.406	2.94	Non-PAG
Ju-29-23	SERD	Grab	2309	593984	5822002	1205	0.659	0.036	54.92	1.138	48.28	Non-PAG
Jul-4-23	SERD Ramp	Grab	2310	593329	5822219	1148	0.478	0.221	39.836	6.906	5.77	Non-PAG
Jul-13-23	Cariboo Pit	Grab	2311	591790	5823402	1021	0.206	0.116	17.168	3.625	4.74	Non-PAG
Jul-20-23	SERD Center Cell Berm	Grab	2312	593894	5822199	1120	0.397	0.138	33.086	4.312	7.67	Non-PAG
Jul-27-23	Lower SERD	Grab	2313	594239	5822111	1061	0.47	0.115	39.169	3.594	10.9	Non-PAG
Aug-2-23	Lower SERD	Grab	2314	594224	5822074	1080	0.596	0.186	49.67	5.812	8.55	Non-PAG
Aug-9-23	Bottom of TAR	Grab	2315	593659	5820906	1133	0.38	0.193	31.669	6.031	5.25	Non-PAG
Aug-17-23	NE SERD	Grab	2316	593960	5821770	1102	0.363	0.33	30.252	10.312	2.93	Non-PAG
Aug-24-23	NE Corner SERD	Grab	2317	593982	5821762	995	0.282	0.34	23.502	10.625	2.21	Non-PAG
Aug-31-23	NE Corner SERD	Grab	2318	593986	5821762	996	0.294	0.105	24.502	3.281	7.47	Non-PAG
Sep-6-23	W Side of Center SERD	Grab	2319	593576	5822007	1076	0.352	0.062	29.335	1.931	15.19	Non-PAG
Sep-13-23	Excavated Ramp Before Corner 5	Grab	2320	594191	5820382	877	0.642	0.186	53.504	5.812	9.2	Non-PAG
Sep-21-23	NE Side of Ramp @ Corner 5	Grab	2321	594238	5820377	853	0.474	0.122	39.503	3.812	10.36	Non-PAG
Sep-26-23	SERD E Side of Berm	Grab	2322	594028	5821842	1114	0.383	0.094	31.919	2.931	10.89	Non-PAG
Oct-5-23	SERD W Edge	Grab	2323	593507	5822010	934	0.338	0.080	28.169	2.512	11.21	Non-PAG
Oct-10-23	SERD Ramp	Grab	2324	593514	5822235	1230	0.648	0.099	54.004	3.081	17.53	Non-PAG
Oct-18-23	SERD Central	Grab	2325	593783	5821978	1096	0.245	0.158	20.418	4.938	4.14	Non-PAG
Oct-25-23	SERD Center N Side	Grab	2326	593785	5822176	1121	0.467	0.130	38.919	4.062	9.58	Non-PAG

Nov-1-23	SERD Center N Side	Grab	2327	593804	5822131	1118	0.465	0.149	38.753	4.656	8.32	Non-PAG
Nov-7-23	SERD E Edge	Grab	2328	593977	5821956	1123	0.228	0.152	19.001	4.750	4.00	Non-PAG
Nov-14-23	SERD S Edge	Grab	2329	593631	5821761	1171	0.358	0.109	29.835	3.406	8.76	Non-PAG
Nov-20-23	SERD SE Edge	Grab	2330	594010	5821855	1031	0.338	0.072	28.169	2.266	12.43	Non-PAG
Nov-27-23	SERD Mid Containment Berm	Grab	2331	593635	5822007	1065	0.380	0.223	31.669	6.969	4.54	Non-PAG
Dec-5-23	SERD Central Berm	Grab	2332	593750	5821982	1182	0.298	0.211	24.835	6.594	3.77	Non-PAG
Dec-11-23	SERD Containment S Edge	Grab	2333	593674	5821757	1042	0.381	0.246	31.752	7.688	4.13	Non-PAG
Dec-19-23	SERD Outer Berm NW Edge	Grab	2334	593621	5822301	1235	0.334	0.155	27.835	4.844	5.75	Non-PAG
Dec-27-23	SERD SE Edge	Grab	2335	593647	5821802	1180	0.352	0.026	29.335	0.816	35.97	Non-PAG

Appendix D. Lab Reports for Tailings Samples

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A3444**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Feb-2023 10:35
PO	: 5590012190	Date Analysis Commenced	: 18-Feb-2023
C-O-C number	: D0018	Issue Date	: 23-Feb-2023 15:19
Sampler	: ----		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	January 2023 Tailings Month End	----	----	----	----
					Client sampling date / time	13-Feb-2023 11:51	----	----	----	----
						VA23A3444-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108	0.10	pH units		8.89	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351	0.050	%		0.374	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399	500	mg/kg		1500	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		18600	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		0.34	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		12.3	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		302	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.73	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		13.9	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		0.103	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		25800	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		36.4	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		18.8	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		522	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg		61600	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		3.40	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		14.2	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		12900	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		637	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.0545	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		4.91	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		17.5	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		1230	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		1970	----	----	----	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	January 2023 Tailings Month End	----	----	----	----
					Client sampling date / time	13-Feb-2023 11:51	----	----	----	----
						VA23A3444-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Selenium	7782-49-2	E440	0.20	mg/kg		0.92	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		0.21	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		1950	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		120	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		1800	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		2020	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		0.68	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		0.941	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		234	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		53.9	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		6.2	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		9.74	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		2.33	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.93	----	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.46	----	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		403	----	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.186	----	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	----	----	----	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	January 2023 Tailings Month End	----	----	----	----
					Client sampling date / time	13-Feb-2023 11:51	----	----	----	----
						VA23A3444-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		16.0	----	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A3444**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Feb-2023 10:35
PO	: 5590012190	Date Analysis Commenced	: 18-Feb-2023
C-O-C number	: D0018	Issue Date	: 23-Feb-2023 15:19
Sampler	: ---- 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 840965)											
VA23A3444-001	January 2023 Tailings Month End	pH (1:2 soil:water)	----	E108	0.10	pH units	8.89	8.64	2.9%	5%	----
Organic / Inorganic Carbon (QC Lot: 840778)											
VA23A3442-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	7.98	8.02	0.485%	20%	----
Inorganics (QC Lot: 840779)											
VA23A3442-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	6380 mg/kg	0.530	18.5%	20%	----
Metals (QC Lot: 840963)											
VA23A3444-001	January 2023 Tailings Month End	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0545	0.0556	0.0011	Diff <2x LOR	----
Metals (QC Lot: 840964)											
VA23A3444-001	January 2023 Tailings Month End	Aluminum	7429-90-5	E440	50	mg/kg	18600	18000	2.95%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.34	0.32	0.02	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	12.3	12.3	0.666%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	302	328	8.19%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.73	0.72	1.90%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	13.9	12.9	1.0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.103	0.091	0.012	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	25800	25800	0.0743%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	36.4	36.1	0.890%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	18.8	19.0	0.816%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	522	520	0.384%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	61600	59600	3.40%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	3.40	5.44	46.1%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	14.2	13.9	2.55%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12900	13400	3.44%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	637	637	0.0598%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.91	4.97	1.38%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	17.5	17.5	0.251%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1230	1280	4.05%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1970	1910	2.74%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 840964) - continued											
VA23A3444-001	January 2023 Tailings Month End	Selenium	7782-49-2	E440	0.20	mg/kg	0.92	0.86	0.06	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.21	0.21	0.003	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1950	2000	2.75%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	120	117	2.42%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	1800	1500	300	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2020	1880	7.27%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.68	0.63	0.05	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.941	0.931	1.12%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	234	234	0.247%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	53.9	55.5	2.93%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.2	5.4	0.8	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 840778)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 840779)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 840963)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 840964)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 840964) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 842185)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----
TCLP Metals (QCLot: 842186)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 840965)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Organic / Inorganic Carbon (QCLot: 840778)									
Carbon, total [TC]	----	E351	0.05	%	48 %	101	90.0	110	----
Inorganics (QCLot: 840779)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	97.8	90.0	110	----
Metals (QCLot: 840963)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.5	80.0	120	----
Metals (QCLot: 840964)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	92.1	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	111	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.7	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	106	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.2	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.2	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	105	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	110	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	105	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	111	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.2	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.4	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 840964) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	89.5	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	100	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.4	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	92.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	92.5	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.2	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.5	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	88.0	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 842185)										
VA23A3383-001	Anonymous	Antimony, TCLP	7440-36-0	E444	5.02 mg/L	5 mg/L	100	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	99.6	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.9 mg/L	12.5 mg/L	103	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.255 mg/L	0.25 mg/L	102	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.247 mg/L	0.25 mg/L	98.7	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.16 mg/L	1.25 mg/L	93.2	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.241 mg/L	0.25 mg/L	96.2	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.35 mg/L	2.5 mg/L	94.1	50.0	140	----
		Iron, TCLP	7439-89-6	E444	235 mg/L	250 mg/L	93.9	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.58 mg/L	10 mg/L	95.8	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	265 mg/L	250 mg/L	106	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.37 mg/L	2.5 mg/L	94.8	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.94 mg/L	5 mg/L	98.9	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.095 mg/L	0.1 mg/L	94.6	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	94.1	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.11 mg/L	5 mg/L	102	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.1	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.67 mg/L	10 mg/L	96.7	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	86.7	50.0	150	----
TCLP Metals (QCLot: 842186)										
VA23A3383-001	Anonymous	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	88.2	50.0	140	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 840778)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.0	80.0	120	----
Inorganics (QCLot: 840779)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	92.7	70.0	130	----
Metals (QCLot: 840963)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----
Metals (QCLot: 840964)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	98.4	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	112	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	96.9	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	109	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	105	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	99.2	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	98.6	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	101	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	93.9	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	106	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	103	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	123	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	90.6	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	103	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	97.1	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	99.8	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 840964) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	94.8	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	112	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	95.3	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	101	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.4	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	88.3	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0018

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA23A3444

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax - On File
Email 2
Email 3

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax On File
Email 2

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends, st
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please conta

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590008044 Q2 2022
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 3444 **ALS Contact:** Can Dang **Sampler:** Assay Lab

Analysis Reque

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below: TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	January 2023 Tailings Month End	13-Jan-23	11:51	soil	2	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
						2	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Gabriel Holmes	Jan. 14, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JC	FEB 15 2023	1035am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the while - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5238**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Mar-2023 10:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 13-Mar-2023
C-O-C number	: A0216	Issue Date	: 16-Mar-2023 14:07
Sampler	: AL		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: February Tailings Composite	----	----	----	----
					Client sampling date / time: 28-Feb-2023	----	----	----	----
					VA23A5238-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
pH (1:2 soil:water)	----	E108	0.10	pH units	8.89	----	----	----	----
Organic / Inorganic Carbon									
Carbon, total [TC]	----	E351	0.050	%	0.266	----	----	----	----
Inorganics									
Sulfur, total	7704-34-9	E399	500	mg/kg	1970	----	----	----	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	18700	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.32	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	12.6	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	335	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	0.69	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	19.3	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.084	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	22200	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	35.0	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	18.4	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	671	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	57400	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	3.12	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	13.2	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	12800	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	609	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0575	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	5.73	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	16.5	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	1260	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg	1600	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	0.96	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	February Tailings Composite	----	----	----	----
					Client sampling date / time	28-Feb-2023	----	----	----	----
						VA23A5238-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440	0.10	mg/kg		0.23	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		1780	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		135	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		1300	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		2060	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		0.76	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		0.860	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		214	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		52.8	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		6.3	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		9.78	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		1.80	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.90	----	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.41	----	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		412	----	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.257	----	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		10.3	----	----	----	----

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	February Tailings Composite	----	----	----	----
					Client sampling date / time	28-Feb-2023	----	----	----	----
						VA23A5238-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A5238**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Mar-2023 10:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 13-Mar-2023
C-O-C number	: A0216	Issue Date	: 16-Mar-2023 14:08
Sampler	: AL 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 862764)											
FJ2300524-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.48	8.42	0.7%	5%	----
Organic / Inorganic Carbon (QC Lot: 864566)											
VA23A5236-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.206	0.216	0.010	Diff <2x LOR	----
Inorganics (QC Lot: 864567)											
VA23A5236-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	2130 mg/kg	0.211	0.002	Diff <2x LOR	----
Metals (QC Lot: 862762)											
FJ2300524-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	5060	4660	8.26%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.59	0.58	0.009	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	5.59	5.44	2.69%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	293	268	9.00%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.25	0.22	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	5.5	<5.0	0.5	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.610	0.647	5.87%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	41600	42400	1.99%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	14.1	12.9	8.97%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	4.29	4.24	1.36%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	10.3	9.91	3.55%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	12200	12300	0.511%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	6.32	6.98	9.90%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	6.1	6.0	0.1	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	10700	10600	0.841%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	193	189	1.71%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.27	1.17	7.93%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	14.6	14.2	2.21%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	766	697	9.39%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	970	870	10.9%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.39	0.01	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.11	<0.10	0.007	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	146	144	1	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 862762) - continued											
FJ2300524-001	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	81.3	80.9	0.452%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.096	0.087	0.009	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	130	118	10.0%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.747	0.697	7.01%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	33.2	32.0	3.90%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	54.2	53.5	1.35%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.7	0.04	Diff <2x LOR	----
Metals (QC Lot: 862763)											
VA23A5209-002	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0324 µg/g	0.0298	8.47%	40%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 864566)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 864567)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 862762)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 862762) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 862763)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 862992)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 862993)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 862764)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Organic / Inorganic Carbon (QCLot: 864566)									
Carbon, total [TC]	----	E351	0.05	%	48 %	100	90.0	110	----
Inorganics (QCLot: 864567)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	99.9	90.0	110	----
Metals (QCLot: 862762)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.5	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	100	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.2	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.3	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	99.9	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.9	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.3	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.7	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	100.0	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	94.4	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	100	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.0	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.1	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 862762) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	98.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.4	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	96.4	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.6	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.4	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.2	80.0	120	----
Metals (QCLot: 862763)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 862992)										
VA23A5238-001	February Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.7	50.0	140	----
TCLP Metals (QCLot: 862993)										
VA23A5238-001	February Tailings Composite	Antimony, TCLP	7440-36-0	E444	5.40 mg/L	5 mg/L	108	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.8	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.0 mg/L	12.5 mg/L	104	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.236 mg/L	0.25 mg/L	94.6	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.66 mg/L	10 mg/L	96.6	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.249 mg/L	0.25 mg/L	99.7	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.17 mg/L	1.25 mg/L	93.4	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.241 mg/L	0.25 mg/L	96.4	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.41 mg/L	2.5 mg/L	96.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	246 mg/L	250 mg/L	98.5	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.88 mg/L	10 mg/L	98.8	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	291 mg/L	250 mg/L	116	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.42 mg/L	2.5 mg/L	96.6	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.02 mg/L	5 mg/L	100	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.098 mg/L	0.1 mg/L	98.2	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	99.1	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.86 mg/L	5 mg/L	97.3	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	101	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.04 mg/L	10 mg/L	90.4	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	90.5	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 864566)									
	RM	Carbon, total [TC]	----	E351	1.4 %	93.6	80.0	120	----
Inorganics (QCLot: 864567)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	119	70.0	130	----
Metals (QCLot: 862762)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	110	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	101	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	98.8	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	108	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	111	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	112	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	99.7	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	97.2	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	104	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	107	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	99.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	95.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	112	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	98.9	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	95.2	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	97.3	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 862762) - continued									
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	112	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	100	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	106	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.5	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	94.0	70.0	130	----
Metals (QCLot: 862763)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	111	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: A0216

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Environmental Division
Vancouver
Work Order Reference
VA23A5238

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	
Email 3	
Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges ap
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharg
☐ 3 day [P3] if received by 3pm M-F - 25% rush surchar
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharg
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharg
☐ Same day [E2] if received by 10am M-S - 200% rush s
Additional fees may apply to rush requests on w
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, p
Analysi

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590008044 Q2 2022	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only): 5238 **ALS Contact:** Can Dang **Sampler:** Assay Lab

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	February Tailings Composite	28-Feb-23		Soil/Sediment	2	R	R	R	R			

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
						3	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Amanda Nicholson	Date: March 9, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: MAR 10 2023	Time: 1020 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7872**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 13-Apr-2023 08:00
PO	: 5590012190	Date Analysis Commenced	: 15-Apr-2023
C-O-C number	: D0073	Issue Date	: 20-Apr-2023 19:55
Sampler	: Assay Lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	March Tailings Composite	----	----	----	----
					Client sampling date / time	11-Apr-2023	----	----	----	----
						VA23A7872-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108	0.10	pH units		9.04	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351	0.050	%		0.361	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399	500	mg/kg		1090	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		21000	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		0.46	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		14.2	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		259	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.79	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		13.2	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		0.088	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		24800	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		31.8	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		19.0	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		540	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg		59000	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		2.64	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		16.4	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		14400	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		605	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.0588	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		4.58	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		17.2	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		1180	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		1930	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		0.75	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		0.21	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	March Tailings Composite	----	----	----	----
					Client sampling date / time	11-Apr-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7872-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440	50	mg/kg		1900	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		159	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		<1000	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		2200	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		0.81	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		1.08	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		214	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		56.0	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		5.1	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		9.71	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		2.77	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.92	----	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.57	----	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		469	----	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.116	----	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		17.1	----	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	March Tailings Composite	----	----	----	----
					Client sampling date / time	11-Apr-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7872-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL REPORT

Work Order	: **VA23A7872**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 13-Apr-2023 08:00
PO	: 5590012190	Date Analysis Commenced	: 15-Apr-2023
C-O-C number	: D0073	Issue Date	: 20-Apr-2023 19:55
Sampler	: Assay Lab 250-790-2215 Ext 2112		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 901399)											
VA23A7872-001	March Tailings Composite	pH (1:2 soil:water)	----	E108	0.10	pH units	9.04	9.09	0.6%	5%	----
Organic / Inorganic Carbon (QC Lot: 902729)											
KS2301138-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	3.90	3.94	0.959%	20%	----
Inorganics (QC Lot: 902731)											
VA23A7872-001	March Tailings Composite	Sulfur, total	7704-34-9	E399	0.050	%	1090 mg/kg	0.103	0.006	Diff <2x LOR	----
Metals (QC Lot: 901397)											
VA23A7872-001	March Tailings Composite	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0588	0.0640	0.0052	Diff <2x LOR	----
Metals (QC Lot: 901398)											
VA23A7872-001	March Tailings Composite	Aluminum	7429-90-5	E440	50	mg/kg	21000	19800	5.87%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.46	0.44	0.02	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	14.2	13.4	5.88%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	259	246	4.92%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.79	0.77	2.38%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	13.2	12.3	0.9	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.088	0.097	0.009	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	24800	23900	3.82%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	31.8	29.7	6.69%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	19.0	18.2	4.26%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	540	511	5.52%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	59000	56500	4.26%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	2.64	2.62	0.584%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	16.4	15.8	4.17%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	14400	13900	4.10%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	605	565	6.94%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.58	4.31	6.22%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	17.2	16.5	4.37%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1180	1190	1.15%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1930	1820	5.66%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.75	0.76	0.009	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 901398) - continued											
VA23A7872-001	March Tailings Composite	Silver	7440-22-4	E440	0.10	mg/kg	0.21	0.20	0.01	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1900	1850	2.66%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	159	152	4.75%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2200	2030	8.40%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.81	0.74	0.07	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.08	1.02	6.50%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	214	202	5.33%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	56.0	54.1	3.47%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	5.1	4.7	0.3	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 902729)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 902731)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 901397)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 901398)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 901398) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 902078)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 902079)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 901399)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Organic / Inorganic Carbon (QCLot: 902729)									
Carbon, total [TC]	----	E351	0.05	%	48 %	100	90.0	110	----
Inorganics (QCLot: 902731)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	93.3	90.0	110	----
Metals (QCLot: 901397)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
Metals (QCLot: 901398)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.4	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	94.4	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	95.4	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	96.4	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	92.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	91.0	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	92.1	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	92.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	92.0	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.7	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	92.6	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	89.9	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	92.3	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	92.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	88.8	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	93.0	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.4	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 901398) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	86.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.7	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	97.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	90.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.7	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	91.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	89.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	92.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.2	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	84.6	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 902078)										
VA23A7872-001	March Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	102	50.0	140	----
TCLP Metals (QCLot: 902079)										
VA23A7872-001	March Tailings Composite	Antimony, TCLP	7440-36-0	E444	5.40 mg/L	5 mg/L	108	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	93.3	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	101	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.236 mg/L	0.25 mg/L	94.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.66 mg/L	10 mg/L	96.6	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.235 mg/L	0.25 mg/L	94.2	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.14 mg/L	1.25 mg/L	91.0	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.220 mg/L	0.25 mg/L	88.2	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.19 mg/L	2.5 mg/L	87.6	50.0	140	----
		Iron, TCLP	7439-89-6	E444	222 mg/L	250 mg/L	89.0	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.67 mg/L	10 mg/L	96.7	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	249 mg/L	250 mg/L	99.6	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.17 mg/L	2.5 mg/L	86.9	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.81 mg/L	5 mg/L	96.2	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.107 mg/L	0.1 mg/L	107	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.1	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.86 mg/L	5 mg/L	97.3	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.6	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.64 mg/L	10 mg/L	96.4	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	97.2	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 902729)									
	RM	Carbon, total [TC]	----	E351	1.4 %	97.5	80.0	120	----
Inorganics (QCLot: 902731)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	111	70.0	130	----
Metals (QCLot: 901397)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	94.2	70.0	130	----
Metals (QCLot: 901398)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	99.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	97.5	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	98.9	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	110	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.6	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	97.4	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	95.4	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.1	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.8	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	111	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	98.2	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	97.8	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	96.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	91.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	98.3	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 901398) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	97.1	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	116	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	101	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	98.3	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	82.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0073

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 7871

ALS Contact: Can Dang **Sampler:** Assay Lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	March Tailings Composite	11-Apr-23		Soil/Sediment	2	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23A7872

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
						3	2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: April 12, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: APR 13 2023	Time: 8am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A9797**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 05-May-2023 11:00
PO	: 5590012190	Date Analysis Commenced	: 06-May-2023
C-O-C number	: D0085	Issue Date	: 12-May-2023 22:22
Sampler	: Assay Lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA Vancouver - Environmental	8081 Lougheed Highway, Burnaby, British Columbia
B	CALA ISO/IEC 17025:2017	SK Saskatoon - Environmental	819 58 Street East, Saskatoon, Saskatchewan

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: April Tailings Composite	----	----	----	----
						Client sampling date / time: 03-May-2023	----	----	----	----
						VA23A9797-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/VA	A	0.10	pH units	9.04	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	B	0.050	%	0.329	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	B	500	mg/kg	1410	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	A	50	mg/kg	22200	----	----	----	----
Antimony	7440-36-0	E440/VA	A	0.10	mg/kg	0.50	----	----	----	----
Arsenic	7440-38-2	E440/VA	A	0.10	mg/kg	14.9	----	----	----	----
Barium	7440-39-3	E440/VA	A	0.50	mg/kg	313	----	----	----	----
Beryllium	7440-41-7	E440/VA	A	0.10	mg/kg	0.76	----	----	----	----
Bismuth	7440-69-9	E440/VA	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	A	5.0	mg/kg	20.8	----	----	----	----
Cadmium	7440-43-9	E440/VA	A	0.020	mg/kg	0.118	----	----	----	----
Calcium	7440-70-2	E440/VA	A	50	mg/kg	25000	----	----	----	----
Chromium	7440-47-3	E440/VA	A	0.50	mg/kg	48.1	----	----	----	----
Cobalt	7440-48-4	E440/VA	A	0.10	mg/kg	18.6	----	----	----	----
Copper	7440-50-8	E440/VA	A	0.50	mg/kg	572	----	----	----	----
Iron	7439-89-6	E440/VA	A	50	mg/kg	58400	----	----	----	----
Lead	7439-92-1	E440/VA	A	0.50	mg/kg	3.68	----	----	----	----
Lithium	7439-93-2	E440/VA	A	2.0	mg/kg	14.8	----	----	----	----
Magnesium	7439-95-4	E440/VA	A	20	mg/kg	13900	----	----	----	----
Manganese	7439-96-5	E440/VA	A	1.0	mg/kg	704	----	----	----	----
Mercury	7439-97-6	E510/VA	A	0.0500	mg/kg	0.0712	----	----	----	----
Molybdenum	7439-98-7	E440/VA	A	0.10	mg/kg	9.31	----	----	----	----
Nickel	7440-02-0	E440/VA	A	0.50	mg/kg	19.3	----	----	----	----
Phosphorus	7723-14-0	E440/VA	A	50	mg/kg	1320	----	----	----	----
Potassium	7440-09-7	E440/VA	A	100	mg/kg	2430	----	----	----	----
Selenium	7782-49-2	E440/VA	A	0.20	mg/kg	1.16	----	----	----	----
Silver	7440-22-4	E440/VA	A	0.10	mg/kg	0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	April Tailings Composite	----	----	----	----
					Client sampling date / time	03-May-2023	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23A9797-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440/VA	A	50	mg/kg	2950	----	----	----	----
Strontium	7440-24-6	E440/VA	A	0.50	mg/kg	242	----	----	----	----
Sulfur	7704-34-9	E440/VA	A	1000	mg/kg	1900	----	----	----	----
Thallium	7440-28-0	E440/VA	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/VA	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/VA	A	1.0	mg/kg	2460	----	----	----	----
Tungsten	7440-33-7	E440/VA	A	0.50	mg/kg	0.89	----	----	----	----
Uranium	7440-61-1	E440/VA	A	0.050	mg/kg	1.09	----	----	----	----
Vanadium	7440-62-2	E440/VA	A	0.20	mg/kg	221	----	----	----	----
Zinc	7440-66-6	E440/VA	A	2.0	mg/kg	61.4	----	----	----	----
Zirconium	7440-67-7	E440/VA	A	1.0	mg/kg	7.5	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	9.75	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	2.78	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	4.92	----	----	----	----
pH, TCLP final	----	EPP444/VA		0.010	pH units	5.60	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	A	1.00	mg/L	<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	A	1.0	mg/L	<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	A	2.5	mg/L	<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	A	0.025	mg/L	<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	A	0.50	mg/L	<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	A	10	mg/L	392	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	A	5.0	mg/L	<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	A	2.5	mg/L	23.3	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	A	0.0010	mg/L	<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	April Tailings Composite	----	----	----	----
					Client sampling date / time	03-May-2023	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23A9797-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Selenium, TCLP	7782-49-2	E444/VA	A	0.10	mg/L	<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	A	1.0	mg/L	<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	A	0.20	mg/L	<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	A	0.15	mg/L	<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	A	0.50	mg/L	<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	A	10	mg/L	<10	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL REPORT

Work Order	: **VA23A9797**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 05-May-2023 11:00
PO	: 5590012190	Date Analysis Commenced	: 06-May-2023
C-O-C number	: D0085	Issue Date	: 12-May-2023 22:24
Sampler	: Assay Lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 933345)											
VA23A9792-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.01	8.05	0.5%	5%	----
Organic / Inorganic Carbon (QC Lot: 928016)											
CG2305589-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	4.01	3.96	1.08%	20%	----
Inorganics (QC Lot: 928017)											
VA23A9797-001	April Tailings Composite	Sulfur, total	7704-34-9	E399	0.050	%	1410 mg/kg	0.155	0.013	Diff <2x LOR	----
Metals (QC Lot: 933343)											
VA23A9792-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0888	0.0707	0.0182	Diff <2x LOR	----
Metals (QC Lot: 933344)											
VA23A9792-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	19100	20200	5.80%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.39	0.42	0.04	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.27	3.16	3.38%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	103	92.4	11.2%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.24	0.28	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.129	0.122	0.007	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	10300	12300	17.4%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	25.0	36.0	36.3%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	10.4	10.4	0.421%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	44.2	39.2	12.2%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	24500	24900	1.68%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	68.0	52.1	26.4%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	10.0	10.2	0.2	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	7480	7740	3.35%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	528	591	11.2%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.51	0.65	23.7%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	22.0	22.4	1.53%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	599	660	9.58%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1130	920	20.5%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 933344) - continued											
VA23A9792-001	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	720	719	0.0971%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	43.0	48.3	11.7%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.052	0.054	0.001	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1110	1090	2.12%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.400	0.386	3.35%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	64.2	66.6	3.59%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	72.7	68.9	5.34%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.2	0.3	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 928016)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 928017)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 933343)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 933344)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 933344) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 928472)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 928473)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 933345)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Organic / Inorganic Carbon (QCLot: 928016)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.5	90.0	110	----
Inorganics (QCLot: 928017)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	96.2	90.0	110	----
Metals (QCLot: 933343)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 933344)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	89.8	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	87.1	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	93.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.9	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	97.0	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	87.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.7	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	97.6	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	94.0	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	100	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	103	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 933344) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	86.9	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.3	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	96.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	91.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.6	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	93.6	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	97.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 928472)										
VA23A9797-001	April Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	93.2	50.0	140	----
TCLP Metals (QCLot: 928473)										
VA23A9797-001	April Tailings Composite	Antimony, TCLP	7440-36-0	E444	5.90 mg/L	5 mg/L	118	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		Barium, TCLP	7440-39-3	E444	14.8 mg/L	12.5 mg/L	119	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.254 mg/L	0.25 mg/L	102	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.81 mg/L	10 mg/L	98.1	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.254 mg/L	0.25 mg/L	102	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.30 mg/L	1.25 mg/L	104	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.246 mg/L	0.25 mg/L	98.6	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.46 mg/L	2.5 mg/L	98.5	50.0	140	----
		Iron, TCLP	7439-89-6	E444	243 mg/L	250 mg/L	97.4	50.0	140	----
		Lead, TCLP	7439-92-1	E444	11.2 mg/L	10 mg/L	112	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	278 mg/L	250 mg/L	111	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.48 mg/L	2.5 mg/L	99.1	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.96 mg/L	5 mg/L	99.3	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.108 mg/L	0.1 mg/L	108	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.4 mg/L	5 mg/L	109	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.76 mg/L	5 mg/L	115	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.80 mg/L	0.75 mg/L	106	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	10.1 mg/L	10 mg/L	101	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	104	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 928016)									
	RM	Carbon, total [TC]	----	E351	1.4 %	104	80.0	120	----
Inorganics (QCLot: 928017)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	94.3	70.0	130	----
Metals (QCLot: 933343)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
Metals (QCLot: 933344)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	117	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	103	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	99.7	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	107	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	117	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	105	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	96.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	113	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	110	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	101	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	98.5	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	115	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	107	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 933344) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	100	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	97.9	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	95.8	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0085

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

- ☑ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Can Dang **Sampler:** Assay Lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	April Tailings Composite	3-May-23		Soil/Sediment	2	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23A9797

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				6	8		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: May 4, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: MAY - 5 2023	Time: 11 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B4410**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Jun-2023 11:15
PO	: 5590012190	Date Analysis Commenced	: 27-Jun-2023
C-O-C number	: F0570	Issue Date	: 04-Jul-2023 13:08
Sampler	: ----		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA Vancouver - Environmental	8081 Lougheed Highway, Burnaby, BC
B	CALA ISO/IEC 17025:2017	SK Saskatoon - Environmental	819 58 Street East, Saskatoon, SK

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: May Tailings Composite	----	----	----	----
						Client sampling date / time: 21-Jun-2023	----	----	----	----
						VA23B4410-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/VA	A	0.10	pH units	9.27	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	B	0.050	%	0.313	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	B	500	mg/kg	1670	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	A	50	mg/kg	20700	----	----	----	----
Antimony	7440-36-0	E440/VA	A	0.10	mg/kg	0.38	----	----	----	----
Arsenic	7440-38-2	E440/VA	A	0.10	mg/kg	14.2	----	----	----	----
Barium	7440-39-3	E440/VA	A	0.50	mg/kg	280	----	----	----	----
Beryllium	7440-41-7	E440/VA	A	0.10	mg/kg	0.78	----	----	----	----
Bismuth	7440-69-9	E440/VA	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	A	5.0	mg/kg	18.8	----	----	----	----
Cadmium	7440-43-9	E440/VA	A	0.020	mg/kg	0.103	----	----	----	----
Calcium	7440-70-2	E440/VA	A	50	mg/kg	25600	----	----	----	----
Chromium	7440-47-3	E440/VA	A	0.50	mg/kg	32.3	----	----	----	----
Cobalt	7440-48-4	E440/VA	A	0.10	mg/kg	20.0	----	----	----	----
Copper	7440-50-8	E440/VA	A	0.50	mg/kg	880	----	----	----	----
Iron	7439-89-6	E440/VA	A	50	mg/kg	59800	----	----	----	----
Lead	7439-92-1	E440/VA	A	0.50	mg/kg	3.55	----	----	----	----
Lithium	7439-93-2	E440/VA	A	2.0	mg/kg	15.8	----	----	----	----
Magnesium	7439-95-4	E440/VA	A	20	mg/kg	13500	----	----	----	----
Manganese	7439-96-5	E440/VA	A	1.0	mg/kg	625	----	----	----	----
Mercury	7439-97-6	E510/VA	A	0.0500	mg/kg	0.0720	----	----	----	----
Molybdenum	7439-98-7	E440/VA	A	0.10	mg/kg	4.92	----	----	----	----
Nickel	7440-02-0	E440/VA	A	0.50	mg/kg	16.9	----	----	----	----
Phosphorus	7723-14-0	E440/VA	A	50	mg/kg	1240	----	----	----	----
Potassium	7440-09-7	E440/VA	A	100	mg/kg	2190	----	----	----	----
Selenium	7782-49-2	E440/VA	A	0.20	mg/kg	1.15	----	----	----	----
Silver	7440-22-4	E440/VA	A	0.10	mg/kg	0.28	----	----	----	----

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: May Tailings Composite	----	----	----	----
						Client sampling date / time: 21-Jun-2023	----	----	----	----
						VA23B4410-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440/VA	A	50	mg/kg	2000	----	----	----	----
Strontium	7440-24-6	E440/VA	A	0.50	mg/kg	147	----	----	----	----
Sulfur	7704-34-9	E440/VA	A	1000	mg/kg	1500	----	----	----	----
Thallium	7440-28-0	E440/VA	A	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/VA	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/VA	A	1.0	mg/kg	2250	----	----	----	----
Tungsten	7440-33-7	E440/VA	A	0.50	mg/kg	0.73	----	----	----	----
Uranium	7440-61-1	E440/VA	A	0.050	mg/kg	1.08	----	----	----	----
Vanadium	7440-62-2	E440/VA	A	0.20	mg/kg	231	----	----	----	----
Zinc	7440-66-6	E440/VA	A	2.0	mg/kg	55.8	----	----	----	----
Zirconium	7440-67-7	E440/VA	A	1.0	mg/kg	7.7	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	10.2	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	2.17	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	4.93	----	----	----	----
pH, TCLP final	----	EPP444/VA		0.010	pH units	5.46	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	A	1.00	mg/L	<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	A	1.0	mg/L	<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	A	2.5	mg/L	<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	A	0.025	mg/L	<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	A	0.50	mg/L	<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	A	10	mg/L	401	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	A	0.050	mg/L	0.244	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	A	5.0	mg/L	<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	A	2.5	mg/L	17.7	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	A	0.0010	mg/L	<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Sediment (Matrix: Soil/Solid)					Client sample ID	May Tailings Composite	----	----	----	----
					Client sampling date / time	21-Jun-2023	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B4410-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Selenium, TCLP	7782-49-2	E444/VA	A	0.10	mg/L	<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	A	1.0	mg/L	<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	A	0.20	mg/L	<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	A	0.15	mg/L	<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	A	0.50	mg/L	<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	A	10	mg/L	<10	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B4410**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Jun-2023 11:15
PO	: 5590012190	Date Analysis Commenced	: 27-Jun-2023
C-O-C number	: F0570	Issue Date	: 04-Jul-2023 13:08
Sampler	: ---- 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1018126)											
KS2302162-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.3	0.3%	5%	----
Organic / Inorganic Carbon (QC Lot: 1018636)											
RG2300888-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	5.00	5.14	2.92%	20%	----
Inorganics (QC Lot: 1018638)											
RG2300888-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	0.265	0.243	0.022	Diff <2x LOR	----
Metals (QC Lot: 1018123)											
KS2302162-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1018124)											
KS2302162-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	452	604	28.8%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.64	0.85	28.0%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	0.47	0.44	0.03	Diff <2x LOR	----
		Barium	7440-39-3	E440	0.50	mg/kg	144	121	17.3%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	19.7	12.6	44.2%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	9.3	5.7	3.6	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.205	0.117	55.0%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	1260	1240	2.21%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	12.9	11.1	14.4%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	1.54	0.79	63.9%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	11.7	8.04	37.0%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	4650	3150	38.6%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	20.0	24.7	21.3%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	192	203	5.54%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	80.2	52.8	41.3%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	7.71	5.66	30.6%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	5.24	3.92	28.8%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	<50	# 196	146	Diff <2x LOR	DUP-H
		Potassium	7440-09-7	E440	100	mg/kg	<100	<100	0	Diff <2x LOR	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1018124) - continued											
KS2302162-001	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	0.13	0.26	0.13	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	927	722	24.8%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	5.58	3.60	43.2%	40%	DUP-H
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	3.0	2.4	0.6	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	20.2	17.4	15.2%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	5.93	4.25	32.9%	30%	DUP-H
		Zinc	7440-66-6	E440	2.0	mg/kg	258	191	29.8%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	4.2	# 1.7	2.5	Diff <2x LOR	DUP-H

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1018636)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1018638)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1018123)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1018124)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1018124) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 1017865)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1017866)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1018126)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Organic / Inorganic Carbon (QCLot: 1018636)									
Carbon, total [TC]	----	E351	0.05	%	48 %	101	90.0	110	----
Inorganics (QCLot: 1018638)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	97.6	90.0	110	----
Metals (QCLot: 1018123)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	101	80.0	120	----
Metals (QCLot: 1018124)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.0	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.9	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	95.7	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	102	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.5	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1018124) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.2	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.7	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	96.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.3	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.3	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1017865)										
VA23B4410-001	May Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	100	50.0	140	----
TCLP Metals (QCLot: 1017866)										
VA23B4410-001	May Tailings Composite	Antimony, TCLP	7440-36-0	E444	5.13 mg/L	5 mg/L	103	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	108	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.8 mg/L	12.5 mg/L	110	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.278 mg/L	0.25 mg/L	111	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.9 mg/L	10 mg/L	109	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.269 mg/L	0.25 mg/L	108	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.32 mg/L	1.25 mg/L	105	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.262 mg/L	0.25 mg/L	105	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.58 mg/L	2.5 mg/L	103	50.0	140	----
		Iron, TCLP	7439-89-6	E444	267 mg/L	250 mg/L	107	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	292 mg/L	250 mg/L	117	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.64 mg/L	2.5 mg/L	106	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.44 mg/L	5 mg/L	109	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.110 mg/L	0.1 mg/L	110	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.35 mg/L	5 mg/L	107	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.83 mg/L	0.75 mg/L	110	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	11.0 mg/L	10 mg/L	110	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	95.0	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1018636)									
	RM	Carbon, total [TC]	----	E351	1.4 %	95.2	80.0	120	----
Inorganics (QCLot: 1018638)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	100	70.0	130	----
Metals (QCLot: 1018123)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	109	70.0	130	----
Metals (QCLot: 1018124)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	110	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	91.2	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	130	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	117	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	97.0	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	114	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	103	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.3	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	99.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	109	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	108	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	95.4	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	99.9	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1018124) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	99.2	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	95.1	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	114	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	104	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	108	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	96.5	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: F0570

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	On File
Email 2	
Email 3	

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	On File
Email 2	

Turnaround Time (TAT) Requested

- ☑ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):	ALS Contact: Can Dang	Sampler: Assay Lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	May Tailings Composite	21-Jun-23		Soil/Sediment	2	R	R	R	R			

Environmental Division Vancouver
Work Order Reference
VA23B4410

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Spec … op-down below

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Gabriel Holmes	Date: June 22, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JL	Date: JUN 23 2023	Time: 11:15 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B6452**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 19-Jul-2023 10:20
PO	: 5590012190	Date Analysis Commenced	: 20-Jul-2023
C-O-C number	: A0256	Issue Date	: 27-Jul-2023 12:20
Sampler	: AL		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample(s) F01: Samples Received with temperature >10 °C in Saskatoon

Qualifiers

Qualifier	*Description*
LTIS	*Limited sample available for TCLP or SPLP inorganics/SVOCs (<100g). Leachate fluid volume & sample weight were scaled down proportionately to permit analysis. Test results from modified TCLP or SPLP procedures may be unsuitable for regulatory purposes.*

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: July Tailings Composite	----	----	----	----
					Client sampling date / time: 18-Jul-2023 00:00	----	----	----	----
					VA23B6452-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	9.09	----	----	----	----
Organic / Inorganic Carbon									
Carbon, total [TC]	----	E351/SK	0.050	%	0.304	----	----	----	----
Inorganics									
Sulfur, total	7704-34-9	E399/SK	500	mg/kg	1270	----	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	23700	----	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.46	----	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	13.8	----	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	330	----	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.85	----	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	15.7	----	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.085	----	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	27500	----	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	54.4	----	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	20.2	----	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	536	----	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	62600	----	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	2.96	----	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	14.7	----	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	15600	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	685	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0782	----	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	4.70	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	21.7	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	1310	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	2780	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.81	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	0.23	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	July Tailings Composite	----	----	----	----
					Client sampling date / time	18-Jul-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B6452-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Sodium	7440-23-5	E440/VA	50	mg/kg		2770	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		244	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		<1000	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		2.1	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		2440	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		0.71	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		1.21	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		233	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		57.0	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		7.4	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		9.62	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		3.16	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		4.96	----	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		5.36 LTIS	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		489	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.200	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		28.3	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	July Tailings Composite	----	----	----	----
					Client sampling date / time	18-Jul-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B6452-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B6452**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 19-Jul-2023 10:20
PO	: 5590012190	Date Analysis Commenced	: 20-Jul-2023
C-O-C number	: A0256	Issue Date	: 27-Jul-2023 12:20
Sampler	: AL 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1050445)											
FJ2301763-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.15	8.14	0.1%	5%	----
Organic / Inorganic Carbon (QC Lot: 1050309)											
VA23B6205-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	1.95	1.97	0.971%	20%	----
Inorganics (QC Lot: 1050310)											
VA23B6452-001	July Tailings Composite	Sulfur, total	7704-34-9	E399	0.050	%	1270 mg/kg	0.103	0.024	Diff <2x LOR	----
Metals (QC Lot: 1050443)											
FJ2301763-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	9570	9820	2.53%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.65	0.64	0.010	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	7.92	8.20	3.55%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	152	152	0.168%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.40	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.288	0.258	11.1%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	4460	3980	11.4%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	23.9	23.9	0.236%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	8.27	8.39	1.51%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	10.9	10.2	6.24%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	20800	20900	0.745%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	8.50	8.39	1.35%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	11.8	11.9	0.1	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	4920	4800	2.31%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	418	418	0.165%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.20	1.23	2.39%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	23.0	22.8	0.779%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	844	837	0.746%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1620	1680	3.76%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.25	0.25	0.007	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	73	76	4	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1050443) - continued											
FJ2301763-001	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	23.5	23.4	0.562%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.136	0.146	0.010	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	259	271	4.75%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.497	0.505	1.47%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	45.5	47.4	4.10%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	69.6	67.0	3.68%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.4	0.08	Diff <2x LOR	----
Metals (QC Lot: 1050444)											
FJ2301763-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1050309)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1050310)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1050443)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1050443) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1050444)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 1056870)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1056871)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1050445)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Organic / Inorganic Carbon (QCLot: 1050309)									
Carbon, total [TC]	----	E351	0.05	%	48 %	103	90.0	110	----
Inorganics (QCLot: 1050310)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	101	90.0	110	----
Metals (QCLot: 1050443)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	100	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.4	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	87.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.0	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	99.3	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.5	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	95.8	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	113	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	97.0	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.5	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	100	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	106	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	89.9	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1050443) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.9	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.8	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.4	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	99.1	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	95.9	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.1	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	93.8	80.0	120	----
Metals (QCLot: 1050444)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1056870)										
VA23B6452-001	July Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0006 mg/L	0.001 mg/L	59.6	50.0	140	----
TCLP Metals (QCLot: 1056871)										
VA23B6452-001	July Tailings Composite	Antimony, TCLP	7440-36-0	E444	4.67 mg/L	5 mg/L	93.5	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	97.6	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.0 mg/L	12.5 mg/L	96.2	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.233 mg/L	0.25 mg/L	93.3	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.06 mg/L	10 mg/L	90.6	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.241 mg/L	0.25 mg/L	96.4	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.19 mg/L	1.25 mg/L	95.3	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.235 mg/L	0.25 mg/L	93.9	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.29 mg/L	2.5 mg/L	91.5	50.0	140	----
		Iron, TCLP	7439-89-6	E444	238 mg/L	250 mg/L	95.4	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.29 mg/L	10 mg/L	92.9	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	255 mg/L	250 mg/L	102	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.34 mg/L	2.5 mg/L	93.6	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.93 mg/L	5 mg/L	98.6	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.6	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.81 mg/L	5 mg/L	96.2	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.74 mg/L	0.75 mg/L	98.7	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.56 mg/L	10 mg/L	95.6	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	88.6	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1050309)									
	RM	Carbon, total [TC]	----	E351	1.4 %	97.6	80.0	120	----
Inorganics (QCLot: 1050310)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	90.3	70.0	130	----
Metals (QCLot: 1050443)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	112	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	94.0	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	111	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	121	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	124	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	112	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	119	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	119	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	122	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	115	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	97.9	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	107	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	100	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	119	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	105	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	99.8	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	94.0	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1050443) - continued									
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	123	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	115	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	107	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	98.4	70.0	130	----
Metals (QCLot: 1050444)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	111	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: A0256

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Environmental Division
Vancouver
Work Order Reference
VA23B6452

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minir
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mini
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mini
Street:	PO BOX 12	Email 1 or Fax On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mini
City/Province:	Likely, BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharg
Postal Code:	V0L 1N0	Email 3	Additional fees may apply to rush requests on weekend
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	Date and Time Required for all E&P TATs:
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please c
Company:		Email 1 or Fax On File	
Contact:	On File	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only): 6452 | ALS Contact: Can Dang | Sampler: Assay Lab

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	June Tailings Composite	18-Jul-23		Soil/Sediment	2	R	R	R	R			

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			10		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Amanda Nicholson	Date: July 18, 2023	Time: 15:30	Received by:	Date:	Time:	Received by:	Date: JUL 19 2023	Time: 1020am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9657**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Aug-2023 11:20
PO	: 5590012190	Date Analysis Commenced	: 25-Aug-2023
C-O-C number	: D0117	Issue Date	: 30-Aug-2023 21:02
Sampler	: Assay lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	SK ALS Environmental - Saskatoon	819 58 Street East, Saskatoon, SK
B	CALA ISO/IEC 17025:2017	VA ALS Environmental - Vancouver	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: July Tailings Composite	----	----	----	----
						Client sampling date / time: 22-Aug-2023 00:00	----	----	----	----
						VA23B9657-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
pH (1:2 soil:water)	----	E108/VA	B	0.10	pH units	9.08	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	A	0.050	%	0.323	----	----	----	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	A	500	mg/kg	1480	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	B	50	mg/kg	20400	----	----	----	----
Antimony	7440-36-0	E440/VA	B	0.10	mg/kg	0.44	----	----	----	----
Arsenic	7440-38-2	E440/VA	B	0.10	mg/kg	13.5	----	----	----	----
Barium	7440-39-3	E440/VA	B	0.50	mg/kg	268	----	----	----	----
Beryllium	7440-41-7	E440/VA	B	0.10	mg/kg	0.77	----	----	----	----
Bismuth	7440-69-9	E440/VA	B	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	B	5.0	mg/kg	16.8	----	----	----	----
Cadmium	7440-43-9	E440/VA	B	0.020	mg/kg	0.103	----	----	----	----
Calcium	7440-70-2	E440/VA	B	50	mg/kg	26000	----	----	----	----
Chromium	7440-47-3	E440/VA	B	0.50	mg/kg	36.1	----	----	----	----
Cobalt	7440-48-4	E440/VA	B	0.10	mg/kg	17.7	----	----	----	----
Copper	7440-50-8	E440/VA	B	0.50	mg/kg	576	----	----	----	----
Iron	7439-89-6	E440/VA	B	50	mg/kg	56500	----	----	----	----
Lead	7439-92-1	E440/VA	B	0.50	mg/kg	3.60	----	----	----	----
Lithium	7439-93-2	E440/VA	B	2.0	mg/kg	15.2	----	----	----	----
Magnesium	7439-95-4	E440/VA	B	20	mg/kg	12000	----	----	----	----
Manganese	7439-96-5	E440/VA	B	1.0	mg/kg	627	----	----	----	----
Mercury	7439-97-6	E510/VA	B	0.0500	mg/kg	0.0723	----	----	----	----
Molybdenum	7439-98-7	E440/VA	B	0.10	mg/kg	4.56	----	----	----	----
Nickel	7440-02-0	E440/VA	B	0.50	mg/kg	16.4	----	----	----	----
Phosphorus	7723-14-0	E440/VA	B	50	mg/kg	1220	----	----	----	----
Potassium	7440-09-7	E440/VA	B	100	mg/kg	2060	----	----	----	----
Selenium	7782-49-2	E440/VA	B	0.20	mg/kg	0.88	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	July Tailings Composite	----	----	----	----
					Client sampling date / time	22-Aug-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B9657-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Silver	7440-22-4	E440/VA	B	0.10	mg/kg	0.24	----	----	----	----
Sodium	7440-23-5	E440/VA	B	50	mg/kg	2810	----	----	----	----
Strontium	7440-24-6	E440/VA	B	0.50	mg/kg	212	----	----	----	----
Sulfur	7704-34-9	E440/VA	B	1000	mg/kg	1200	----	----	----	----
Thallium	7440-28-0	E440/VA	B	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/VA	B	2.0	mg/kg	2.0	----	----	----	----
Titanium	7440-32-6	E440/VA	B	1.0	mg/kg	2090	----	----	----	----
Tungsten	7440-33-7	E440/VA	B	0.50	mg/kg	0.74	----	----	----	----
Uranium	7440-61-1	E440/VA	B	0.050	mg/kg	1.09	----	----	----	----
Vanadium	7440-62-2	E440/VA	B	0.20	mg/kg	211	----	----	----	----
Zinc	7440-66-6	E440/VA	B	2.0	mg/kg	53.8	----	----	----	----
Zirconium	7440-67-7	E440/VA	B	1.0	mg/kg	7.3	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	9.77	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	3.39	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	4.91	----	----	----	----
pH, TCLP final	----	EPP444/VA		0.010	pH units	5.51	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	B	1.00	mg/L	<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	B	1.0	mg/L	<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	B	2.5	mg/L	<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	B	0.025	mg/L	<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	B	0.50	mg/L	<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	B	0.050	mg/L	<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	B	10	mg/L	469	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	B	0.25	mg/L	<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	B	0.050	mg/L	<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	B	0.050	mg/L	0.141	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	B	5.0	mg/L	<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	B	0.25	mg/L	<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	B	2.5	mg/L	19.2	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	July Tailings Composite	----	----	----	----
					Client sampling date / time	22-Aug-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B9657-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Mercury, TCLP	7439-97-6	E512/VA	B	0.0010	mg/L	<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	B	0.25	mg/L	<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	B	0.10	mg/L	<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	B	0.050	mg/L	<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	B	1.0	mg/L	<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	B	0.20	mg/L	<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	B	0.15	mg/L	<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	B	0.50	mg/L	<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	B	10	mg/L	<10	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL REPORT

Work Order	: **VA23B9657**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Aug-2023 11:20
PO	: 5590012190	Date Analysis Commenced	: 25-Aug-2023
C-O-C number	: D0117	Issue Date	: 30-Aug-2023 21:02
Sampler	: Assay lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
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Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1109804)											
VA23B9657-001	July Tailings Composite	pH (1:2 soil:water)	----	E108	0.10	pH units	9.08	9.11	0.3%	5%	----
Organic / Inorganic Carbon (QC Lot: 1105841)											
VA23B9653-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.345	0.339	0.006	Diff <2x LOR	----
Inorganics (QC Lot: 1105842)											
VA23B9653-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	6960 mg/kg	0.711	2.13%	20%	----
Metals (QC Lot: 1109801)											
VA23B9657-001	July Tailings Composite	Aluminum	7429-90-5	E440	50	mg/kg	20400	19600	4.00%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.44	0.38	0.06	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	13.5	12.4	8.41%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	268	267	0.456%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.77	0.72	6.14%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	16.8	16.3	0.5	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.103	0.098	0.005	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	26000	25800	0.641%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	36.1	33.9	6.15%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	17.7	17.2	2.92%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	576	564	2.16%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	56500	55400	1.98%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	3.60	3.17	12.8%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.2	15.2	0.0478%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12000	11700	2.76%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	627	586	6.70%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.56	4.50	1.41%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	16.4	16.0	2.93%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1220	1080	12.0%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2060	1940	5.77%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.88	0.92	0.04	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.24	0.23	0.01	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	2810	2750	1.97%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1109801) - continued											
VA23B9657-001	July Tailings Composite	Strontium	7440-24-6	E440	0.50	mg/kg	212	203	4.53%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	1200	1200	20	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	2.0	<2.0	0.05	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2090	1670	22.0%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.74	<0.50	0.24	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.09	1.03	5.64%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	211	203	3.58%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	53.8	50.7	5.93%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	7.3	5.4	1.8	Diff <2x LOR	----
Metals (QC Lot: 1109802)											
VA23B9657-001	July Tailings Composite	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0723	0.0702	0.0021	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1105841)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1105842)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1109801)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1109801) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1109802)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 1107057)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1107058)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1109804)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Organic / Inorganic Carbon (QCLot: 1105841)									
Carbon, total [TC]	----	E351	0.05	%	48 %	101	90.0	110	----
Inorganics (QCLot: 1105842)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	101	90.0	110	----
Metals (QCLot: 1109801)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.8	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	92.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.4	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	93.1	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.9	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	93.8	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	97.5	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.2	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.8	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.9	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.2	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.1	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.3	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	96.9	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1109801) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	94.4	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	96.9	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.3	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.5	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	97.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.7	80.0	120	----
Metals (QCLot: 1109802)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	96.0	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1107057)										
VA23B9657-001	July Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 1107058)										
VA23B9657-001	July Tailings Composite	Antimony, TCLP	7440-36-0	E444	5.40 mg/L	5 mg/L	108	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	108	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.0 mg/L	12.5 mg/L	104	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.277 mg/L	0.25 mg/L	111	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.75 mg/L	10 mg/L	97.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.260 mg/L	0.25 mg/L	104	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.26 mg/L	1.25 mg/L	101	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.253 mg/L	0.25 mg/L	101	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.46 mg/L	2.5 mg/L	98.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	251 mg/L	250 mg/L	100	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	262 mg/L	250 mg/L	105	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.47 mg/L	2.5 mg/L	98.9	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.47 mg/L	5 mg/L	109	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.076 mg/L	0.1 mg/L	76.1	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	98.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.21 mg/L	5 mg/L	104	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.79 mg/L	0.75 mg/L	105	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	10.8 mg/L	10 mg/L	108	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	1.0 mg/L	1 mg/L	97.6	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1105841)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.1	80.0	120	----
Inorganics (QCLot: 1105842)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1109801)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	92.1	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	99.0	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.1	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	111	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	98.5	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	105	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	96.7	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	96.4	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	98.6	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	97.6	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	96.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	103	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	89.8	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.2	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	90.7	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	101	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	95.6	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	95.5	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	99.3	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	89.2	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1109801) - continued									
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	96.1	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	95.2	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	87.9	70.0	130	----
Metals (QCLot: 1109802)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0117

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference VA23B9657

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minim

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge

Additional fees may apply to rush requests on weeken

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please c

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 96577

ALS Contact: Can Dang Sampler: Assay Lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	July Tailings Composite	22-Aug-23		Soil/Sediment	2	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				6.12 C			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Dave Stanley	Aug. 22, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	8/23/23	1220pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23D0446**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Dec-2023 09:20
PO	: 5590012190	Date Analysis Commenced	: 21-Dec-2023
C-O-C number	: ----	Issue Date	: 27-Dec-2023 21:23
Sampler	: Assay Lab		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ghazaleh Khanmirzaei	Analsyt	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: November Tailings Composite	----	----	----	----
					Client sampling date / time: 18-Dec-2023 00:00	----	----	----	----
					VA23D0446-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	9.21	----	----	----	----
Organic / Inorganic Carbon									
Carbon, total [TC]	----	E351/SK	0.050	%	0.394	----	----	----	----
Inorganics									
Sulfur, total	7704-34-9	E399/SK	500	mg/kg	740	----	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	27100	----	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.61	----	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	15.0	----	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	373	----	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.89	----	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	15.7	----	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.106	----	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	36200	----	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	55.4	----	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	23.8	----	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	927	----	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	75900	----	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	3.74	----	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	16.5	----	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	14600	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	711	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.114	----	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	5.44	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	14.0	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	1750	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	3660	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: November Tailings Composite	----	----	----	----
					Client sampling date / time: 18-Dec-2023 00:00	----	----	----	----
					VA23D0446-001	--------	--------	--------	--------
					Result	----	----	----	----
Metals									
Selenium	7782-49-2	E440/VA	0.20	mg/kg	1.18	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	0.32	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	2680	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	253	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	<1000	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	3.0	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	2600	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	0.55	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	1.38	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	304	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	61.0	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	9.0	----	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	9.70	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	3.80	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	4.94	----	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units	5.67	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	473	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L	<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L	<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.062	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L	<5.0	----	----	----	----

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: November Tailings Composite	----	----	----	----
					Client sampling date / time: 18-Dec-2023 00:00	----	----	----	----
					VA23D0446-001	--------	--------	--------	--------
					Result	----	----	----	----
TCLP Metals									
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L	<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L	18.3	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L	<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L	<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L	<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L	<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L	<10	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL REPORT

Work Order	: **VA23D0446**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Dec-2023 09:20
PO	: 5590012190	Date Analysis Commenced	: 21-Dec-2023
C-O-C number	: ----	Issue Date	: 27-Dec-2023 21:23
Sampler	: Assay Lab 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ghazaleh Khanmirzaei	Analsyt	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1286023)											
VA23D0419-017	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.37	7.41	0.5%	5%	----
Organic / Inorganic Carbon (QC Lot: 1285759)											
SK2307272-002	Anonymous	Carbon, total [TC]	----	E351	0.050	%	3.42	3.51	2.34%	20%	----
Inorganics (QC Lot: 1285761)											
VA23D0446-001	November Tailings Composite	Sulfur, total	7704-34-9	E399	0.050	%	740 mg/kg	0.077	0.003	Diff <2x LOR	----
Metals (QC Lot: 1286021)											
VA23D0419-017	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1286022)											
VA23D0419-017	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	18200	19400	6.54%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.23	0.22	0.01	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.59	3.64	1.20%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	63.1	64.3	1.92%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.17	0.19	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	0.24	0.04	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.166	0.179	7.64%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	4700	4770	1.63%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	15.0	14.9	0.264%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	7.72	8.02	3.92%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	26.3	26.7	1.76%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	22300	22500	0.888%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	7.38	7.35	0.433%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	5.3	5.7	0.4	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	5450	5690	4.39%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	373	420	11.8%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.11	1.17	5.46%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	9.21	9.19	0.259%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	385	375	2.64%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	810	810	0.0140%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1286022) - continued											
VA23D0419-017	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	463	472	1.86%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	44.4	45.4	2.03%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.055	0.055	0.0002	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1080	1050	2.98%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.72	0.78	0.06	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.837	0.849	1.46%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	63.9	65.9	2.98%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	62.2	63.2	1.54%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1285759)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1285761)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1286021)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1286022)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1286022) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 1287940)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1287941)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1286023)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	101	95.0	105	----
Organic / Inorganic Carbon (QCLot: 1285759)									
Carbon, total [TC]	----	E351	0.05	%	48 %	100	90.0	110	----
Inorganics (QCLot: 1285761)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	96.8	90.0	110	----
Metals (QCLot: 1286021)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.7	80.0	120	----
Metals (QCLot: 1286022)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	94.8	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	91.3	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.4	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	83.3	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	87.0	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	83.6	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	92.6	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	89.3	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	88.1	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	90.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	88.6	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	92.2	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	92.4	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	81.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	95.1	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.4	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	86.3	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	89.9	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	98.8	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	91.6	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.2	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1286022) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	83.0	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	92.8	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	91.8	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	92.4	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	88.0	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	91.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	89.2	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	90.0	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	93.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	90.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	90.9	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	89.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1287940)										
VA23D0419-017	Anonymous	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 1287941)										
VA23D0419-017	Anonymous	Antimony, TCLP	7440-36-0	E444	5.32 mg/L	5 mg/L	106	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.3 mg/L	5 mg/L	105	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.9 mg/L	12.5 mg/L	111	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.238 mg/L	0.25 mg/L	95.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.73 mg/L	10 mg/L	97.3	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.254 mg/L	0.25 mg/L	101	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	249 mg/L	250 mg/L	99.4	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.28 mg/L	1.25 mg/L	102	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.250 mg/L	0.25 mg/L	100.0	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.38 mg/L	2.5 mg/L	95.4	50.0	140	----
		Iron, TCLP	7439-89-6	E444	240 mg/L	250 mg/L	95.9	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.77 mg/L	10 mg/L	97.7	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	253 mg/L	250 mg/L	101	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.44 mg/L	2.5 mg/L	97.8	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.23 mg/L	5 mg/L	104	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.095 mg/L	0.1 mg/L	95.0	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	92.3	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.98 mg/L	5 mg/L	99.6	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.69 mg/L	10 mg/L	96.9	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.9 mg/L	1 mg/L	94.4	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1285759)									
	RM	Carbon, total [TC]	----	E351	1.4 %	97.6	80.0	120	----
Inorganics (QCLot: 1285761)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	93.7	70.0	130	----
Metals (QCLot: 1286021)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----
Metals (QCLot: 1286022)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	99.4	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	93.0	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	88.3	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	92.6	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	106	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	100.0	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	91.4	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	99.9	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	92.8	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	90.2	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	93.7	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	91.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	89.0	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	98.6	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	96.1	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	89.5	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	93.6	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	92.7	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	102	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	96.6	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	89.1	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1286022) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	92.1	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	87.7	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	101	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	94.6	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	95.2	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	92.2	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	87.2	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: D0174

Page 1 of 1

Environmental Division Vancouver

Work Order Reference

VA23D0446

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimun
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimun
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimur
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends,
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only): **ALS Contact:** Can Dang **Sampler:** Assay Lab

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	November Tailings Composite	18-Dec-23		Soil/Sediment	2	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Dec. 19, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: DEC 20 2023	Time: 920am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA24A0768**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Jan-2024 10:05
PO	: 5590012190	Date Analysis Commenced	: 17-Jan-2024
C-O-C number	: A0344	Issue Date	: 22-Jan-2024 08:50
Sampler	: ----		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ghazaleh Khanmirzaei	Analsyt	Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
LTIS	*Limited sample available for TCLP or SPLP inorganics/SVOCs (<100g). Leachate fluid volume & sample weight were scaled down proportionately to permit analysis. Test results from modified TCLP or SPLP procedures may be unsuitable for regulatory purposes.*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	August Tailings Composite	September Tailings Composite	October Tailings Composite	December Tailings Composite	----
					Client sampling date / time	11-Jan-2024 00:00	11-Jan-2024 00:00	11-Jan-2024 00:00	11-Jan-2024 00:00	----
						VA24A0768-001	VA24A0768-002	VA24A0768-003	VA24A0768-004	--------
						Result	Result	Result	Result	----
Physical Tests										
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		8.99	8.96	8.99	9.06	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%		0.396	0.409	0.391	0.402	----
Inorganics										
Sulfur, total	7704-34-9	E399/SK	500	mg/kg		1000	1110	1180	1150	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		17900	19100	18600	18400	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		0.47	0.45	0.44	0.60	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		12.4	12.4	12.1	11.5	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		215	225	231	276	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.66	0.67	0.58	0.59	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		11.8	13.2	11.8	8.8	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		0.090	0.083	0.097	0.080	----
Calcium	7440-70-2	E440/VA	50	mg/kg		25000	28300	26800	23000	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		30.4	31.6	32.2	29.7	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		18.5	17.4	16.0	17.4	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		602	717	818	673	----
Iron	7439-89-6	E440/VA	50	mg/kg		56400	49800	48000	54400	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		2.79	2.88	2.90	2.30	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		14.3	14.9	12.5	11.1	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		12200	10600	9110	10900	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		522	528	551	529	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0766	0.0716	0.0762	0.106	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		3.66	4.56	5.04	5.36	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		15.0	11.9	8.93	11.6	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		1210	1150	1040	1170	----
Potassium	7440-09-7	E440/VA	100	mg/kg		2090	2060	2030	2370	----

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	August Tailings Composite	September Tailings Composite	October Tailings Composite	December Tailings Composite	----
					Client sampling date / time	11-Jan-2024 00:00	11-Jan-2024 00:00	11-Jan-2024 00:00	11-Jan-2024 00:00	----
						VA24A0768-001	VA24A0768-002	VA24A0768-003	VA24A0768-004	--------
						Result	Result	Result	Result	----
Metals										
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.80	0.95	1.15	0.87	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		0.21	0.25	0.25	0.22	----
Sodium	7440-23-5	E440/VA	50	mg/kg		1800	2450	2990	2600	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		173	215	204	180	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		<1000	<1000	<1000	<1000	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		2.2	2.6	2.8	2.2	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		2080	1910	1820	1760	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		0.70	0.71	0.68	0.54	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		1.13	1.13	1.08	1.07	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		223	212	206	209	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		57.1	50.6	44.7	47.3	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		8.5	9.4	9.7	7.2	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		9.70	9.74	9.77	9.75	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		3.87	4.51	4.42	4.67	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		4.94	4.94	4.94	4.94	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		5.87	5.93	5.87 LTIS	5.91	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		574	614	573	591	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		<0.050	0.102	0.122	<0.050	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	----

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	August Tailings Composite	September Tailings Composite	October Tailings Composite	December Tailings Composite	----
					Client sampling date / time	11-Jan-2024 00:00	11-Jan-2024 00:00	11-Jan-2024 00:00	11-Jan-2024 00:00	----
						VA24A0768-001	VA24A0768-002	VA24A0768-003	VA24A0768-004	--------
						Result	Result	Result	Result	----
TCLP Metals										
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		11.7	15.3	14.3	27.5	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL REPORT

Work Order	: **VA24A0768**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Jan-2024 10:05
PO	: 5590012190	Date Analysis Commenced	: 17-Jan-2024
C-O-C number	: A0344	Issue Date	: 22-Jan-2024 08:50
Sampler	: ---- 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ghazaleh Khanmirzaei	Analsyt	Vancouver Metals, Burnaby, British Columbia
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1305895)											
VA24A0768-001	August Tailings Composite	pH (1:2 soil:water)	----	E108	0.10	pH units	8.99	9.00	0.1%	5%	----
Organic / Inorganic Carbon (QC Lot: 1305743)											
VA24A0750-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.211	0.198	0.013	Diff <2x LOR	----
Inorganics (QC Lot: 1305744)											
VA24A0750-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	6860 mg/kg	0.612	11.4%	20%	----
Metals (QC Lot: 1305893)											
VA24A0768-001	August Tailings Composite	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0766	0.0784	0.0018	Diff <2x LOR	----
Metals (QC Lot: 1305894)											
VA24A0768-001	August Tailings Composite	Aluminum	7429-90-5	E440	50	mg/kg	17900	18400	2.71%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.47	0.46	0.01	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	12.4	11.8	4.62%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	215	230	6.73%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.66	0.69	3.31%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	11.8	11.9	0.1	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.090	0.089	0.0008	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	25000	24700	1.11%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	30.4	29.9	1.92%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	18.5	18.1	2.18%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	602	579	3.76%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	56400	53400	5.35%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	2.79	2.90	3.85%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	14.3	14.5	1.43%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12200	11600	4.40%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	522	538	3.05%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	3.66	3.74	2.35%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	15.0	14.7	2.07%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1210	1120	8.13%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2090	1970	5.96%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.80	0.89	0.09	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1305894) - continued											
VA24A0768-001	August Tailings Composite	Silver	7440-22-4	E440	0.10	mg/kg	0.21	0.22	0.009	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1800	1660	7.84%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	173	175	0.751%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	2.2	2.2	0.05	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2080	1970	5.18%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.70	0.68	0.02	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.13	1.09	3.67%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	223	216	3.24%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	57.1	55.2	3.32%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	8.5	8.3	1.66%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 1305743)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 1305744)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1305893)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1305894)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1305894) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	# 1.6	B
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 1307772)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1307773)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1305895)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
Organic / Inorganic Carbon (QCLot: 1305743)									
Carbon, total [TC]	----	E351	0.05	%	48 %	100	90.0	110	----
Inorganics (QCLot: 1305744)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	99.5	90.0	110	----
Metals (QCLot: 1305893)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	89.5	80.0	120	----
Metals (QCLot: 1305894)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.0	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	96.4	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.6	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.1	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	116	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.2	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	86.4	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.2	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	96.1	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1305894) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.8	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.5	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	97.8	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.8	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.9	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.3	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	95.5	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.3	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.7	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.2	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	97.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1307772)										
VA24A0768-001	August Tailings Composite	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.9	50.0	140	----
TCLP Metals (QCLot: 1307773)										
VA24A0768-001	August Tailings Composite	Antimony, TCLP	7440-36-0	E444	5.03 mg/L	5 mg/L	101	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.7 mg/L	12.5 mg/L	93.8	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.260 mg/L	0.25 mg/L	104	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.61 mg/L	10 mg/L	96.1	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.253 mg/L	0.25 mg/L	101	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.28 mg/L	1.25 mg/L	102	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.247 mg/L	0.25 mg/L	99.0	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.41 mg/L	2.5 mg/L	96.4	50.0	140	----
		Iron, TCLP	7439-89-6	E444	242 mg/L	250 mg/L	97.0	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.52 mg/L	10 mg/L	95.2	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	261 mg/L	250 mg/L	104	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.50 mg/L	2.5 mg/L	100	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.03 mg/L	5 mg/L	100	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.088 mg/L	0.1 mg/L	88.2	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.2	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.80 mg/L	5 mg/L	95.9	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.77 mg/L	0.75 mg/L	102	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	1.0 mg/L	1 mg/L	96.5	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1305743)									
	RM	Carbon, total [TC]	----	E351	1.4 %	110	80.0	120	----
Inorganics (QCLot: 1305744)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	81.8	70.0	130	----
Metals (QCLot: 1305893)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	96.8	70.0	130	----
Metals (QCLot: 1305894)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	100	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	92.5	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	100	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	91.0	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	92.1	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	114	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.0	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	90.9	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	107	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	95.4	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	91.4	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	94.6	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	89.6	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	91.1	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	97.7	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	98.5	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	96.9	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	95.5	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	86.6	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	106	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	100	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	96.2	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1305894) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	95.0	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	97.1	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	99.3	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	95.9	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	98.0	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	94.9	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	93.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: A0344

Page 1 of 1

Environmental Division Vancouver
Work Order Reference
VA24A0768

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: On File
Email 2:
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: On File
Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimu
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimu
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimu
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 768
ALS Contact: Can Dang
Sampler: Assay Lab

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	August Tailings Composite	11-Jan-24		Soil/Sediment	1	R	R	R	R			
	September Tailings Composite	11-Jan-24		Soil/Sediment	1	R	R	R	R			
	October Tailings Composite	11-Jan-24		Soil/Sediment	1	R	R	R	R			
	December Tailings Composite	11-Jan-24		Soil/Sediment	1	R	R	R	R			

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☑ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
				1	

SHIPMENT RELEASE (client use)

Released by: Amanda Nicholson	Date: January 11, 2024	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date: JAN 12 2024	Time: 1005

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Appendix E. SERDS Co-Disposal Tailings Data

Sample (Date)	Total Carbon	Total Sulphur	NP	AP	NP/AP	Total Tonnage	Comments
	%	%	kg $CaCO_3$/t	kg $CaCO_3$/t	-	t	
20230501						0	
20230502A						0	
20230502B						0	
20230503						0	
20230504						0	
20230505						0	
20230506						0	
20230507						0	
20230508						11118	
20230509						9475	
20230510	0.206	0.187	17.17	5.84	2.94	22815	
20230511	0.209	0.175	17.42	5.47	3.18	17750	
20230512						22510	
20230513	0.274	0.3	22.84	9.38	2.44	6518	
20230514						1721	
20230515						0	
20230516						0	
20230517						0	
20230518						0	
20230519						0	
20230520						5625	
20230521						12055	
20230522						11565	
20230523	0.281	0.131	23.418	4.094	5.72	25645	
20230524						14005	
20230525	0.241	0.148	20.085	4.625	4.34	15525	
20230526	0.296	0.096	24.668	2.997	8.23	16360	
20230527	0.263	0.242	21.918	7.562	2.9	33545	
20230528	0.271	0.178	22.585	5.562	4.06	11920	
20230529	0.355	0.101	29.585	3.156	9.37	13155	
20230530	0.281	0.11	23.418	3.438	6.81	13605	
20230531						16966	
20230601						7722	
20230602	0.28	0.107	23.335	3.344	6.98	7446	
20230603	0.316	0.064	26.335	2.016	13.07	6460	
20230604						0	
20230605						4310	
20230606						25558	
20230607	0.254	0.107	21.168	3.344	6.33	24489	
20230608	0.259	0.143	21.585	4.469	4.83	29215	
20230609	0.233	0.128	19.418	4	4.85	32746	
20230610						19746	No sample due to lack of access
20230611	0.263	0.134	21.918	4.188	5.23	27340	
20230612	0.263	0.09	21.918	2.806	7.81	18415	
20230613	0.239	0.074	19.918	2.309	8.62	25751	
20230614	0.234	0.067	19.501	2.091	9.33	21777	
20230615						14607	
20230616						5738	
20230617	0.33	0.186	27.502	5.812	4.73	5997	
20230618	0.314	0.18	26.168	5.625	4.65	9065	
20230619	0.253	0.064	21.085	2.003	10.53	18628	
20230620	0.27	0.087	22.501	2.719	8.28	20770	
20230621	0.183	0.109	15.251	3.406	4.48	22151	
20230622	0.26	0.152	21.668	4.75	4.56	12397	
20230623						18556	
20230624						11037	
20230625						14735	
20230626	0.275	0.298	22.918	9.312	2.46	2295	
20230627							No Tailings dumped today

20230628							No Tailings dumped today
20230629	0.659	0.036	54.92	1.138	48.28		No Tailings dumped today
20230630							No Tailings dumped today
20230701							No Tailings dumped today
20230702							No Tailings dumped today
20230703							No Tailings dumped today
20230704							No Tailings dumped today
20230705							No Tailings dumped today
20230706							No Tailings dumped today
20230707							No Tailings dumped today
20230708	0.329	0.191	27.418	5.969	4.59	13881	
20230709	0.399	0.144	33.252	4.5	7.39	5997	Missed SG & Moisture measured
20230710	0.283	0.232	23.585	7.25	3.25	9920	Missed SG & Moisture measured
20230711	0.289	0.209	24.085	6.531	3.69	22402	Missed SG & Moisture measured
20230712	0.31	0.079	25.835	2.459	10.5	37863	Missed SG & Moisture measured
20230713	0.308	0.104	25.668	3.25	7.9	29984	Missed SG & Moisture measured
20230714	0.351	0.278	29.252	8.688	3.37	27867	Missed SG & Moisture measured
20230715	0.253	0.074	21.085	2.297	9.18	28501	Missed SG & Moisture measured
20230716	0.278	0.111	23.168	3.469	6.68	10676	Missed SG & Moisture measured
20230717	0.282	0.113	23.502	3.531	6.66	22461	Missed SG & Moisture measured
20230718	0.332	0.103	27.669	3.219	8.6	17587	No moisture measured
20230719	0.287	0.056	23.918	1.734	13.79	21327	
20230720	0.264	0.062	22.001	1.922	11.45	21735	
20230721	0.283	0.057	23.585	1.791	13.17	24004	
20230722						12253	No sample collected
20230723	0.244	0.067	20.335	2.088	9.74		
20230724	0.318	0.051	26.502	1.6	16.56		
20230725							No sample collected
20230726	0.296	0.048	24.668	1.484	16.62		
20230727	0.258	0.228	21.501	7.125	3.02		
20230728A	0.219	0.078	18.251	2.431	7.51		
20230728B	0.313	0.151	26.085	4.719	5.53		
20230729							
20230730	0.317	0.162	26.418	5.062	5.22		
20230731	0.245	0.165	20.418	5.156	3.96		
20230801	0.305	0.098	25.418	3.047	8.34		
20230802							No sample collected
20230803							No sample collected
20230804	0.341	0.191	28.419	5.969	4.76		
20230805							No sample collected
20230806							No sample collected
20230807	0.291	0.18	24.252	5.625	4.31		
20230808	0.277	0.202	23.085	6.312	3.66		
20230809	0.359	0.233	29.919	7.281	4.11		
20230810	0.235	0.132	19.585	4.125	4.75		
20230811	0.392	0.687	32.669	21.469	1.52		
20230812	0.362	0.075	30.169	2.341	12.89		
20230813	0.395	0.196	32.919	6.125	5.37		
20230814	0.392	0.248	32.669	7.75	4.22		
20230815							No sample collected
20230816	0.294	0.111	24.502	3.469	7.06		
20230817	0.336	0.081	28.002	2.525	11.09		
20230818							No sample collected
20230819	0.373	0.079	31.085	2.462	12.62		
20230820	0.261	0.094	21.751	2.944	7.39		
20230821	0.364	0.097	30.335	3.034	10		
20230822	0.312	0.081	26.002	2.522	10.31		
20230823	0.453	0.24	37.753	7.5	5.03		
20230824							No sample collected - not hauling tailings to SERD
20230825	0.436	0.442	36.336	13.812	2.63		
20230826	0.367	0.197	30.585	6.156	4.97		

20230827	0.414	0.159	34.502	4.969	6.94		
20230828	0.331	0.094	27.585	2.925	9.43		
20230829							No sample collected
20230830							No sample collected - not hauling tailings to SERD
20230831	0.419	0.133	34.919	4.156	8.4		
20230901							No sample collected
20230902							No sample collected
20230903							No sample collected
20230904							
20230905							
20230906							No sample collected - not hauling tailings to SERD
20230907							No sample collected - not hauling tailings to SERD
20230908							No sample collected - not hauling tailings to SERD
20230909							No sample collected - not hauling tailings to SERD
20230910							No sample collected - not hauling tailings to SERD
20230911							No sample collected - not hauling tailings to SERD
20230912							No sample collected - not hauling tailings to SERD
20230913							No sample collected - not hauling tailings to SERD
20230914							No sample collected - not hauling tailings to SERD
20230915							No sample collected - not hauling tailings to SERD
20230916							No sample collected - not hauling tailings to SERD
20230917							No sample collected - not hauling tailings to SERD
20230918							No sample collected - not hauling tailings to SERD
20230919							No sample collected - not hauling tailings to SERD
20230920	0.261	0.087	21.751	2.722	7.99		
20230921	0.305	0.098	25.418	3.056	8.32		
20230922	0.352	0.063	29.335	1.981	14.81		
20230923	0.283	0.084	23.585	2.638	8.94		
20230924	0.261	0.048	21.751	1.488	14.62		
20230925	0.308	0.131	25.668	4.094	6.27		
20230926	0.282	0.113	23.502	3.531	6.66		
20230927	0.374	0.127	31.169	3.969	7.85		
20230928	0.251	0.198	20.918	6.188	3.38		
20230929	0.243	0.134	20.251	4.188	4.84		
20230930	0.279	0.241	23.252	7.531	3.09		
20231001	0.321	0.072	26.752	2.253	11.87		
20231002	0.348	0.065	29.002	2.038	14.23		
20231003	0.316	0.201	26.335	6.281	4.19		
20231004	0.404	0.185	33.669	5.781	5.82		
20231005	0.416	***	34.669	6.375	5.44		
20231006	0.316	***	26.335	3.281	8.03		
20231007	0.381	0.375	31.752	11.719	2.71		
20231008	0.325	0.151	27.085	4.719	5.74		
20231009	0.366	0.115	30.502	3.594	8.49		
20231010	0.348	0.088	29.002	2.741	10.58		
20231011							No Sample Collected
20231012	0.351	0.155	29.252	4.844	6.04		
20231013	0.327	0.143	27.252	4.469	6.1		
20231014	0.316	0.18	26.335	5.625	4.68		
20231015							No Sample Collected
20231016	0.283	0.13	23.585	4.062	5.81		
20231017	0.269	0.098	22.418	3.059	7.33		
20231018	0.264	0.103	22.001	3.219	6.84		
20231019	0.317	0.102	26.418	3.188	8.29		
20231020	0.37	0.05	30.835	1.575	19.58		
20231021	0.328	0.215	27.335	6.719	4.07		
20231022	0.356	0.175	29.669	5.469	5.43		
20231023	0.351	0.163	29.252	5.094	5.74		
20231024	0.519	0.231	43.253	7.219	5.99		
20231025	0.45	0.123	37.502	3.844	9.76		
20231026	0.275	0.21	22.918	6.562	3.49		

20231027	0.327	0.338	27.252	10.562	2.58		
20231028	0.398	0.096	33.169	2.991	11.09		
20231029	0.308	0.128	25.668	4	6.42		
20231030	0.288	0.124	24.002	3.875	6.19		
20231031							No Sample Collected
20231101							No Sample Collected
20231102							No Sample Collected
20231103							No Sample Collected
20231104							No Sample Collected
20231105							No Sample Collected
20231106							No Sample Collected
20231107							No Sample Collected
20231108							No Sample Collected
20231109	0.34	0.257	28.335	8.031	3.53		
20231110	0.363	0.184	30.252	5.75	5.26		
20231111	0.416	0.225	34.669	7.031	4.93		
20231112	0.289	0.106	24.085	3.312	7.27		
20231113	0.27	0.156	22.501	4.875	4.62		
20231114	0.338	0.108	28.169	3.375	8.35		
20231115	0.302	0.101	25.168	3.156	7.97		
20231116	0.358	0.109	29.835	3.406	8.76		
20231117	0.348	0.139	29.002	4.344	6.68		
20231118	0.334	0.162	27.835	5.062	5.5		
20231119	0.321	0.144	26.752	4.5	5.94		
20231120	0.467	0.124	38.919	3.875	10.04		
20231121							
20231122							
20231123	0.302	0.125	25.168	3.906	6.44		
20231124							No Tailings dumped today
20231125							No Tailings dumped today
20231126							No Tailings dumped today
20231127							No Tailings dumped today
20231128							No Tailings dumped today
20231129							No Tailings dumped today
20231130							No Tailings dumped today
20231201							No Tailings dumped today
20231202							No Tailings dumped today
20231203							No Tailings dumped today
20231204							No Sample Collected
20231205							No Sample Collected
20231206	0.333	0.163	27.752	5.094	5.45		
20231207	0.335	0.169	27.919	5.281	5.29		
20231208	0.306	0.259	25.502	8.094	3.15		
20231209							No Sample Collected
20231210	0.504	0.104	42.003	3.25	12.92		
20231211							
20231212	0.344	0.161	28.669	5.031	5.7		
20231213	0.394	0.064	32.84	1.994	16.47		
20231214	0.339	0.19	28.25	5.938	4.76		
20231215	0.319	0.195	26.59	6.094	4.36		
20231216	0.408	0.153	34.00	4.781	7.11		
20231217	0.329	0.128	27.42	4	6.85		
20231218	0.36	0.416	30.00	13	2.31		
20231219	0.31	0.136	25.84	4.25	6.08		
20231220	0.328	0.121	27.34	3.781	7.23		
20231221	0.291	0.081	24.25	2.541	9.55		
20231222	0.308	0.156	25.67	4.875	5.27		
20231223	0.34	0.195	28.34	6.094	4.65		
20231224	0.37	0.358	30.84	11.188	2.76		
20231225							No Sample Collected
20231226							

20231227							
20231228							
20231229							
20231230	0.481	0.149	40.09	4.656	8.61		
20231231							

Appendix F. Lab Reports for WTP Waste Samples

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A3442**	Page	: 1 of 8
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Feb-2023 10:35
PO	: 5590012190	Date Analysis Commenced	: 16-Feb-2023
C-O-C number	: D0044	Issue Date	: 23-Feb-2023 12:48
Sampler	: ----		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Colby Bingham	Laboratory Supervisor	Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Laboratory Supervisor	Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Kate Dimitrova	Analsyt	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: WTP Byproduct	----	----	----	----
					Client sampling date / time: 14-Feb-2023 12:52	----	----	----	----
					VA23A3442-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
pH (1:2 soil:water)	----	E108	0.10	pH units	8.62	----	----	----	----
Organic / Inorganic Carbon									
Carbon, total [TC]	----	E351	0.050	%	7.98	----	----	----	----
Inorganics									
Sulfur, total	7704-34-9	E399	500	mg/kg	6380	----	----	----	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	104000	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.54	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	15.2	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	225	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	0.52	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	38.4	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.617	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	20300	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	11.7	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	13.9	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	1150	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	13500	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	5.13	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	14.1	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	9890	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	735	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0993	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	26.4	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	20.9	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	651	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg	1050	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	16.3	----	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	14-Feb-2023 12:52	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3442-001	--------	--------	--------	--------	
					Result	----	----	----	----	
Metals										
Silver	7440-22-4	E440	0.10	mg/kg	0.24	----	----	----	----	
Sodium	7440-23-5	E440	50	mg/kg	935	----	----	----	----	
Strontium	7440-24-6	E440	0.50	mg/kg	487	----	----	----	----	
Sulfur	7704-34-9	E440	1000	mg/kg	5600	----	----	----	----	
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	----	----	----	----	
Tin	7440-31-5	E440	2.0	mg/kg	<2.0	----	----	----	----	
Titanium	7440-32-6	E440	1.0	mg/kg	440	----	----	----	----	
Tungsten	7440-33-7	E440	0.50	mg/kg	0.59	----	----	----	----	
Uranium	7440-61-1	E440	0.050	mg/kg	8.78	----	----	----	----	
Vanadium	7440-62-2	E440	0.20	mg/kg	35.2	----	----	----	----	
Zinc	7440-66-6	E440	2.0	mg/kg	160	----	----	----	----	
Zirconium	7440-67-7	E440	1.0	mg/kg	6.0	----	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	WTP Sludgeline	----	----	----	----
					Client sampling date / time	14-Feb-2023 12:35	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3442-002	--------	--------	--------	--------	
					Result	----	----	----	----	
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	88.3	----	----	----	----	
Conductivity	----	E100	2.0	µS/cm	1140	----	----	----	----	
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	512	----	----	----	----	
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L	512	----	----	----	----	
pH	----	E108	0.10	pH units	8.04	----	----	----	----	
Solids, total dissolved [TDS]	----	E162	10	mg/L	864	----	----	----	----	
Solids, total suspended [TSS]	----	E164	1.0	mg/L	21.2	----	----	----	----	
Turbidity	----	E121	0.10	NTU	11.9	----	----	----	----	
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0394	----	----	----	----	
Chloride	16887-00-6	E235.Cl	0.50	mg/L	9.06	----	----	----	----	
Fluoride	16984-48-8	E235.F	0.020	mg/L	0.465	----	----	----	----	
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	3.94	----	----	----	----	
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L	3.96	----	----	----	----	
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0192	----	----	----	----	
Nitrogen, total	7727-37-9	E366	0.030	mg/L	4.18	----	----	----	----	
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	----	----	----	----	
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0201	----	----	----	----	
Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	----	----	----	----	
Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	509	----	----	----	----	
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	3.74	----	----	----	----	
Total Metals										
Aluminum, total	7429-90-5	E420	0.0030	mg/L	2.39	----	----	----	----	
Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00091	----	----	----	----	
Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00201	----	----	----	----	
Barium, total	7440-39-3	E420	0.00010	mg/L	0.0520	----	----	----	----	
Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	----	----	----	----	
Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----	
Boron, total	7440-42-8	E420	0.010	mg/L	0.136	----	----	----	----	

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	WTP Sludgeline	----	----	----	----
					Client sampling date / time	14-Feb-2023 12:35	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A3442-002	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
Cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000600 DLM	----	----	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L		159	----	----	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L		0.00053	----	----	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00050	----	----	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L		0.0268	----	----	----	----
Iron, total	7439-89-6	E420	0.030	mg/L		0.520	----	----	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L		0.000162	----	----	----	----
Lithium, total	7439-93-2	E420	0.0010	mg/L		0.0074	----	----	----	----
Magnesium, total	7439-95-4	E420	0.100	mg/L		27.8	----	----	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L		0.101	----	----	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.170	----	----	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L		0.00092	----	----	----	----
Potassium, total	7440-09-7	E420	0.050	mg/L		3.57	----	----	----	----
Selenium, total	7782-49-2	E420	0.000050	mg/L		0.0399	----	----	----	----
Silicon, total	7440-21-3	E420	0.10	mg/L		7.24	----	----	----	----
Silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
Sodium, total	7440-23-5	E420	0.050	mg/L		33.0	----	----	----	----
Strontium, total	7440-24-6	E420	0.00020	mg/L		3.20	----	----	----	----
Thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
Tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
Titanium, total	7440-32-6	E420	0.0100	mg/L		0.0240	----	----	----	----
Uranium, total	7440-61-1	E420	0.000010	mg/L		0.00306	----	----	----	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00252	----	----	----	----
Zinc, total	7440-66-6	E420	0.0030	mg/L		0.0074	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.119	----	----	----	----
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00090	----	----	----	----
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00071	----	----	----	----
Barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0442	----	----	----	----
Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	WTP Sludgeline	----	----	----	----
					Client sampling date / time	14-Feb-2023 12:35	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A3442-002	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	----	----
Boron, dissolved	7440-42-8	E421	0.010	mg/L		0.137	----	----	----	----
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000421	----	----	----	----
Calcium, dissolved	7440-70-2	E421	0.050	mg/L		162	----	----	----	----
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	----	----	----
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00012	----	----	----	----
Copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00456	----	----	----	----
Iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	----	----	----	----
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	----	----	----
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0068	----	----	----	----
Magnesium, dissolved	7439-95-4	E421	0.100	mg/L		26.0	----	----	----	----
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0761	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.168	----	----	----	----
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	----	----	----	----
Potassium, dissolved	7440-09-7	E421	0.050	mg/L		3.29	----	----	----	----
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.0393	----	----	----	----
Silicon, dissolved	7440-21-3	E421	0.050	mg/L		5.31	----	----	----	----
Silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
Sodium, dissolved	7440-23-5	E421	0.050	mg/L		30.4	----	----	----	----
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L		3.15	----	----	----	----
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	----	----	----	----
Tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	----	----	----	----
Titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	----	----	----	----
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00256	----	----	----	----
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00104	----	----	----	----
Zinc, dissolved	7440-66-6	E421	0.0030	mg/L		0.0041	----	----	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A3442**	Page	: 1 of 22
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Feb-2023 10:35
PO	: 5590012190	Date Analysis Commenced	: 16-Feb-2023
C-O-C number	: D0044	Issue Date	: 23-Feb-2023 12:48
Sampler	: ---- 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Colby Bingham	Laboratory Supervisor	Saskatoon Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Laboratory Supervisor	Saskatoon Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Kate Dimitrova	Analsyt	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Milad Khani	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 839666)											
CG2301954-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.85	7.86	0.127%	10%	----
Organic / Inorganic Carbon (QC Lot: 840778)											
VA23A3442-001	WTP Byproduct	Carbon, total [TC]	----	E351	0.050	%	7.98	8.02	0.485%	20%	----
Inorganics (QC Lot: 840779)											
VA23A3442-001	WTP Byproduct	Sulfur, total	7704-34-9	E399	0.050	%	6380 mg/kg	0.530	18.5%	20%	----
Metals (QC Lot: 841515)											
RG2300146-006	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	17400	17100	1.69%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.71	0.68	4.87%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	12.4	12.3	0.794%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	218	219	0.511%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.84	0.86	3.07%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.27	0.27	0.003	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	13.8	12.7	1.1	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.507	0.468	7.97%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	31600	30000	5.06%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	32.2	32.9	2.15%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	13.9	13.0	6.82%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	29.8	29.5	1.20%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	27100	25800	4.89%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	14.0	14.1	0.619%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	24.9	23.6	5.44%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	16000	15700	1.98%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	631	589	6.94%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.72	1.71	0.558%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	42.1	41.6	1.22%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	635	617	2.88%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	3130	3030	3.20%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	2.15	2.16	0.276%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.12	0.12	0.001	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1020	1010	1.36%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 841515) - continued											
RG2300146-006	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	69.5	67.5	2.95%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	5000	4000	1000	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.322	0.314	0.009	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	131	134	2.39%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.10	2.13	1.77%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	53.5	52.7	1.63%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	89.4	89.1	0.276%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	12.1	11.9	2.19%	30%	----
Metals (QC Lot: 841516)											
VA23A3442-001	WTP Byproduct	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0993	0.114	0.0148	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 837648)											
FJ2300356-003	Anonymous	pH	----	E108	0.10	pH units	8.46	8.46	0.00%	4%	----
Physical Tests (QC Lot: 837649)											
FJ2300356-003	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	203	205	0.594%	20%	----
Physical Tests (QC Lot: 837650)											
FJ2300356-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	380	380	0.00%	10%	----
Physical Tests (QC Lot: 837795)											
VA23A3440-001	Anonymous	Turbidity	----	E121	0.10	NTU	2.68	2.56	4.51%	15%	----
Physical Tests (QC Lot: 840870)											
KS2300457-001	Anonymous	Solids, total dissolved [TDS]	----	E162	10	mg/L	559	556	0.628%	20%	----
Anions and Nutrients (QC Lot: 837651)											
FJ2300356-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.087	0.083	0.004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 837652)											
FJ2300356-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 837654)											
FJ2300356-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.177	0.175	0.983%	20%	----
Anions and Nutrients (QC Lot: 837655)											
FJ2300356-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 837656)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 837656) - continued											
FJ2300356-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	9.85	9.76	0.917%	20%	----
Anions and Nutrients (QC Lot: 837658)											
FJ2300356-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0030	0.0028	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 840201)											
VA23A3440-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0162	0.0161	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 840202)											
VA23A3440-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0059	0.0058	0.00003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 840203)											
VA23A3440-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.289	0.270	6.76%	20%	----
Anions and Nutrients (QC Lot: 840205)											
VA23A3440-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.150	mg/L	1.85	1.84	0.489%	20%	----
Organic / Inorganic Carbon (QC Lot: 840199)											
VA23A3440-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.35	1.34	0.01	Diff <2x LOR	----
Total Metals (QC Lot: 838286)											
YL2300115-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.280	0.282	0.847%	20%	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00019	0.00019	0.000002	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00109	0.00106	3.44%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0515	0.0511	0.739%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.153	0.157	2.20%	20%	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	29.6	29.5	0.386%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00012	0.00012	0.000006	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00116	0.00110	0.00006	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.165	0.165	0.0126%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	0.000153	0.000153	0.0000006	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0154	0.0155	0.976%	20%	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	7.63	7.50	1.81%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00437	0.00426	2.70%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00693	0.00708	2.16%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.00104	0.00105	0.00001	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	8.28	8.30	0.179%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 838286) - continued											
YL2300115-001	Anonymous	Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000107	0.000075	0.000032	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	5.34	5.34	0.0812%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	12.6	12.4	1.92%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.321	0.325	1.21%	20%	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	0.000011	0.000011	0.00000005	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00617	0.00662	7.02%	20%	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.00357	0.00359	0.609%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00276	0.00271	0.00005	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 838419)											
VA23A3440-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0034	0.0032	0.0002	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00124	0.00124	0.0527%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00298	0.00300	0.575%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0225	0.0222	1.41%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.246	0.257	4.74%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000200	mg/L	<0.0000200	<0.0000200	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	108	110	1.07%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00010	0.00011	0.0000002	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00254	0.00255	0.00001	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0066	0.0066	0.00007	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	21.2	20.8	2.18%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0971	0.0964	0.767%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.220	0.220	0.225%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.949	0.940	0.991%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.0125	0.0130	3.68%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.52	6.40	1.84%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 838419) - continued											
VA23A3440-001	Anonymous	Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	31.2	31.4	0.443%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.938	0.919	2.06%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00462	0.00476	2.96%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00166	0.00166	0.000004	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 840778)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Inorganics (QCLot: 840779)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 841515)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 841515) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 841516)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 837649)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 837650)						
Conductivity	----	E100	1	µS/cm	1.3	----
Physical Tests (QCLot: 837795)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 840640)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 840870)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 837651)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 837652)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 837654)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 837655)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 837656)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 837658)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 840201)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 840202)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 840203)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 840205)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Organic / Inorganic Carbon (QCLot: 840199)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 838286)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 838286) - continued						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 838419)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 838419) - continued						
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 839666)									
pH (1:2 soil:water)	----	E108	----	pH units	7 pH units	100	97.0	103	----
Organic / Inorganic Carbon (QCLot: 840778)									
Carbon, total [TC]	----	E351	0.05	%	48 %	101	90.0	110	----
Inorganics (QCLot: 840779)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	97.8	90.0	110	----
Metals (QCLot: 841515)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	97.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	95.6	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.5	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.5	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	91.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.8	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.4	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.1	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.6	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.1	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.4	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	93.8	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	103	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	97.3	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.9	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	104	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.3	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	95.7	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	83.5	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	96.4	80.0	120	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 841515) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	94.6	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.6	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	92.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	94.6	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	97.5	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.5	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.7	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	90.2	80.0	120	----
Metals (QCLot: 841516)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Physical Tests (QCLot: 837648)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 837649)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 837650)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 837795)									
Turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 840640)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	88.2	85.0	115	----
Physical Tests (QCLot: 840870)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	98.2	85.0	115	----
Anions and Nutrients (QCLot: 837651)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 837652)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 837654)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 837655)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 837656)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 837658)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	94.4	80.0	120	----
Anions and Nutrients (QCLot: 840201)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.3	80.0	120	----
Anions and Nutrients (QCLot: 840202)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	90.6	80.0	120	----
Anions and Nutrients (QCLot: 840203)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 840205)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	96.1	75.0	125	----
Organic / Inorganic Carbon (QCLot: 840199)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	115	80.0	120	----
Total Metals (QCLot: 838286)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.6	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.0	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.0	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.9	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.3	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.8	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	98.7	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 838286) - continued									
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	105	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.4	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.3	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.4	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	109	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.5	80.0	120	----
Dissolved Metals (QCLot: 838419)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.8	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.4	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.0	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.5	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.8	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.7	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.5	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	100	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.1	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.0	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 838419) - continued									
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.8	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.8	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.6	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.9	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.8	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.1	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 837651)										
FJ2300356-002	Anonymous	Fluoride	16984-48-8	E235.F	0.951 mg/L	1 mg/L	95.1	75.0	125	----
Anions and Nutrients (QCLot: 837652)										
FJ2300356-002	Anonymous	Chloride	16887-00-6	E235.Cl	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 837654)										
FJ2300356-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.56 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 837655)										
FJ2300356-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.486 mg/L	0.5 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 837656)										
FJ2300356-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 837658)										
FJ2300356-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0266 mg/L	0.03 mg/L	88.8	70.0	130	----
Anions and Nutrients (QCLot: 840201)										
VA23A3440-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0469 mg/L	0.05 mg/L	93.9	70.0	130	----
Anions and Nutrients (QCLot: 840202)										
VA23A3440-002	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0464 mg/L	0.05 mg/L	92.8	70.0	130	----
Anions and Nutrients (QCLot: 840203)										
VA23A3440-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 840205)										
VA23A3440-002	Anonymous	Nitrogen, total	7727-37-9	E366	ND mg/L	2 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 840199)										
VA23A3440-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 838286)										
YL2300115-002	Anonymous	Aluminum, total	7429-90-5	E420	0.183 mg/L	0.2 mg/L	91.4	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0366 mg/L	0.04 mg/L	91.6	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00917 mg/L	0.01 mg/L	91.7	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 838286) - continued										
YL2300115-002	Anonymous	Boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00377 mg/L	0.004 mg/L	94.2	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Copper, total	7440-50-8	E420	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		Iron, total	7439-89-6	E420	1.84 mg/L	2 mg/L	91.9	70.0	130	----
		Lead, total	7439-92-1	E420	0.0177 mg/L	0.02 mg/L	88.7	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0916 mg/L	0.1 mg/L	91.6	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Molybdenum, total	7439-98-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0366 mg/L	0.04 mg/L	91.4	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		Silicon, total	7440-21-3	E420	9.20 mg/L	10 mg/L	92.0	70.0	130	----
		Silver, total	7440-22-4	E420	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		Tin, total	7440-31-5	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0372 mg/L	0.04 mg/L	93.1	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00399 mg/L	0.004 mg/L	99.8	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		Zinc, total	7440-66-6	E420	0.374 mg/L	0.4 mg/L	93.6	70.0	130	----
Dissolved Metals (QCLot: 838419)										
VA23A3440-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.183 mg/L	0.2 mg/L	91.4	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0370 mg/L	0.04 mg/L	92.4	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00870 mg/L	0.01 mg/L	87.0	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00387 mg/L	0.004 mg/L	96.8	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 838419) - continued										
VA23A3440-002	Anonymous	Chromium, dissolved	7440-47-3	E421	0.0365 mg/L	0.04 mg/L	91.2	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.85 mg/L	2 mg/L	92.7	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0933 mg/L	0.1 mg/L	93.3	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0179 mg/L	0.02 mg/L	89.4	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0362 mg/L	0.04 mg/L	90.5	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	8.88 mg/L	10 mg/L	88.8	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00268 mg/L	0.004 mg/L	66.9	70.0	130	MES
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00363 mg/L	0.004 mg/L	90.7	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0364 mg/L	0.04 mg/L	91.0	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00392 mg/L	0.004 mg/L	97.9	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0955 mg/L	0.1 mg/L	95.5	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.361 mg/L	0.4 mg/L	90.3	70.0	130	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 839666)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	99.9	96.0	104	----
Organic / Inorganic Carbon (QCLot: 840778)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.0	80.0	120	----
Inorganics (QCLot: 840779)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	92.7	70.0	130	----
Metals (QCLot: 841515)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	94.8	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	89.2	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	97.8	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	95.0	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	107	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	94.8	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	104	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	89.8	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	98.8	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	99.2	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	95.8	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	98.3	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	99.7	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	95.7	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	98.3	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.4	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	103	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	103	70.0	130	----
	RM	Silver	7440-22-4	E440	4.06 mg/kg	90.4	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	108	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 841515) - continued									
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	94.9	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	116	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	94.7	70.0	130	----
	RM	Titanium	7440-32-6	E440	839 mg/kg	88.4	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	87.7	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	92.4	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	98.9	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	90.2	70.0	130	----
Metals (QCLot: 841516)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	96.2	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0044

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA23A3442

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	
Email 3	
Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends, st
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please conta

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590008044 Q2 2022	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (ALS use only): 3442 **ALS Contact:** Can Dang **Sampler:** DS, KA, MJ

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Total Sulfur	ICP-MS	Total inorganic carbon	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	TN/NH3	Hardness	Ra-226	Nutrients-1	Total Metals	Dissolved Metals	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
									P	F/P		P	F/P			P			F			
	WTP Byproduct	14-Feb-23	12:52	Soil/Sediment	1	R	R	R														
	WTP Sludgeline	14-Feb-23	12;35	Water	6				R	R	R						R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				2			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Feb 14, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: FEB 15 2023	Time: 1035am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5511**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Mar-2023 12:40
PO	: 5590012190	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: D0055	Issue Date	: 12-Apr-2023 17:13
Sampler	: DS, KA, MJ		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	Internal Subcontracting, North Vancouver, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Due to limited sample weight available, shakeflask leaching procedure and analysis could not be performed on the sample.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: WTP Byproduct	----	----	----	----
					Client sampling date / time: 14-Mar-2023 12:15	----	----	----	----
					VA23A5511-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
pH (1:2 soil:water)	----	E108	0.10	pH units	7.74 FR5	----	----	----	----
Acid Base Accounting									
Carbon, inorganic [IC]	----	C-CAL15	0.02	%	2.33	----	----	----	----
Carbon, total [TC]	----	C-IR07	0.01	%	6.98	----	----	----	----
Carbon, total organic [TOC]	----	C-IR17	0.02	%	4.65	----	----	----	----
Sulfur, total	7704-34-9	S-IR08	0.01	%	0.50	----	----	----	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	135000	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.86	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	29.8	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	224	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	0.61	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	<0.28 DLA	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	47.5	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.643	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	19900	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	15.9	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	14.6	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	2000	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	17800	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	5.50	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	15.2	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	10700	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	674	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg	0.122	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	32.4	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	19.6	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	859	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg	1360	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	14-Mar-2023 12:15	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5511-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Selenium	7782-49-2	E440	0.20	mg/kg		21.7	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		0.27	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		766	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		623	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		5500	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.069 DLA	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.8 DLA	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		755	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		0.72	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		11.7	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		52.8	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		189	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		7.9	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		7.20	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		1.65	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.90	----	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.08	----	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		72	----	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	----	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		1.48	----	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	14-Mar-2023 12:15	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5511-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		3.6	----	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A5511**	Page	: 1 of 11
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 15-Mar-2023 12:40
PO	: 5590012190	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: D0055	Issue Date	: 12-Apr-2023 17:12
Sampler	: DS, KA, MJ 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	ALS Minerals (Vancouver) Internal Subcontracting, North Vancouver, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 868283)											
VA23A5511-001	WTP Byproduct	pH (1:2 soil:water)	----	E108	0.10	pH units	7.74	7.69	0.6%	5%	----
Metals (QC Lot: 868281)											
VA23A5511-001	WTP Byproduct	Mercury	7439-97-6	E510	0.0500	mg/kg	0.122	0.119	0.0026	Diff <2x LOR	----
Metals (QC Lot: 868282)											
VA23A5511-001	WTP Byproduct	Aluminum	7429-90-5	E440	67	mg/kg	135000	125000	7.62%	40%	----
		Antimony	7440-36-0	E440	0.13	mg/kg	0.86	0.72	0.14	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.13	mg/kg	29.8	31.9	6.60%	30%	----
		Barium	7440-39-3	E440	0.67	mg/kg	224	194	14.0%	40%	----
		Beryllium	7440-41-7	E440	0.13	mg/kg	0.61	0.58	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.27	mg/kg	<0.28	<0.27	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	6.7	mg/kg	47.5	42.2	5.2	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.027	mg/kg	0.643	0.599	7.12%	30%	----
		Calcium	7440-70-2	E440	67	mg/kg	19900	18200	9.29%	30%	----
		Chromium	7440-47-3	E440	0.67	mg/kg	15.9	13.5	16.6%	30%	----
		Cobalt	7440-48-4	E440	0.13	mg/kg	14.6	13.0	11.1%	30%	----
		Copper	7440-50-8	E440	0.67	mg/kg	2000	2020	0.615%	30%	----
		Iron	7439-89-6	E440	67	mg/kg	17800	16000	10.6%	30%	----
		Lead	7439-92-1	E440	0.67	mg/kg	5.50	5.12	7.03%	40%	----
		Lithium	7439-93-2	E440	2.7	mg/kg	15.2	13.1	2.0	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	27	mg/kg	10700	9450	12.2%	30%	----
		Manganese	7439-96-5	E440	1.3	mg/kg	674	642	4.84%	30%	----
		Molybdenum	7439-98-7	E440	0.13	mg/kg	32.4	30.6	5.62%	40%	----
		Nickel	7440-02-0	E440	0.67	mg/kg	19.6	17.8	9.96%	30%	----
		Phosphorus	7723-14-0	E440	67	mg/kg	859	846	1.58%	30%	----
		Potassium	7440-09-7	E440	130	mg/kg	1360	1130	18.3%	40%	----
		Selenium	7782-49-2	E440	0.27	mg/kg	21.7	20.6	5.25%	30%	----
		Silver	7440-22-4	E440	0.13	mg/kg	0.27	0.26	0.01	Diff <2x LOR	----
		Sodium	7440-23-5	E440	67	mg/kg	766	716	6.76%	40%	----
		Strontium	7440-24-6	E440	0.67	mg/kg	623	588	5.84%	40%	----
		Sulfur	7704-34-9	E440	1300	mg/kg	5500	5100	300	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 868282) - continued											
VA23A5511-001	WTP Byproduct	Thallium	7440-28-0	E440	0.067	mg/kg	<0.069	<0.067	0.067	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.7	mg/kg	<2.8	<2.7	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.3	mg/kg	755	584	25.6%	40%	----
		Tungsten	7440-33-7	E440	0.67	mg/kg	0.72	<0.67	0.05	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.067	mg/kg	11.7	11.2	3.84%	30%	----
		Vanadium	7440-62-2	E440	0.27	mg/kg	52.8	46.4	12.9%	30%	----
		Zinc	7440-66-6	E440	2.7	mg/kg	189	176	7.66%	30%	----
		Zirconium	7440-67-7	E440	1.3	mg/kg	7.9	6.8	1.1	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 868281)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 868282)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 868282) - continued						
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 869265)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 869266)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 868283)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Metals (QCLot: 868281)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 868282)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	92.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.5	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	89.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	93.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	92.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.3	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.4	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	98.4	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.1	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.1	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	92.4	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	106	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.4	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.3	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	84.7	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	91.5	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	94.6	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.1	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.2	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 868282) - continued									
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	90.7	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	92.5	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	89.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.4	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	85.0	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 869265)										
VA23A5454-001	Anonymous	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	96.0	50.0	140	----
TCLP Metals (QCLot: 869266)										
VA23A5454-001	Anonymous	Antimony, TCLP	7440-36-0	E444	4.88 mg/L	5 mg/L	97.7	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	93.0	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.4 mg/L	12.5 mg/L	99.5	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.218 mg/L	0.25 mg/L	87.1	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.51 mg/L	10 mg/L	95.1	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.226 mg/L	0.25 mg/L	90.4	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	222 mg/L	250 mg/L	88.7	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.14 mg/L	1.25 mg/L	90.9	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.223 mg/L	0.25 mg/L	89.1	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.26 mg/L	2.5 mg/L	90.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	223 mg/L	250 mg/L	89.1	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.13 mg/L	10 mg/L	91.3	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	240 mg/L	250 mg/L	96.0	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.26 mg/L	2.5 mg/L	90.2	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.71 mg/L	5 mg/L	94.2	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.096 mg/L	0.1 mg/L	96.1	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	88.7	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.68 mg/L	5 mg/L	93.5	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	92.7	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.06 mg/L	10 mg/L	90.6	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	82.4	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 868281)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	106	70.0	130	----
Metals (QCLot: 868282)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	104	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	95.7	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	97.5	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	96.8	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	114	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	95.2	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	99.9	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.3	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	98.4	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	98.4	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	102	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	97.8	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.1	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	100	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	102	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	88.3	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	98.2	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	95.8	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	99.0	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 868282) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	95.1	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	99.3	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	98.1	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	89.7	70.0	130	----

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9-APR-2023
Account: APN

CERTIFICATE VA23073322

Project: VA23A5511

This report is for 1 sample of Crushed Rock submitted to our lab in Vancouver, BC, Canada on 20-MAR-2023.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE SOFTWARE DEVELOPMENT GROUP	CAN DANG	ALSEV DATASUBLET

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
DISP-01	Disposal of all sample fractions
LOG-21	Sample logging - ClientBarCode
PUL-31	Pulverize up to 250g 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
C-CAL15	Inorganic carbon by difference	
C-IR07	Total Carbon (IR Spectroscopy)	LECO
S-IR08	Total Sulphur (IR Spectroscopy)	LECO
C-IR17	Non-Carbonate C by multiple HCl leach IR	LECO

This is the Final Report and supersedes any preliminary report with this certificate number.Results apply to samples as submitted.All pages of this report have been checked and approved for release.
***** See Appendix Page for comments regarding this certificate *****

Signature:

Saa Traxler, Director, North Vancouver Operations

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9-APR-2023
Account: APN

Project: VA23A5511

CERTIFICATE OF ANALYSIS VA23073322

Sample Description	Method Analyte Units LOD	WEI-21 Recvd Wt. kg 0.02	C-IR07 C % 0.01	S-IR08 S % 0.01	C-IR17 C organi % 0.02	C-CAL15 C inorga % 0.02
VA23A5511-001		0.19	6.98	0.50	4.65	2.33

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.
2103 Dollarton Hwy
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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9-APR-2023
Account: APN

Project: VA23A5511

CERTIFICATE OF ANALYSIS VA23073322

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
C-CAL15	C-IR07	C-IR17	DISP-01
LOG-21	PUL-31	S-IR08	WEI-21

Chain of Custody (COC) / Analytical Request Form

COC Number: D0055

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590008044 Q2 2022
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 5571

ALS Contact: Can Dang **Sampler:** DS, KA, MJ

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS aqua regia digestion	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	Total inorganic carbon (HCL)	Shake Flask extraction (ph, conductiv	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	WTP Byproduct	14-03-23	12:15	Soil	2	R	R	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23A5511

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

...ion by selecting from drop-down below
...OC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C			
			4			

SHIPMENT RELEASE (client use)

Released by: Dave Stanley	Date: Mar. 14, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: CW	Date: Mar 15	Time: 1240

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6349**	Page	: 1 of 7
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Mar-2023 08:00
PO	: 5590012190	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: T0003	Issue Date	: 18-Apr-2023 11:17
Sampler	: D S, G H, K A		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Paolo Obillo	Account Manager Assistant	Internal Subcontracting, North Vancouver, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mV	millivolts
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Method Spike (MS) - After adding the spike solution to VA23A6349-1, a precipitate was formed, resulting in low recoveries for Sb, As, Cr, Fe, Pb, Se, V and Zr. This issue is expected to be specific to the sample with the spiking solution, and not the sample itself (without spiking solution), as there was no visual precipitate noted. Results for VA23A6349-1 are not expected to be impacted

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: WTP Byproduct	----	----	----	----
					Client sampling date / time: 23-Mar-2023 10:59	----	----	----	----
					VA23A6349-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
Conductivity, leachable	----	E103	2.0	µS/cm	2280	----	----	----	----
Moisture	----	E144	0.25	%	86.3	----	----	----	----
Oxidation-reduction potential [ORP], leachable	----	E127	0.10	mV	190	----	----	----	----
pH	----	E116	0.10	pH units	7.47	----	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	7.59	----	----	----	----
Acid Base Accounting									
Carbon, inorganic [IC]	----	C-CAL15	0.02	%	1.19	----	----	----	----
Carbon, total [TC]	----	C-IR07	0.01	%	3.97	----	----	----	----
Carbon, total organic [TOC]	----	C-IR17	0.02	%	2.78	----	----	----	----
Sulfur, total	7704-34-9	S-IR08	0.01	%	0.39	----	----	----	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	96700	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.78	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	34.4	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	278	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	0.68	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	38.1	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.516	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	18900	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	20.0	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	16.5	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	1310	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	22700	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	6.62	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	24.0	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	13400	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	1250	----	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg	0.103	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	23-Mar-2023 10:59	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6349-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Molybdenum	7439-98-7	E440	0.10	mg/kg		24.5	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		25.9	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		832	----	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		1570	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		11.8	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		0.25	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		893	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		476	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		3900	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		945	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		1.11	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		8.78	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		67.7	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		147	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		9.7	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		7.41	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		1.70	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.92	----	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.10	----	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		75	----	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	23-Mar-2023 10:59	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6349-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		1.06	----	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		4.0	----	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	----	----	----	----
Leachable Anions & Nutrients										
Alkalinity, total (as CaCO3), leachable	----	E294	1.0	mg/L		61.5	----	----	----	----
Ammonia, total, leachable (as N)	7664-41-7	E300	0.0050	mg/L		14.3	----	----	----	----
Bromide, leachable	24959-67-9	E243.Br	0.050	mg/L		2.41	----	----	----	----
Phosphorus, total dissolved	7723-14-0	E381	0.0020	mg/L		0.132	----	----	----	----
Chloride, leachable	16887-00-6	E243.Cl	0.50	mg/L		24.8	----	----	----	----
Fluoride, leachable	16984-48-8	E243.F	0.020	mg/L		1.24	----	----	----	----
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.0010	mg/L		0.169	----	----	----	----
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.0050	mg/L		3.70	----	----	----	----
Sulfate, leachable	14808-79-8	E243.SO4	0.50	mg/L		1300	----	----	----	----
Leachable Metals										
Aluminum, leachable	7429-90-5	E446	0.0050	mg/L		0.624	----	----	----	----
Antimony, leachable	7440-36-0	E446	0.00010	mg/L		0.00345	----	----	----	----
Arsenic, leachable	7440-38-2	E446	0.0010	mg/L		0.0066	----	----	----	----
Barium, leachable	7440-39-3	E446	0.0010	mg/L		0.174	----	----	----	----
Beryllium, leachable	7440-41-7	E446	0.00050	mg/L		<0.00250 DLA	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	23-Mar-2023 10:59	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6349-001	--------	--------	--------	--------
						Result	----	----	----	----
Leachable Metals										
Bismuth, leachable	7440-69-9	E446	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Boron, leachable	7440-42-8	E446	0.010	mg/L		0.155	----	----	----	----
Cadmium, leachable	7440-43-9	E446	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Calcium, leachable	7440-70-2	E446	0.10	mg/L		456	----	----	----	----
Chromium, leachable	7440-47-3	E446	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Cobalt, leachable	7440-48-4	E446	0.00010	mg/L		0.00058	----	----	----	----
Copper, leachable	7440-50-8	E446	0.0010	mg/L		0.360	----	----	----	----
Hardness (as CaCO3), dissolved	----	E446	0.60	mg/L		1200	----	----	----	----
Iron, leachable	7439-89-6	E446	0.030	mg/L		<0.150 DLA	----	----	----	----
Lead, leachable	7439-92-1	E446	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Lithium, leachable	7439-93-2	E446	0.0050	mg/L		<0.0250 DLA	----	----	----	----
Magnesium, leachable	7439-95-4	E446	0.050	mg/L		16.1	----	----	----	----
Manganese, leachable	7439-96-5	E446	0.00050	mg/L		0.0746	----	----	----	----
Mercury, leachable	7439-97-6	E515	0.000050	mg/L		<0.000050	----	----	----	----
Molybdenum, leachable	7439-98-7	E446	0.00010	mg/L		0.702	----	----	----	----
Nickel, leachable	7440-02-0	E446	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Phosphorus, leachable	7723-14-0	E446	0.30	mg/L		<1.50 DLA	----	----	----	----
Potassium, leachable	7440-09-7	E446	0.050	mg/L		18.1	----	----	----	----
Selenium, leachable	7782-49-2	E446	0.00050	mg/L		0.0880	----	----	----	----
Silicon, leachable	7440-21-3	E446	0.050	mg/L		0.671	----	----	----	----
Silver, leachable	7440-22-4	E446	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Sodium, leachable	7440-23-5	E446	0.050	mg/L		80.3	----	----	----	----
Strontium, leachable	7440-24-6	E446	0.00050	mg/L		10.5	----	----	----	----
Sulfur, leachable	7704-34-9	E446	0.50	mg/L		451	----	----	----	----
Thallium, leachable	7440-28-0	E446	0.00010	mg/L		<0.00050 DLA	----	----	----	----
Tin, leachable	7440-31-5	E446	0.00050	mg/L		<0.00250 DLA	----	----	----	----
Titanium, leachable	7440-32-6	E446	0.010	mg/L		<0.050 DLA	----	----	----	----
Uranium, leachable	7440-61-1	E446	0.000010	mg/L		0.00170	----	----	----	----
Vanadium, leachable	7440-62-2	E446	0.0010	mg/L		<0.0050 DLA	----	----	----	----
Zinc, leachable	7440-66-6	E446	0.010	mg/L		<0.050 DLA	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL REPORT

Work Order	: **VA23A6349**	Page	: 1 of 17
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Mar-2023 08:00
PO	: 5590012190	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: T0003	Issue Date	: 18-Apr-2023 11:17
Sampler	: D S, G H, K A 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
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Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Paolo Obillo	Account Manager Assistant	ALS Minerals (Vancouver) Internal Subcontracting, North Vancouver, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 876087)											
VA23A6349-001	WTP Byproduct	Moisture	----	E144	0.25	%	86.3	85.9	0.406%	20%	----
Physical Tests (QC Lot: 876267)											
VA23A4257-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.69	6.66	0.4%	5%	----
Physical Tests (QC Lot: 881506)											
VA23A6349-001	WTP Byproduct	pH	----	E116	0.10	pH units	7.47	7.47	0.00%	5%	----
Physical Tests (QC Lot: 881509)											
VA23A6349-001	WTP Byproduct	Oxidation-reduction potential [ORP], leachable	----	E127	0.10	mV	190	188	1.00%	30%	----
Metals (QC Lot: 876265)											
VA23A4257-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 876266)											
VA23A4257-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	21100	18500	12.8%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.17	0.15	0.01	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	4.43	4.24	4.60%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	40.7	36.6	10.6%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.29	0.25	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.065	0.060	0.005	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	7650	6630	14.2%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	39.9	37.1	7.34%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	14.4	14.6	1.61%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	46.0	42.1	8.98%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	28700	25700	11.0%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	1.99	1.95	0.04	Diff <2x LOR	----
		Lithium	7439-93-2	E440	2.0	mg/kg	9.3	8.4	0.9	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	9080	7910	13.7%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	560	546	2.62%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.21	0.21	0.004	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	29.4	26.9	8.77%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	509	476	6.75%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 876266) - continued											
VA23A4257-001	Anonymous	Potassium	7440-09-7	E440	100	mg/kg	580	510	12.9%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	231	193	38	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	40.7	34.8	15.6%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1800	1560	14.5%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.268	0.244	0.024	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	84.5	75.6	11.1%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	41.8	37.5	10.8%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	3.9	3.6	0.3	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 881510)											
VA23A6349-001	WTP Byproduct	Ammonia, total, leachable (as N)	7664-41-7	E300	0.250	mg/L	14.3	15.2	6.02%	20%	----
Leachable Anions & Nutrients (QC Lot: 881511)											
VA23A6349-001	WTP Byproduct	Alkalinity, total (as CaCO3), leachable	----	E294	1.0	mg/L	61.5	61.4	0.163%	25%	----
Leachable Anions & Nutrients (QC Lot: 881512)											
VA23A6349-001	WTP Byproduct	Phosphorus, total dissolved	7723-14-0	E381	0.0200	mg/L	0.132	0.118	0.0136	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 881513)											
VA23A6349-001	WTP Byproduct	Sulfate, leachable	14808-79-8	E243.SO4	1.00	mg/L	1300	1570	19.2%	30%	----
Leachable Anions & Nutrients (QC Lot: 881514)											
VA23A6349-001	WTP Byproduct	Nitrate (as N), leachable	14797-55-8	E243.NO3	0.100	mg/L	3.70	4.97	29.3%	30%	----
Leachable Anions & Nutrients (QC Lot: 881515)											
VA23A6349-001	WTP Byproduct	Nitrite (as N), leachable	14797-65-0	E243.NO2	0.0200	mg/L	0.169	0.266	44.6%	30%	DUP-H
Leachable Anions & Nutrients (QC Lot: 881516)											
VA23A6349-001	WTP Byproduct	Fluoride, leachable	16984-48-8	E243.F	0.400	mg/L	1.24	1.22	0.018	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 881517)											
VA23A6349-001	WTP Byproduct	Chloride, leachable	16887-00-6	E243.Cl	10.0	mg/L	24.8	32.6	7.89	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 881518)											
VA23A6349-001	WTP Byproduct	Bromide, leachable	24959-67-9	E243.Br	1.00	mg/L	2.41	2.41	0.002	Diff <2x LOR	----
Leachable Metals (QC Lot: 881505)											

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Leachable Metals (QC Lot: 881505) - continued											
VA23A6349-001	WTP Byproduct	Mercury, leachable	7439-97-6	E515	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Leachable Metals (QC Lot: 881507)											
VA23A6349-001	WTP Byproduct	Aluminum, leachable	7429-90-5	E446	0.0250	mg/L	0.624	0.614	1.68%	30%	----
		Antimony, leachable	7440-36-0	E446	0.00050	mg/L	0.00345	0.00345	0.201%	30%	----
		Arsenic, leachable	7440-38-2	E446	0.0050	mg/L	0.0066	0.0072	0.0006	Diff <2x LOR	----
		Barium, leachable	7440-39-3	E446	0.0050	mg/L	0.174	0.189	8.28%	30%	----
		Beryllium, leachable	7440-41-7	E446	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E446	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Boron, leachable	7440-42-8	E446	0.050	mg/L	0.155	0.153	0.001	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E446	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Calcium, leachable	7440-70-2	E446	0.50	mg/L	456	526	14.2%	30%	----
		Chromium, leachable	7440-47-3	E446	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E446	0.00050	mg/L	0.00058	0.00059	0.00002	Diff <2x LOR	----
		Copper, leachable	7440-50-8	E446	0.0050	mg/L	0.360	0.357	0.674%	30%	----
		Iron, leachable	7439-89-6	E446	0.150	mg/L	<0.150	<0.150	0	Diff <2x LOR	----
		Lead, leachable	7439-92-1	E446	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Lithium, leachable	7439-93-2	E446	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
		Magnesium, leachable	7439-95-4	E446	0.250	mg/L	16.1	20.8	25.4%	30%	----
		Manganese, leachable	7439-96-5	E446	0.00250	mg/L	0.0746	0.0779	4.36%	30%	----
		Molybdenum, leachable	7439-98-7	E446	0.00050	mg/L	0.702	0.717	2.05%	30%	----
		Nickel, leachable	7440-02-0	E446	0.00250	mg/L	<0.00250	0.00264	0.00014	Diff <2x LOR	----
		Phosphorus, leachable	7723-14-0	E446	1.50	mg/L	<1.50	<1.50	0	Diff <2x LOR	----
		Potassium, leachable	7440-09-7	E446	0.250	mg/L	18.1	19.6	7.98%	30%	----
		Selenium, leachable	7782-49-2	E446	0.00250	mg/L	0.0880	0.0947	7.31%	30%	----
		Silicon, leachable	7440-21-3	E446	0.250	mg/L	0.671	0.713	0.042	Diff <2x LOR	----
		Silver, leachable	7440-22-4	E446	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Sodium, leachable	7440-23-5	E446	0.250	mg/L	80.3	98.4	20.2%	30%	----
		Strontium, leachable	7440-24-6	E446	0.00250	mg/L	10.5	12.2	14.2%	30%	----
		Sulfur, leachable	7704-34-9	E446	0.50	mg/L	451	527	15.5%	30%	----
		Thallium, leachable	7440-28-0	E446	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E446	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E446	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E446	0.000050	mg/L	0.00170	0.00199	15.7%	30%	----
		Vanadium, leachable	7440-62-2	E446	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Leachable Metals (QC Lot: 881507) - continued											
VA23A6349-001	WTP Byproduct	Zinc, leachable	7440-66-6	E446	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 876087)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 881508)						
Conductivity, leachable	----	E103	2	µS/cm	<2.0	----
Metals (QCLot: 876265)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 876266)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 876266) - continued						
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 880364)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 880365)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----
Leachable Anions & Nutrients (QCLot: 881510)						
Ammonia, total, leachable (as N)	7664-41-7	E300	0.005	mg/L	<0.0050	----
Leachable Anions & Nutrients (QCLot: 881511)						

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Leachable Anions & Nutrients (QCLot: 881511) - continued						
Alkalinity, total (as CaCO3), leachable	----	E294	1	mg/L	<1.0	----
Leachable Anions & Nutrients (QCLot: 881512)						
Phosphorus, total dissolved	7723-14-0	E381	0.002	mg/L	<0.0020	----
Leachable Anions & Nutrients (QCLot: 881513)						
Sulfate, leachable	14808-79-8	E243.SO4	0.5	mg/L	<0.50	----
Leachable Anions & Nutrients (QCLot: 881514)						
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.005	mg/L	# 0.0059	B
Leachable Anions & Nutrients (QCLot: 881515)						
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.001	mg/L	<0.0010	----
Leachable Anions & Nutrients (QCLot: 881516)						
Fluoride, leachable	16984-48-8	E243.F	0.02	mg/L	<0.020	----
Leachable Anions & Nutrients (QCLot: 881517)						
Chloride, leachable	16887-00-6	E243.Cl	0.5	mg/L	<0.50	----
Leachable Anions & Nutrients (QCLot: 881518)						
Bromide, leachable	24959-67-9	E243.Br	0.05	mg/L	<0.050	----
Leachable Metals (QCLot: 881505)						
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	<0.000050	----
Leachable Metals (QCLot: 881507)						
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	<0.0050	----
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	<0.00010	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	<0.0010	----
Barium, leachable	7440-39-3	E446	0.001	mg/L	<0.0010	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	<0.00050	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	<0.00050	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	<0.010	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	<0.000050	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	<0.10	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	<0.00050	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	<0.00010	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	<0.0010	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	<0.030	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	<0.00010	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	<0.0050	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	<0.050	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Leachable Metals (QCLot: 881507) - continued						
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	<0.00010	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	<0.00050	----
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	<0.30	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	<0.050	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	<0.00050	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	<0.050	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	<0.000050	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	<0.050	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	<0.00050	----
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	<0.50	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	<0.00010	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	<0.00050	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	<0.010	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	<0.000010	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	<0.0010	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	<0.010	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 876087)									
Moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Physical Tests (QCLot: 876267)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 881506)									
pH	----	E116	----	pH units	7.04 pH units	99.6	95.0	105	----
Physical Tests (QCLot: 881508)									
Conductivity, leachable	----	E103	2	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 881509)									
Oxidation-reduction potential [ORP], leachable	----	E127	----	mV	220 mV	101	95.0	105	----
Metals (QCLot: 876265)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.1	80.0	120	----
Metals (QCLot: 876266)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	92.0	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	98.4	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.2	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	89.6	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	87.4	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	88.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	94.5	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	86.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	88.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	89.9	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	89.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	90.7	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	91.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	98.5	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	89.6	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	93.5	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	91.7	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	101	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 876266) - continued									
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	91.0	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	92.1	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	83.0	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	94.8	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	93.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	89.4	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	92.3	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	92.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	87.1	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	92.7	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	89.5	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	92.6	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	92.2	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	90.5	80.0	120	----
Leachable Anions & Nutrients (QCLot: 881510)									
Ammonia, total, leachable (as N)	7664-41-7	E300	0.005	mg/L	0.2 mg/L	104	85.0	115	----
Leachable Anions & Nutrients (QCLot: 881511)									
Alkalinity, total (as CaCO3), leachable	----	E294	1	mg/L	500 mg/L	105	85.0	115	----
Leachable Anions & Nutrients (QCLot: 881512)									
Phosphorus, total dissolved	7723-14-0	E381	0.002	mg/L	0.05 mg/L	90.0	80.0	120	----
Leachable Anions & Nutrients (QCLot: 881513)									
Sulfate, leachable	14808-79-8	E243.SO4	0.5	mg/L	25 mg/L	95.9	70.0	130	----
Leachable Anions & Nutrients (QCLot: 881514)									
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.005	mg/L	0.625 mg/L	96.2	70.0	130	----
Leachable Anions & Nutrients (QCLot: 881515)									
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.001	mg/L	0.125 mg/L	94.4	70.0	130	----
Leachable Anions & Nutrients (QCLot: 881516)									
Fluoride, leachable	16984-48-8	E243.F	0.02	mg/L	0.25 mg/L	94.3	70.0	130	----
Leachable Anions & Nutrients (QCLot: 881517)									
Chloride, leachable	16887-00-6	E243.Cl	0.5	mg/L	25 mg/L	95.1	70.0	130	----
Leachable Anions & Nutrients (QCLot: 881518)									
Bromide, leachable	24959-67-9	E243.Br	0.05	mg/L	0.125 mg/L	89.1	70.0	130	----
Leachable Metals (QCLot: 881505)									
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	0.0005 mg/L	91.5	50.0	130	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Leachable Metals (QCLot: 881507)									
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	0.2 mg/L	93.2	70.0	130	----
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	0.1 mg/L	92.0	70.0	130	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	0.1 mg/L	97.4	70.0	130	----
Barium, leachable	7440-39-3	E446	0.001	mg/L	0.025 mg/L	102	70.0	130	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	0.01 mg/L	90.2	70.0	130	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	0.1 mg/L	86.4	50.0	130	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	0.1 mg/L	90.4	70.0	130	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	0.01 mg/L	93.4	70.0	130	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	5 mg/L	91.4	70.0	130	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	0.025 mg/L	91.0	70.0	130	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	0.025 mg/L	89.7	70.0	130	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	0.025 mg/L	91.1	70.0	130	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	0.1 mg/L	95.3	70.0	130	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	0.05 mg/L	95.2	70.0	130	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	0.025 mg/L	88.2	70.0	130	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	5 mg/L	98.5	70.0	130	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	0.025 mg/L	92.2	70.0	130	----
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	0.025 mg/L	92.5	70.0	130	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	0.05 mg/L	89.8	70.0	130	----
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	1 mg/L	97.0	70.0	130	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	5 mg/L	91.2	70.0	130	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	0.1 mg/L	94.2	70.0	130	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	1 mg/L	97.7	70.0	130	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	0.01 mg/L	81.2	50.0	130	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	5 mg/L	95.2	70.0	130	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	0.025 mg/L	93.9	70.0	130	----
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	5 mg/L	99.0	70.0	130	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	0.11 mg/L	85.2	70.0	130	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	0.05 mg/L	92.4	50.0	130	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	0.025 mg/L	87.0	50.0	130	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	0.0005 mg/L	91.2	70.0	130	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	0.05 mg/L	93.0	70.0	130	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	0.05 mg/L	95.2	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 880364)										
VA23A6349-001	WTP Byproduct	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	89.5	50.0	140	----
TCLP Metals (QCLot: 880365)										
VA23A6349-001	WTP Byproduct	Antimony, TCLP	7440-36-0	E444	0.12 mg/L	5 mg/L	2.44	50.0	140	RRQC
		Arsenic, TCLP	7440-38-2	E444	0.05 mg/L	5 mg/L	0.948	50.0	140	RRQC
		Barium, TCLP	7440-39-3	E444	12.1 mg/L	12.5 mg/L	96.7	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.241 mg/L	0.25 mg/L	96.4	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.34 mg/L	10 mg/L	93.4	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.249 mg/L	0.25 mg/L	99.7	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	247 mg/L	250 mg/L	98.7	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	0.01 mg/L	1.25 mg/L	1.18	50.0	140	RRQC
		Cobalt, TCLP	7440-48-4	E444	0.241 mg/L	0.25 mg/L	96.4	50.0	140	----
		Copper, TCLP	7440-50-8	E444	1.57 mg/L	2.5 mg/L	62.9	50.0	140	----
		Iron, TCLP	7439-89-6	E444	2.1 mg/L	250 mg/L	0.830	50.0	140	RRQC
		Lead, TCLP	7439-92-1	E444	3.86 mg/L	10 mg/L	38.6	50.0	140	RRQC
		Magnesium, TCLP	7439-95-4	E444	258 mg/L	250 mg/L	103	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.39 mg/L	2.5 mg/L	95.7	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	0.12 mg/L	5 mg/L	2.44	50.0	140	RRQC
		Silver, TCLP	7440-22-4	E444	0.085 mg/L	0.1 mg/L	85.1	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.1	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.21 mg/L	5 mg/L	84.2	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.005 mg/L	0.75 mg/L	0.681	50.0	140	RRQC
		Zinc, TCLP	7440-66-6	E444	9.12 mg/L	10 mg/L	91.2	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.08 mg/L	10 mg/L	0.820	50.0	150	RRQC
Leachable Metals (QCLot: 881505)										
FJ2300640-002	Anonymous	Mercury, leachable	7439-97-6	E515	0.000095 mg/L	0.0001 mg/L	94.9	70.0	130	----
Leachable Metals (QCLot: 881507)										
FJ2300640-002	Anonymous	Aluminum, leachable	7429-90-5	E446	ND mg/L	0.2 mg/L	ND	70.0	130	----
		Antimony, leachable	7440-36-0	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Arsenic, leachable	7440-38-2	E446	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		Barium, leachable	7440-39-3	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Leachable Metals (QCLot: 881507) - continued										
FJ2300640-002	Anonymous	Beryllium, leachable	7440-41-7	E446	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		Bismuth, leachable	7440-69-9	E446	0.00880 mg/L	0.01 mg/L	88.0	70.0	130	----
		Boron, leachable	7440-42-8	E446	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Cadmium, leachable	7440-43-9	E446	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		Calcium, leachable	7440-70-2	E446	4.04 mg/L	4 mg/L	101	70.0	130	----
		Chromium, leachable	7440-47-3	E446	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		Cobalt, leachable	7440-48-4	E446	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		Copper, leachable	7440-50-8	E446	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Iron, leachable	7439-89-6	E446	1.84 mg/L	2 mg/L	92.0	70.0	130	----
		Lead, leachable	7439-92-1	E446	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		Lithium, leachable	7439-93-2	E446	0.0912 mg/L	0.1 mg/L	91.2	70.0	130	----
		Magnesium, leachable	7439-95-4	E446	0.946 mg/L	1 mg/L	94.6	70.0	130	----
		Manganese, leachable	7439-96-5	E446	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		Molybdenum, leachable	7439-98-7	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, leachable	7440-02-0	E446	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		Phosphorus, leachable	7723-14-0	E446	9.47 mg/L	10 mg/L	94.7	70.0	130	----
		Potassium, leachable	7440-09-7	E446	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, leachable	7782-49-2	E446	0.0365 mg/L	0.04 mg/L	91.2	70.0	130	----
		Silicon, leachable	7440-21-3	E446	9.00 mg/L	10 mg/L	90.0	70.0	130	----
		Silver, leachable	7440-22-4	E446	0.00375 mg/L	0.004 mg/L	93.8	70.0	130	----
		Sodium, leachable	7440-23-5	E446	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, leachable	7440-24-6	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, leachable	7704-34-9	E446	19.1 mg/L	20 mg/L	95.6	70.0	130	----
		Thallium, leachable	7440-28-0	E446	0.00365 mg/L	0.004 mg/L	91.3	70.0	130	----
		Tin, leachable	7440-31-5	E446	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		Titanium, leachable	7440-32-6	E446	0.039 mg/L	0.04 mg/L	96.8	70.0	130	----
		Uranium, leachable	7440-61-1	E446	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		Vanadium, leachable	7440-62-2	E446	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		Zinc, leachable	7440-66-6	E446	0.381 mg/L	0.4 mg/L	95.3	70.0	130	----

Qualifiers

Qualifier	Description
RRQC	*Refer to report comments for information regarding this QC result.*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 876265)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	105	70.0	130	----
Metals (QCLot: 876266)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	101	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	95.8	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	104	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	109	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	97.4	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	97.5	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	105	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	96.9	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	98.0	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	98.1	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	98.3	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	96.1	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	106	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	118	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	98.9	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	96.9	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	96.0	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	97.6	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	104	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 876266) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	100	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.2	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	89.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: T0003

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590008044 Q2 2022
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 6349

ALS Contact: Can Dang **Sampler:** GH, DS, KA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS aqua regia digestion	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	Total inorganic carbon (HCL)	Shake Flask extraction (ph, conductiv	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	WTP Byproduct	23-03-23	10:59	Soil	4	R	R	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23A6349

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4.6			

SHIPMENT RELEASE (client use)

Released by: Kenneth Adusei	Date: Mar. 23, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	March 24	800

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B0791**	Page	: 1 of 7
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 17-May-2023 09:50
PO	: 5590012190	Date Analysis Commenced	: 18-May-2023
C-O-C number	: T0011	Issue Date	: 22-Jun-2023 17:21
Sampler	: DS, GH, KA		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Virginia Smith	Account Manager Assistant	Internal Subcontracting, North Vancouver, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mV	millivolts
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA Vancouver - Environmental	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLB	*Detection Limit Raised. Analyte detected at comparable level in Method Blank.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
FR10	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:10 due to high soil organic content.*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: WTP Byproduct	----	----	----	----
						Client sampling date / time: 16-May-2023 10:25	----	----	----	----
						VA23B0791-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
Conductivity, leachable	----	E103/VA		2.0	µS/cm	1880	----	----	----	----
Moisture	----	E144/VA	A	0.25	%	91.8	----	----	----	----
Oxidation-reduction potential [ORP], leachable	----	E127/VA		0.10	mV	249	----	----	----	----
pH	----	E116/VA		0.10	pH units	7.51	----	----	----	----
pH (1:2 soil:water)	----	E108/VA	A	0.10	pH units	7.71 FR10	----	----	----	----
Acid Base Accounting										
Carbon, inorganic [IC]	----	C-CAL15/1L		0.02	%	0.76	----	----	----	----
Carbon, total [TC]	----	C-IR07/1L		0.01	%	5.09	----	----	----	----
Carbon, total organic [TOC]	----	C-IR17/1L		0.02	%	4.33	----	----	----	----
Sulfur, total	7704-34-9	S-IR08/1L		0.01	%	0.24	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	A	50	mg/kg	72300	----	----	----	----
Antimony	7440-36-0	E440/VA	A	0.10	mg/kg	0.64	----	----	----	----
Arsenic	7440-38-2	E440/VA	A	0.10	mg/kg	23.2	----	----	----	----
Barium	7440-39-3	E440/VA	A	0.50	mg/kg	285	----	----	----	----
Beryllium	7440-41-7	E440/VA	A	0.10	mg/kg	0.89	----	----	----	----
Bismuth	7440-69-9	E440/VA	A	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	A	5.0	mg/kg	15.9	----	----	----	----
Cadmium	7440-43-9	E440/VA	A	0.020	mg/kg	0.368	----	----	----	----
Calcium	7440-70-2	E440/VA	A	50	mg/kg	21800	----	----	----	----
Chromium	7440-47-3	E440/VA	A	0.50	mg/kg	33.8	----	----	----	----
Cobalt	7440-48-4	E440/VA	A	0.10	mg/kg	20.6	----	----	----	----
Copper	7440-50-8	E440/VA	A	0.50	mg/kg	778	----	----	----	----
Iron	7439-89-6	E440/VA	A	50	mg/kg	32400	----	----	----	----
Lead	7439-92-1	E440/VA	A	0.50	mg/kg	7.88	----	----	----	----
Lithium	7439-93-2	E440/VA	A	2.0	mg/kg	26.5	----	----	----	----
Magnesium	7439-95-4	E440/VA	A	20	mg/kg	17600	----	----	----	----
Manganese	7439-96-5	E440/VA	A	1.0	mg/kg	930	----	----	----	----
Mercury	7439-97-6	E510/VA	A	0.0500	mg/kg	0.140	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	16-May-2023 10:25	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B0791-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Molybdenum	7439-98-7	E440/VA	A	0.10	mg/kg	10.4	----	----	----	----
Nickel	7440-02-0	E440/VA	A	0.50	mg/kg	34.0	----	----	----	----
Phosphorus	7723-14-0	E440/VA	A	50	mg/kg	901	----	----	----	----
Potassium	7440-09-7	E440/VA	A	100	mg/kg	2240	----	----	----	----
Selenium	7782-49-2	E440/VA	A	0.20	mg/kg	5.20	----	----	----	----
Silver	7440-22-4	E440/VA	A	0.10	mg/kg	0.34	----	----	----	----
Sodium	7440-23-5	E440/VA	A	50	mg/kg	1030	----	----	----	----
Strontium	7440-24-6	E440/VA	A	0.50	mg/kg	283	----	----	----	----
Sulfur	7704-34-9	E440/VA	A	1000	mg/kg	2600	----	----	----	----
Thallium	7440-28-0	E440/VA	A	0.050	mg/kg	0.082	----	----	----	----
Tin	7440-31-5	E440/VA	A	2.0	mg/kg	<2.0	----	----	----	----
Titanium	7440-32-6	E440/VA	A	1.0	mg/kg	1380	----	----	----	----
Tungsten	7440-33-7	E440/VA	A	0.50	mg/kg	<0.50	----	----	----	----
Uranium	7440-61-1	E440/VA	A	0.050	mg/kg	4.45	----	----	----	----
Vanadium	7440-62-2	E440/VA	A	0.20	mg/kg	82.2	----	----	----	----
Zinc	7440-66-6	E440/VA	A	2.0	mg/kg	151	----	----	----	----
Zirconium	7440-67-7	E440/VA	A	1.0	mg/kg	10.6	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	7.41	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	1.88	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	4.96	----	----	----	----
pH, TCLP final	----	EPP444/VA		0.010	pH units	5.25	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	A	1.00	mg/L	<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	A	1.0	mg/L	<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	A	2.5	mg/L	<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	A	0.025	mg/L	<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	A	0.50	mg/L	<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	A	10	mg/L	140	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	16-May-2023 10:25	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B0791-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Cobalt, TCLP	7440-48-4	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	A	0.050	mg/L	0.161	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	A	5.0	mg/L	<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	A	2.5	mg/L	10.8	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	A	0.0010	mg/L	<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	A	0.25	mg/L	<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	A	0.10	mg/L	<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	A	0.050	mg/L	<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	A	1.0	mg/L	<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	A	0.20	mg/L	<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	A	0.15	mg/L	<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	A	0.50	mg/L	<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	A	10	mg/L	<10	----	----	----	----
Leachable Anions & Nutrients										
Alkalinity, total (as CaCO3), leachable	----	E294/VA	A	1.0	mg/L	68.7	----	----	----	----
Ammonia, total, leachable (as N)	7664-41-7	E300/VA		0.0050	mg/L	1.34	----	----	----	----
Bromide, leachable	24959-67-9	E243.Br/VA	A	0.050	mg/L	0.556	----	----	----	----
Phosphorus, total dissolved	7723-14-0	E381/VA	A	0.0020	mg/L	0.102	----	----	----	----
Chloride, leachable	16887-00-6	E243.Cl/VA	A	0.50	mg/L	16.2	----	----	----	----
Fluoride, leachable	16984-48-8	E243.F/VA	A	0.020	mg/L	0.518	----	----	----	----
Nitrite (as N), leachable	14797-65-0	E243.NO2/VA	A	0.0010	mg/L	0.260	----	----	----	----
Nitrate (as N), leachable	14797-55-8	E243.NO3/VA	A	0.0050	mg/L	<0.645 DLB	----	----	----	----
Sulfate, leachable	14808-79-8	E243.SO4/VA	A	0.50	mg/L	1030	----	----	----	----
Leachable Metals										
Aluminum, leachable	7429-90-5	E446/VA	A	0.0050	mg/L	0.323	----	----	----	----
Antimony, leachable	7440-36-0	E446/VA	A	0.00010	mg/L	0.00174	----	----	----	----
Arsenic, leachable	7440-38-2	E446/VA	A	0.0010	mg/L	0.0092	----	----	----	----
Barium, leachable	7440-39-3	E446/VA	A	0.0010	mg/L	0.154	----	----	----	----
Beryllium, leachable	7440-41-7	E446/VA	A	0.00050	mg/L	<0.00100 DLA	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	16-May-2023 10:25	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B0791-001	--------	--------	--------	--------
						Result	----	----	----	----
Leachable Metals										
Bismuth, leachable	7440-69-9	E446/VA	A	0.00050	mg/L	<0.00100 DLA	----	----	----	----
Boron, leachable	7440-42-8	E446/VA	A	0.010	mg/L	0.103	----	----	----	----
Cadmium, leachable	7440-43-9	E446/VA	A	0.000050	mg/L	<0.000250 DLM	----	----	----	----
Calcium, leachable	7440-70-2	E446/VA	A	0.10	mg/L	410	----	----	----	----
Chromium, leachable	7440-47-3	E446/VA	A	0.00050	mg/L	<0.00100 DLA	----	----	----	----
Cobalt, leachable	7440-48-4	E446/VA	A	0.00010	mg/L	0.00049	----	----	----	----
Copper, leachable	7440-50-8	E446/VA	A	0.0010	mg/L	0.127	----	----	----	----
Hardness (as CaCO3), dissolved	----	E446/VA		0.60	mg/L	1120	----	----	----	----
Iron, leachable	7439-89-6	E446/VA	A	0.030	mg/L	<0.060 DLA	----	----	----	----
Lead, leachable	7439-92-1	E446/VA	A	0.00010	mg/L	<0.00020 DLA	----	----	----	----
Lithium, leachable	7439-93-2	E446/VA	A	0.0050	mg/L	<0.0100 DLA	----	----	----	----
Magnesium, leachable	7439-95-4	E446/VA	A	0.050	mg/L	24.0	----	----	----	----
Manganese, leachable	7439-96-5	E446/VA	A	0.00050	mg/L	0.178	----	----	----	----
Mercury, leachable	7439-97-6	E515/VA	A	0.000050	mg/L	<0.000050	----	----	----	----
Molybdenum, leachable	7439-98-7	E446/VA	A	0.00010	mg/L	0.318	----	----	----	----
Nickel, leachable	7440-02-0	E446/VA	A	0.00050	mg/L	0.00198	----	----	----	----
Phosphorus, leachable	7723-14-0	E446/VA	A	0.30	mg/L	<0.60 DLA	----	----	----	----
Potassium, leachable	7440-09-7	E446/VA	A	0.050	mg/L	8.62	----	----	----	----
Selenium, leachable	7782-49-2	E446/VA	A	0.00050	mg/L	0.0195	----	----	----	----
Silicon, leachable	7440-21-3	E446/VA	A	0.050	mg/L	0.846	----	----	----	----
Silver, leachable	7440-22-4	E446/VA	A	0.000050	mg/L	<0.000100 DLA	----	----	----	----
Sodium, leachable	7440-23-5	E446/VA	A	0.050	mg/L	68.4	----	----	----	----
Strontium, leachable	7440-24-6	E446/VA	A	0.00050	mg/L	3.74	----	----	----	----
Sulfur, leachable	7704-34-9	E446/VA		0.50	mg/L	375	----	----	----	----
Thallium, leachable	7440-28-0	E446/VA	A	0.00010	mg/L	<0.00020 DLA	----	----	----	----
Tin, leachable	7440-31-5	E446/VA	A	0.00050	mg/L	<0.00100 DLA	----	----	----	----
Titanium, leachable	7440-32-6	E446/VA		0.010	mg/L	<0.020 DLA	----	----	----	----
Uranium, leachable	7440-61-1	E446/VA	A	0.000010	mg/L	0.00311	----	----	----	----
Vanadium, leachable	7440-62-2	E446/VA	A	0.0010	mg/L	<0.0020 DLA	----	----	----	----
Zinc, leachable	7440-66-6	E446/VA	A	0.010	mg/L	<0.020 DLA	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B0791**	Page	: 1 of 17
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 17-May-2023 09:50
PO	: 5590012190	Date Analysis Commenced	: 18-May-2023
C-O-C number	: T0011	Issue Date	: 22-Jun-2023 17:21
Sampler	: DS, GH, KA 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Virginia Smith	Account Manager Assistant	ALS Minerals (Vancouver) Internal Subcontracting, North Vancouver, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 948098)											
VA23B0791-001	WTP Byproduct	Moisture	----	E144	0.25	%	91.8	91.5	0.356%	20%	----
Physical Tests (QC Lot: 948122)											
VA23B0728-001	Anonymous	pH	----	E116	0.10	pH units	8.28	8.36	0.962%	5%	----
Physical Tests (QC Lot: 948124)											
VA23B0791-001	WTP Byproduct	Oxidation-reduction potential [ORP], leachable	----	E127	0.10	mV	249	238	4.35%	30%	----
Physical Tests (QC Lot: 950610)											
VA23A9604-002	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.40	8.35	0.6%	5%	----
Metals (QC Lot: 950608)											
VA23A7696-004	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	16700	14600	13.6%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.25	0.20	0.06	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.41	2.94	14.9%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	77.2	72.2	6.70%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.24	0.21	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.074	0.068	0.005	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	3640	3410	6.61%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	26.3	20.5	24.4%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	7.43	5.96	22.0%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	19.2	17.6	8.65%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	20000	16900	17.0%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	2.89	2.61	10.1%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	7.6	7.9	0.4	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	7040	6070	14.8%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	373	311	18.2%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.26	0.20	0.06	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	20.3	16.0	23.6%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	366	364	0.593%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	610	560	10.0%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 950608) - continued											
VA23A7696-004	Anonymous	Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	200	188	12	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	27.6	25.5	7.88%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	926	881	5.05%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.255	0.247	0.008	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	49.4	41.8	16.7%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	46.6	40.5	14.0%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.8	2.9	0.1	Diff <2x LOR	----
Metals (QC Lot: 950609)											
VA23A9604-002	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 948113)											
VA23B0728-001	Anonymous	Sulfate, leachable	14808-79-8	E243.SO4	0.50	mg/L	1310	1320	0.878%	30%	----
Leachable Anions & Nutrients (QC Lot: 948114)											
VA23B0728-001	Anonymous	Nitrate (as N), leachable	14797-55-8	E243.NO3	0.0500	mg/L	9.80	9.16	6.75%	30%	----
Leachable Anions & Nutrients (QC Lot: 948115)											
VA23B0728-001	Anonymous	Chloride, leachable	16887-00-6	E243.Cl	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 948116)											
VA23B0728-001	Anonymous	Alkalinity, total (as CaCO3), leachable	----	E294	1.0	mg/L	11.4	11.4	0%	25%	----
Leachable Anions & Nutrients (QC Lot: 948117)											
VA23B0728-001	Anonymous	Nitrite (as N), leachable	14797-65-0	E243.NO2	0.0100	mg/L	0.265	0.250	5.82%	30%	----
Leachable Anions & Nutrients (QC Lot: 948118)											
VA23B0728-001	Anonymous	Fluoride, leachable	16984-48-8	E243.F	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 948119)											
VA23B0728-001	Anonymous	Bromide, leachable	24959-67-9	E243.Br	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 948126)											
VA23B0791-001	WTP Byproduct	Ammonia, total, leachable (as N)	7664-41-7	E300	0.0050	mg/L	1.34	1.29	3.58%	20%	----
Leachable Metals (QC Lot: 948120)											
VA23B0728-001	Anonymous	Aluminum, leachable	7429-90-5	E446	0.0100	mg/L	0.142	0.153	7.04%	30%	----
		Antimony, leachable	7440-36-0	E446	0.00020	mg/L	0.00422	0.00437	3.39%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Leachable Metals (QC Lot: 948120) - continued											
VA23B0728-001	Anonymous	Arsenic, leachable	7440-38-2	E446	0.0020	mg/L	0.0047	0.0047	0.00004	Diff <2x LOR	----
		Barium, leachable	7440-39-3	E446	0.0020	mg/L	0.0373	0.0384	2.92%	30%	----
		Beryllium, leachable	7440-41-7	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Boron, leachable	7440-42-8	E446	0.020	mg/L	0.057	0.059	0.002	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E446	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Calcium, leachable	7440-70-2	E446	0.20	mg/L	520	537	3.19%	30%	----
		Chromium, leachable	7440-47-3	E446	0.00100	mg/L	0.00412	0.00443	0.00030	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E446	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Copper, leachable	7440-50-8	E446	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
		Iron, leachable	7439-89-6	E446	0.060	mg/L	<0.060	<0.060	0	Diff <2x LOR	----
		Lead, leachable	7439-92-1	E446	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Lithium, leachable	7439-93-2	E446	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Magnesium, leachable	7439-95-4	E446	0.100	mg/L	4.70	4.68	0.223%	30%	----
		Manganese, leachable	7439-96-5	E446	0.00100	mg/L	0.00218	0.00155	0.00062	Diff <2x LOR	----
		Molybdenum, leachable	7439-98-7	E446	0.00020	mg/L	0.0149	0.0144	3.60%	30%	----
		Nickel, leachable	7440-02-0	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Phosphorus, leachable	7723-14-0	E446	0.60	mg/L	<0.60	<0.60	0	Diff <2x LOR	----
		Potassium, leachable	7440-09-7	E446	0.100	mg/L	15.2	15.0	1.28%	30%	----
		Selenium, leachable	7782-49-2	E446	0.00100	mg/L	0.00230	0.00242	0.00012	Diff <2x LOR	----
		Silicon, leachable	7440-21-3	E446	0.100	mg/L	3.57	3.55	0.605%	40%	----
		Silver, leachable	7440-22-4	E446	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, leachable	7440-23-5	E446	0.100	mg/L	48.1	47.9	0.459%	30%	----
		Strontium, leachable	7440-24-6	E446	0.00100	mg/L	3.48	3.42	1.85%	30%	----
		Sulfur, leachable	7704-34-9	E446	0.50	mg/L	486	482	0.714%	30%	----
		Thallium, leachable	7440-28-0	E446	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E446	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E446	0.000020	mg/L	0.000026	0.000021	0.000004	Diff <2x LOR	----
		Vanadium, leachable	7440-62-2	E446	0.0020	mg/L	0.0168	0.0182	7.64%	30%	----
		Zinc, leachable	7440-66-6	E446	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Leachable Metals (QC Lot: 948121)											
VA23B0728-001	Anonymous	Mercury, leachable	7439-97-6	E515	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 948098)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 948123)						
Conductivity, leachable	----	E103	2	µS/cm	<2.0	----
Metals (QCLot: 950608)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 950608) - continued						
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 950609)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 954174)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 954175)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----
Leachable Anions & Nutrients (QCLot: 948113)						
Sulfate, leachable	14808-79-8	E243.SO4	0.5	mg/L	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Leachable Anions & Nutrients (QCLot: 948114)						
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.005	mg/L	# 0.0219	B
Leachable Anions & Nutrients (QCLot: 948115)						
Chloride, leachable	16887-00-6	E243.Cl	0.5	mg/L	<0.50	----
Leachable Anions & Nutrients (QCLot: 948116)						
Alkalinity, total (as CaCO3), leachable	----	E294	1	mg/L	<1.0	----
Leachable Anions & Nutrients (QCLot: 948117)						
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.001	mg/L	<0.0010	----
Leachable Anions & Nutrients (QCLot: 948118)						
Fluoride, leachable	16984-48-8	E243.F	0.02	mg/L	<0.020	----
Leachable Anions & Nutrients (QCLot: 948119)						
Bromide, leachable	24959-67-9	E243.Br	0.05	mg/L	<0.050	----
Leachable Anions & Nutrients (QCLot: 948125)						
Phosphorus, total dissolved	7723-14-0	E381	0.002	mg/L	# 0.0024	B
Leachable Anions & Nutrients (QCLot: 948126)						
Ammonia, total, leachable (as N)	7664-41-7	E300	0.005	mg/L	# 0.0090	B
Leachable Metals (QCLot: 948120)						
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	<0.0050	----
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	<0.00010	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	<0.0010	----
Barium, leachable	7440-39-3	E446	0.001	mg/L	<0.0010	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	<0.00050	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	<0.00050	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	<0.010	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	<0.000050	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	<0.10	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	<0.00050	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	<0.00010	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	<0.0010	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	<0.030	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	<0.00010	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	<0.0050	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	<0.050	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	<0.00050	----
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	<0.00010	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Leachable Metals (QCLot: 948120) - continued						
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	<0.30	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	<0.050	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	<0.00050	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	<0.050	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	<0.000050	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	<0.050	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	<0.00050	----
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	<0.50	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	<0.00010	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	<0.00050	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	<0.010	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	<0.000010	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	<0.0010	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	<0.010	----
Leachable Metals (QCLot: 948121)						
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	<0.000050	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 948098)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 948122)									
pH	----	E116	----	pH units	7.04 pH units	98.9	95.0	105	----
Physical Tests (QCLot: 948123)									
Conductivity, leachable	----	E103	2	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 948124)									
Oxidation-reduction potential [ORP], leachable	----	E127	----	mV	220 mV	99.9	95.0	105	----
Physical Tests (QCLot: 950610)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Metals (QCLot: 950608)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	100.0	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.5	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	95.5	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.6	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.7	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.7	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.8	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.1	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.9	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.9	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.4	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.2	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.5	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	100	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.6	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	97.8	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 950608) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	88.7	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.7	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	101	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.9	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.7	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	99.8	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	95.6	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	103	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.9	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.9	80.0	120	----
Metals (QCLot: 950609)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	111	80.0	120	----
Leachable Anions & Nutrients (QCLot: 948113)									
Sulfate, leachable	14808-79-8	E243.SO4	0.5	mg/L	25 mg/L	101	70.0	130	----
Leachable Anions & Nutrients (QCLot: 948114)									
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.005	mg/L	0.625 mg/L	104	70.0	130	----
Leachable Anions & Nutrients (QCLot: 948115)									
Chloride, leachable	16887-00-6	E243.Cl	0.5	mg/L	25 mg/L	99.1	70.0	130	----
Leachable Anions & Nutrients (QCLot: 948116)									
Alkalinity, total (as CaCO3), leachable	----	E294	1	mg/L	500 mg/L	98.0	85.0	115	----
Leachable Anions & Nutrients (QCLot: 948117)									
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.001	mg/L	0.125 mg/L	92.2	70.0	130	----
Leachable Anions & Nutrients (QCLot: 948118)									
Fluoride, leachable	16984-48-8	E243.F	0.02	mg/L	0.25 mg/L	96.9	70.0	130	----
Leachable Anions & Nutrients (QCLot: 948119)									
Bromide, leachable	24959-67-9	E243.Br	0.05	mg/L	0.125 mg/L	84.2	70.0	130	----
Leachable Anions & Nutrients (QCLot: 948125)									
Phosphorus, total dissolved	7723-14-0	E381	0.002	mg/L	0.05 mg/L	90.9	80.0	120	----
Leachable Anions & Nutrients (QCLot: 948126)									
Ammonia, total, leachable (as N)	7664-41-7	E300	0.005	mg/L	0.2 mg/L	96.0	85.0	115	----
Leachable Metals (QCLot: 948120)									
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	0.2 mg/L	85.0	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Leachable Metals (QCLot: 948120) - continued									
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	0.1 mg/L	95.8	70.0	130	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	0.1 mg/L	98.4	70.0	130	----
Barium, leachable	7440-39-3	E446	0.001	mg/L	0.025 mg/L	99.2	70.0	130	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	0.01 mg/L	87.1	70.0	130	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	0.1 mg/L	82.4	50.0	130	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	0.1 mg/L	95.4	70.0	130	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	0.01 mg/L	89.0	70.0	130	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	5 mg/L	87.4	70.0	130	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	0.025 mg/L	86.0	70.0	130	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	0.025 mg/L	83.7	70.0	130	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	0.025 mg/L	85.9	70.0	130	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	0.1 mg/L	86.1	70.0	130	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	0.05 mg/L	87.3	70.0	130	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	0.025 mg/L	83.5	70.0	130	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	5 mg/L	89.6	70.0	130	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	0.025 mg/L	86.3	70.0	130	----
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	0.025 mg/L	94.3	70.0	130	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	0.05 mg/L	84.2	70.0	130	----
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	1 mg/L	91.8	70.0	130	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	5 mg/L	83.5	70.0	130	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	0.1 mg/L	98.8	70.0	130	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	1 mg/L	101	70.0	130	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	0.01 mg/L	79.6	50.0	130	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	5 mg/L	89.2	70.0	130	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	0.025 mg/L	91.0	70.0	130	----
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	5 mg/L	99.1	70.0	130	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	0.11 mg/L	79.1	70.0	130	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	0.05 mg/L	93.5	50.0	130	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	0.025 mg/L	91.7	50.0	130	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	0.0005 mg/L	90.4	70.0	130	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	0.05 mg/L	86.6	70.0	130	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	0.05 mg/L	88.7	70.0	130	----
Leachable Metals (QCLot: 948121)									
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	0.0005 mg/L	101	50.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 954174)										
VA23B0752-001	Anonymous	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	103	50.0	140	----
TCLP Metals (QCLot: 954175)										
VA23B0752-001	Anonymous	Antimony, TCLP	7440-36-0	E444	5.40 mg/L	5 mg/L	108	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	99.5	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.2 mg/L	12.5 mg/L	106	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.247 mg/L	0.25 mg/L	98.8	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.240 mg/L	0.25 mg/L	96.0	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	234 mg/L	250 mg/L	93.6	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.21 mg/L	1.25 mg/L	96.5	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.239 mg/L	0.25 mg/L	95.7	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.37 mg/L	2.5 mg/L	94.7	50.0	140	----
		Iron, TCLP	7439-89-6	E444	244 mg/L	250 mg/L	97.7	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	263 mg/L	250 mg/L	105	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.43 mg/L	2.5 mg/L	97.4	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.95 mg/L	5 mg/L	99.0	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.104 mg/L	0.1 mg/L	104	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.17 mg/L	5 mg/L	103	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.74 mg/L	0.75 mg/L	99.3	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.54 mg/L	10 mg/L	95.4	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	96.5	50.0	150	----
Leachable Anions & Nutrients (QCLot: 948113)										
VA23B0729-001	Anonymous	Sulfate, leachable	14808-79-8	E243.SO4	ND mg/L	100 mg/L	ND	60.0	140	----
Leachable Anions & Nutrients (QCLot: 948114)										
VA23B0729-001	Anonymous	Nitrate (as N), leachable	14797-55-8	E243.NO3	2.52 mg/L	2.5 mg/L	101	60.0	140	----
Leachable Anions & Nutrients (QCLot: 948115)										
VA23B0729-001	Anonymous	Chloride, leachable	16887-00-6	E243.Cl	104 mg/L	100 mg/L	104	60.0	140	----

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Leachable Anions & Nutrients (QCLot: 948117)										
VA23B0729-001	Anonymous	Nitrite (as N), leachable	14797-65-0	E243.NO2	0.480 mg/L	0.5 mg/L	96.1	60.0	140	----
Leachable Anions & Nutrients (QCLot: 948118)										
VA23B0729-001	Anonymous	Fluoride, leachable	16984-48-8	E243.F	0.941 mg/L	1 mg/L	94.1	60.0	140	----
Leachable Anions & Nutrients (QCLot: 948119)										
VA23B0729-001	Anonymous	Bromide, leachable	24959-67-9	E243.Br	0.467 mg/L	0.5 mg/L	93.4	60.0	140	----
Leachable Metals (QCLot: 948120)										
VA23B0729-001	Anonymous	Aluminum, leachable	7429-90-5	E446	0.189 mg/L	0.2 mg/L	94.6	70.0	130	----
		Antimony, leachable	7440-36-0	E446	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		Arsenic, leachable	7440-38-2	E446	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		Barium, leachable	7440-39-3	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, leachable	7440-41-7	E446	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		Bismuth, leachable	7440-69-9	E446	0.00916 mg/L	0.01 mg/L	91.6	70.0	130	----
		Boron, leachable	7440-42-8	E446	0.099 mg/L	0.1 mg/L	99.1	70.0	130	----
		Cadmium, leachable	7440-43-9	E446	0.00394 mg/L	0.004 mg/L	98.6	70.0	130	----
		Calcium, leachable	7440-70-2	E446	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, leachable	7440-47-3	E446	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		Cobalt, leachable	7440-48-4	E446	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Copper, leachable	7440-50-8	E446	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		Iron, leachable	7439-89-6	E446	1.94 mg/L	2 mg/L	96.8	70.0	130	----
		Lead, leachable	7439-92-1	E446	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Lithium, leachable	7439-93-2	E446	0.0987 mg/L	0.1 mg/L	98.7	70.0	130	----
		Magnesium, leachable	7439-95-4	E446	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, leachable	7439-96-5	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, leachable	7439-98-7	E446	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		Nickel, leachable	7440-02-0	E446	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		Phosphorus, leachable	7723-14-0	E446	9.81 mg/L	10 mg/L	98.1	70.0	130	----
		Potassium, leachable	7440-09-7	E446	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, leachable	7782-49-2	E446	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		Silicon, leachable	7440-21-3	E446	9.94 mg/L	10 mg/L	99.4	70.0	130	----
		Silver, leachable	7440-22-4	E446	0.00380 mg/L	0.004 mg/L	95.1	70.0	130	----
		Sodium, leachable	7440-23-5	E446	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, leachable	7440-24-6	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, leachable	7704-34-9	E446	ND mg/L	20 mg/L	ND	70.0	130	----
		Thallium, leachable	7440-28-0	E446	0.00364 mg/L	0.004 mg/L	90.9	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Leachable Metals (QCLot: 948120) - continued										
VA23B0729-001	Anonymous	Tin, leachable	7440-31-5	E446	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		Titanium, leachable	7440-32-6	E446	0.040 mg/L	0.04 mg/L	101	70.0	130	----
		Uranium, leachable	7440-61-1	E446	ND mg/L	0.004 mg/L	ND	70.0	130	----
		Vanadium, leachable	7440-62-2	E446	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		Zinc, leachable	7440-66-6	E446	0.407 mg/L	0.4 mg/L	102	70.0	130	----
Leachable Metals (QCLot: 948121)										
VA23B0729-001	Anonymous	Mercury, leachable	7439-97-6	E515	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 950608)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	102	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	94.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	100	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	107	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	117	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.6	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	103	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	98.6	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	96.7	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	100	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	96.1	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	107	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	98.2	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.1	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	95.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	108	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	98.8	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	98.3	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	95.7	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	86.0	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	110	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	108	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	103	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 950608) - continued									
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	92.1	70.0	130	----
Metals (QCLot: 950609)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 22-JUN-2023
Account: APN

CERTIFICATE VA23134795

Project: VA23B0791

This report is for 1 sample of Soil submitted to our lab in Vancouver, BC, Canada on 19-MAY-2023.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE SOFTWARE DEVELOPMENT GROUP	CAN DANG	ALSEV DATASUBLET

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
DISP-01	Disposal of all sample fractions
LOG-21	Sample logging - ClientBarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
C-CAL15	Inorganic carbon by difference	
C-IR07	Total Carbon (IR Spectroscopy)	LECO
S-IR08	Total Sulphur (IR Spectroscopy)	LECO
C-IR17	Non-Carbonate C by multiple HCl leach IR	LECO

This is the Final Report and supersedes any preliminary report with this certificate number.Results apply to samples as submitted.All pages of this report have been checked and approved for release.
***** See Appendix Page for comments regarding this certificate *****

Signature:

Saa Traxler, Director, North Vancouver Operations

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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 22-JUN-2023
Account: APN

Project: VA23B0791

CERTIFICATE OF ANALYSIS VA23134795

Sample Description	Method / Analyte / Units / LOD	WEI-21 Recvd Wt. kg 0.02	C-IR07 C % 0.01	S-IR08 S % 0.01	C-IR17 C organi % 0.02	C-CAL15 C inorga % 0.02
VA23B0791-001		0.83	5.09	0.24	4.33	0.76

***** See Appendix Page for comments regarding this certificate *****

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To: **ALS ENVIRONMENTAL**
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 22-JUN-2023
Account: APN

Project: VA23B0791

CERTIFICATE OF ANALYSIS VA23134795

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

C-CAL15	C-IR07	C-IR17	DISP-01
LOG-21	SCR-41	S-IR08	WEI-21

Chain of Custody (COC) / Analytical Request Form

COC Number: T0011

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference

VA23B0791

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimu

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimu

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimu

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends.

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please con

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590008044 Q2 2022
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): B0791

ALS Contact: Can Dang **Sampler:** GH, DS, KA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS aqua regia digestion	Total Carbon (C-IR07)	Total Sulphur (S-IR06)	Total inorganic carbon (HCL)	Shake Flask extraction (ph, conductiv	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	WTP Byproduct	16-May-23	10:25	Soil	4	R	R	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				15	12	10	10

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Kenneth Adusei	May 16, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JC	MAY 17 2023	950 Am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9659**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Aug-2023 16:31
PO	: 5590012190	Date Analysis Commenced	: 25-Aug-2023
C-O-C number	: D0112	Issue Date	: 06-Sep-2023 09:30
Sampler	: DS		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
FR10	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:10 due to high soil organic content.*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: WTP Byproduct	----	----	----	----
					Client sampling date / time: 21-Aug-2023 12:48	----	----	----	----
					VA23B9659-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
Conductivity, leachable	----	E103/VA	2.0	µS/cm	1420	----	----	----	----
Moisture	----	E144/VA	0.25	%	79.4	----	----	----	----
pH	----	E116/VA	0.10	pH units	7.82	----	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	7.55 FR10	----	----	----	----
Organic / Inorganic Carbon									
Carbon, inorganic [IC]	----	E354/SK	0.050	%	0.762	----	----	----	----
Carbon, total [TC]	----	E351/SK	0.050	%	4.01	----	----	----	----
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	E354/SK	0.40	%	6.35	----	----	----	----
Inorganics									
Sulfur, total	7704-34-9	E399/SK	500	mg/kg	2320	----	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	58800	----	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.65	----	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	21.2	----	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	303	----	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.76	----	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	<0.27 DLA	----	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	14.7	----	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.320	----	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	19800	----	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	35.8	----	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	21.0	----	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	718	----	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	27400	----	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	7.34	----	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	21.6	----	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	17000	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	825	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.111	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	21-Aug-2023 12:48	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9659-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		9.30	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		34.1	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		816	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		1890	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		5.51	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		0.25	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		999	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		251	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		2300	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.068 DLA	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		<2.7 DLA	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		1420	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		<0.68 DLA	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		4.16	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		76.7	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		141	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		9.4	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		7.83	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		1.89	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		4.91	----	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		5.07	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		120	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	21-Aug-2023 12:48	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9659-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.139	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		5.2	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL REPORT

Work Order	: **VA23B9659**	Page	: 1 of 12
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 23-Aug-2023 16:31
PO	: 5590012190	Date Analysis Commenced	: 25-Aug-2023
C-O-C number	: D0112	Issue Date	: 06-Sep-2023 09:30
Sampler	: DS 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	Vancouver Metals, Burnaby, British Columbia
Xihua Yao	Laboratory Analyst	Saskatoon Sask Soils, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1109804)											
VA23B9657-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	9.08	9.11	0.3%	5%	----
Physical Tests (QC Lot: 1109811)											
KS2303130-001	Anonymous	Moisture	----	E144	0.25	%	16.6	16.6	0.0147%	20%	----
Physical Tests (QC Lot: 1114053)											
VA23C0395-001	Anonymous	pH	----	E116	0.10	pH units	8.83	8.76	0.796%	5%	----
Organic / Inorganic Carbon (QC Lot: 1105841)											
VA23B9653-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	0.345	0.339	0.006	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1108851)											
CG2311705-001	Anonymous	Carbon, inorganic [IC]	----	E354	0.050	%	1.06	1.06	0.305%	20%	----
Inorganics (QC Lot: 1105842)											
VA23B9653-001	Anonymous	Sulfur, total	7704-34-9	E399	0.050	%	6960 mg/kg	0.711	2.13%	20%	----
Metals (QC Lot: 1109801)											
VA23B9657-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	20400	19600	4.00%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.44	0.38	0.06	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	13.5	12.4	8.41%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	268	267	0.456%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.77	0.72	6.14%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	16.8	16.3	0.5	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.103	0.098	0.005	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	26000	25800	0.641%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	36.1	33.9	6.15%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	17.7	17.2	2.92%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	576	564	2.16%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	56500	55400	1.98%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	3.60	3.17	12.8%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.2	15.2	0.0478%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12000	11700	2.76%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	627	586	6.70%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.56	4.50	1.41%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1109801) - continued											
VA23B9657-001	Anonymous	Nickel	7440-02-0	E440	0.50	mg/kg	16.4	16.0	2.93%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1220	1080	12.0%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2060	1940	5.77%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.88	0.92	0.04	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.24	0.23	0.01	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	2810	2750	1.97%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	212	203	4.53%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	1200	1200	20	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	2.0	<2.0	0.05	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2090	1670	22.0%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.74	<0.50	0.24	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.09	1.03	5.64%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	211	203	3.58%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	53.8	50.7	5.93%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	7.3	5.4	1.8	Diff <2x LOR	----
Metals (QC Lot: 1109802)											
VA23B9657-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0723	0.0702	0.0021	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1109811)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 1114054)						
Conductivity, leachable	----	E103	2	µS/cm	<2.0	----
Organic / Inorganic Carbon (QCLot: 1105841)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Organic / Inorganic Carbon (QCLot: 1108851)						
Carbon, inorganic [IC]	----	E354	0.05	%	<0.050	----
Inorganics (QCLot: 1105842)						
Sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 1109801)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1109801) - continued						
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1109802)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 1107057)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1107058)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
TCLP Metals (QCLot: 1107058) - continued						
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1109804)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1109811)									
Moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Physical Tests (QCLot: 1114053)									
pH	----	E116	----	pH units	7.04 pH units	99.4	95.0	105	----
Physical Tests (QCLot: 1114054)									
Conductivity, leachable	----	E103	2	µS/cm	146.9 µS/cm	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1105841)									
Carbon, total [TC]	----	E351	0.05	%	48 %	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1108851)									
Carbon, inorganic [IC]	----	E354	0.05	%	0.5 %	95.8	90.0	110	----
Inorganics (QCLot: 1105842)									
Sulfur, total	7704-34-9	E399	0.05	%	12.81 %	101	90.0	110	----
Metals (QCLot: 1109801)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.8	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	92.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.4	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	93.1	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.9	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	93.8	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	97.5	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1109801) - continued									
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.2	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.8	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.9	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.2	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.1	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.3	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	96.9	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	94.4	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	96.9	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.3	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.5	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	97.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.7	80.0	120	----
Metals (QCLot: 1109802)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	96.0	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1107057)										
VA23B9657-001	Anonymous	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 1107058)										
VA23B9657-001	Anonymous	Antimony, TCLP	7440-36-0	E444	5.40 mg/L	5 mg/L	108	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	108	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.0 mg/L	12.5 mg/L	104	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.277 mg/L	0.25 mg/L	111	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.75 mg/L	10 mg/L	97.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.260 mg/L	0.25 mg/L	104	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.26 mg/L	1.25 mg/L	101	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.253 mg/L	0.25 mg/L	101	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.46 mg/L	2.5 mg/L	98.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	251 mg/L	250 mg/L	100	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	262 mg/L	250 mg/L	105	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.47 mg/L	2.5 mg/L	98.9	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.47 mg/L	5 mg/L	109	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.076 mg/L	0.1 mg/L	76.1	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	98.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.21 mg/L	5 mg/L	104	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.79 mg/L	0.75 mg/L	105	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	10.8 mg/L	10 mg/L	108	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	1.0 mg/L	1 mg/L	97.6	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1105841)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.1	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1108851)									
	RM	Carbon, inorganic [IC]	----	E354	0.383 %	104	80.0	120	----
Inorganics (QCLot: 1105842)									
	RM	Sulfur, total	7704-34-9	E399	0.352 %	102	70.0	130	----
Metals (QCLot: 1109801)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	92.1	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	99.0	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.1	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	111	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	98.5	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	105	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	96.7	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	96.4	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	98.6	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	97.6	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	96.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	103	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	89.8	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.2	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	90.7	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	101	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	95.6	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	95.5	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1109801) - continued									
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	99.3	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	89.2	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	96.1	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	95.2	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	87.9	70.0	130	----
Metals (QCLot: 1109802)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	97.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0112

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax On File

Email 2

Email 3

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax On File

Email 2

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Can Dang Sampler: DS

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS aqua regia digestion	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	Total inorganic carbon (HCL)	Shake Flask extraction (ph, conductiv	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	WTP Byproduct	21-08-23	12:48	Soil	4	R	R	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23B9659

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

ion by selecting from drop-down below
DC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE-PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Aug. 22, 2023	Time: 15:30	Received by:	Date:	Time:	Received by:	Date: 8/23/23	Time: 11:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

COC Number: D0112

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Vancouver
Work Order Reference
VA23B9659

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely. BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: On File
Email 2:
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: On File
Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] If received by 3pm M-F - no surcharges apply
☐ 4 day [P4] If received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] If received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] If received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] If received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] If received by 10am M-S - 200% rush surcharge
Additional fees may apply to rush requests on weekends,
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please conta

Project Information

ALS Account # / Quote #: VA19-MPMC100-01
Job #:
PO / AFE: 5590012190
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only):

ALS Contact: Can Dang Sampler: DS

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS aqua regia digestion	Total Carbon (C-IR07)	Total Sulphur (S-IR08)	Total inorganic carbon (HCL)	Shake Flask extraction (ph, conductiv	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	WTP Byproduct	21-08-23	12:48	Soil	4	R	R	R	R	R	R			

Environmental Division
Vancouver
Work Order Reference
VA23B9659

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO
Are samples for human consumption/ use?
☐ YES ☐ NO

ion by selecting from drop-down below
DC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE-PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Aug. 22, 2023	Time: 15:30	Received by:	Date:	Time:	Received by:	Date: 8/23/23	Time: 11:20

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C6531**	Page	: 1 of 7
Client	: **Mount Polley Mining Corporation**	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 03-Nov-2023 12:15
PO	: 5590012190	Date Analysis Commenced	: 04-Nov-2023
C-O-C number	: D0157	Issue Date	: 23-Dec-2023 13:38
Sampler	: DS		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Harsha Attanayake	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	Internal Subcontracting, North Vancouver, British Columbia
Kenson Lo		Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mV	millivolts
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: WTP Byproduct	----	----	----	----
					Client sampling date / time: 01-Nov-2023 09:32	----	----	----	----
					VA23C6531-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
Conductivity, leachable	----	E103/VA	2.0	µS/cm	1750	----	----	----	----
Moisture	----	E144/VA	0.25	%	79.6	----	----	----	----
Oxidation-reduction potential [ORP], leachable	----	E127/VA	0.10	mV	299	----	----	----	----
pH	----	E116/VA	0.10	pH units	7.63	----	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	7.87	----	----	----	----
Acid Base Accounting									
Carbon, inorganic [IC]	----	C-CAL15/1L	0.02	%	1.03	----	----	----	----
Carbon, total [TC]	----	C-IR07/1L	0.01	%	2.84	----	----	----	----
Carbon, total organic [TOC]	----	C-IR17/1L	0.02	%	1.81	----	----	----	----
Sulfur, total	7704-34-9	S-IR08/1L	0.01	%	0.27	----	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	71400	----	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.63	----	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	25.8	----	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	330	----	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.75	----	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	<0.20	----	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	17.5	----	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.389	----	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	21800	----	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	24.3	----	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	20.3	----	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	806	----	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	27900	----	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	6.93	----	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	20.8	----	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	17500	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	1040	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.136	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	01-Nov-2023 09:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C6531-001	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		15.8	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		29.9	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		953	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		1630	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		8.07	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		0.24	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		893	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		292	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		3200	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.054	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		<2.0	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		1200	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		0.75	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		5.66	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		76.2	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		152	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		9.2	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		7.55	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		1.98	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		4.96	----	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		5.18	----	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	----	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	----	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	----	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	----	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		<0.50	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		142	----	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	01-Nov-2023 09:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C6531-001	--------	--------	--------	--------
						Result	----	----	----	----
TCLP Metals										
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.212	----	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	----	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	----	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		6.1	----	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	----	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	----	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	----	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	----	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	----	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	----	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	----	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	----	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	----	----	----	----
Leachable Anions & Nutrients										
Alkalinity, total (as CaCO3), leachable	----	E294/VA	2.0	mg/L		96.2	----	----	----	----
Ammonia, total, leachable (as N)	7664-41-7	E300/VA	0.0050	mg/L		1.23	----	----	----	----
Bromide, leachable	24959-67-9	E243.Br/VA	0.050	mg/L		<0.500 DLDS	----	----	----	----
Phosphorus, total dissolved	7723-14-0	E381/VA	0.0020	mg/L		0.0584	----	----	----	----
Chloride, leachable	16887-00-6	E243.Cl/VA	0.50	mg/L		10.8	----	----	----	----
Fluoride, leachable	16984-48-8	E243.F/VA	0.020	mg/L		0.575	----	----	----	----
Nitrite (as N), leachable	14797-65-0	E243.NO2/VA	0.0010	mg/L		0.324	----	----	----	----
Nitrate (as N), leachable	14797-55-8	E243.NO3/VA	0.0050	mg/L		0.854	----	----	----	----
Sulfate, leachable	14808-79-8	E243.SO4/VA	0.50	mg/L		1060	----	----	----	----
Leachable Metals										
Aluminum, leachable	7429-90-5	E446/VA	0.0050	mg/L		0.237	----	----	----	----
Antimony, leachable	7440-36-0	E446/VA	0.00010	mg/L		0.00248	----	----	----	----
Arsenic, leachable	7440-38-2	E446/VA	0.0010	mg/L		0.0086	----	----	----	----
Barium, leachable	7440-39-3	E446/VA	0.0010	mg/L		0.131	----	----	----	----
Beryllium, leachable	7440-41-7	E446/VA	0.00050	mg/L		<0.00100 DLA	----	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	WTP Byproduct	----	----	----	----
					Client sampling date / time	01-Nov-2023 09:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C6531-001	--------	--------	--------	--------
						Result	----	----	----	----
Leachable Metals										
Bismuth, leachable	7440-69-9	E446/VA	0.00050	mg/L		<0.00100 DLA	----	----	----	----
Boron, leachable	7440-42-8	E446/VA	0.010	mg/L		0.083	----	----	----	----
Cadmium, leachable	7440-43-9	E446/VA	0.000050	mg/L		<0.000150 DLM	----	----	----	----
Calcium, leachable	7440-70-2	E446/VA	0.10	mg/L		407	----	----	----	----
Chromium, leachable	7440-47-3	E446/VA	0.00050	mg/L		<0.00100 DLA	----	----	----	----
Cobalt, leachable	7440-48-4	E446/VA	0.00010	mg/L		0.00047	----	----	----	----
Copper, leachable	7440-50-8	E446/VA	0.0010	mg/L		0.0626	----	----	----	----
Hardness (as CaCO3), dissolved	----	E446/VA	0.60	mg/L		1100	----	----	----	----
Iron, leachable	7439-89-6	E446/VA	0.030	mg/L		<0.060 DLA	----	----	----	----
Lead, leachable	7439-92-1	E446/VA	0.00010	mg/L		0.00023	----	----	----	----
Lithium, leachable	7439-93-2	E446/VA	0.0050	mg/L		<0.0100 DLA	----	----	----	----
Magnesium, leachable	7439-95-4	E446/VA	0.050	mg/L		21.6	----	----	----	----
Manganese, leachable	7439-96-5	E446/VA	0.00050	mg/L		0.511	----	----	----	----
Mercury, leachable	7439-97-6	E515/VA	0.000050	mg/L		<0.000050	----	----	----	----
Molybdenum, leachable	7439-98-7	E446/VA	0.00010	mg/L		0.390	----	----	----	----
Nickel, leachable	7440-02-0	E446/VA	0.00050	mg/L		0.00170	----	----	----	----
Phosphorus, leachable	7723-14-0	E446/VA	0.30	mg/L		<0.60 DLA	----	----	----	----
Potassium, leachable	7440-09-7	E446/VA	0.050	mg/L		9.52	----	----	----	----
Selenium, leachable	7782-49-2	E446/VA	0.00050	mg/L		0.0390	----	----	----	----
Silicon, leachable	7440-21-3	E446/VA	0.050	mg/L		1.02	----	----	----	----
Silver, leachable	7440-22-4	E446/VA	0.000050	mg/L		<0.000100 DLA	----	----	----	----
Sodium, leachable	7440-23-5	E446/VA	0.050	mg/L		51.0	----	----	----	----
Strontium, leachable	7440-24-6	E446/VA	0.00050	mg/L		4.05	----	----	----	----
Sulfur, leachable	7704-34-9	E446/VA	0.50	mg/L		444	----	----	----	----
Thallium, leachable	7440-28-0	E446/VA	0.00010	mg/L		<0.00020 DLA	----	----	----	----
Tin, leachable	7440-31-5	E446/VA	0.00050	mg/L		<0.00100 DLA	----	----	----	----
Titanium, leachable	7440-32-6	E446/VA	0.010	mg/L		<0.020 DLA	----	----	----	----
Uranium, leachable	7440-61-1	E446/VA	0.000010	mg/L		0.0166	----	----	----	----
Vanadium, leachable	7440-62-2	E446/VA	0.0010	mg/L		0.0023	----	----	----	----
Zinc, leachable	7440-66-6	E446/VA	0.010	mg/L		<0.020 DLA	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL REPORT

Work Order	: **VA23C6531**	Page	: 1 of 16
Client	: Mount Polley Mining Corporation	Laboratory	: ALS Environmental - Vancouver
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 03-Nov-2023 12:15
PO	: 5590012190	Date Analysis Commenced	: 04-Nov-2023
C-O-C number	: D0157	Issue Date	: 23-Dec-2023 13:38
Sampler	: DS 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
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Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Harsha Attanayake	Laboratory Analyst	Vancouver Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	ALS Minerals (Vancouver) Internal Subcontracting, North Vancouver, British Columbia
Kenson Lo		Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1223131)											
VA23C6531-001	WTP Byproduct	Moisture	----	E144	0.25	%	79.6	79.6	0.0416%	20%	----
Physical Tests (QC Lot: 1225424)											
VA23C6619-020	Anonymous	pH	----	E116	0.10	pH units	8.36	8.45	1.12%	5%	----
Physical Tests (QC Lot: 1231631)											
VA23C6531-001	WTP Byproduct	pH (1:2 soil:water)	----	E108	0.10	pH units	7.87	7.81	0.8%	5%	----
Physical Tests (QC Lot: 1285361)											
VA23C6531-001	WTP Byproduct	Oxidation-reduction potential [ORP], leachable	----	E127	0.10	mV	299	294	1.45%	30%	----
Metals (QC Lot: 1231629)											
VA23C6531-001	WTP Byproduct	Aluminum	7429-90-5	E440	50	mg/kg	71400	80500	12.0%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.63	0.63	0.002	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	25.8	24.4	5.40%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	330	332	0.576%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.75	0.73	3.03%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	17.5	19.9	2.4	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.389	0.420	7.76%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	21800	21700	0.385%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	24.3	22.5	7.70%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	20.3	19.8	2.35%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	806	861	6.67%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	27900	26200	6.27%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	6.93	6.67	3.84%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	20.8	20.3	2.52%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	17500	17400	0.650%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1040	1040	0.113%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	15.8	19.5	21.0%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	29.9	28.6	4.39%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	953	937	1.63%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1630	1600	1.85%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	8.07	9.95	20.9%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1231629) - continued											
VA23C6531-001	WTP Byproduct	Silver	7440-22-4	E440	0.10	mg/kg	0.24	0.25	0.006	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	893	913	2.20%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	292	320	9.18%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	3200	3800	600	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.054	<0.050	0.004	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1200	1170	2.63%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.75	0.67	0.08	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	5.66	6.78	18.1%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	76.2	73.6	3.45%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	152	149	1.54%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	9.2	9.2	0.221%	30%	----
Metals (QC Lot: 1231630)											
VA23C6531-001	WTP Byproduct	Mercury	7439-97-6	E510	0.0500	mg/kg	0.136	0.135	0.0006	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1285355)											
VA23C6531-001	WTP Byproduct	Bromide, leachable	24959-67-9	E243.Br	0.250	mg/L	<0.500	0.259	0.240	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1285356)											
VA23C6531-001	WTP Byproduct	Nitrate (as N), leachable	14797-55-8	E243.NO3	0.0250	mg/L	0.854	0.672	23.9%	30%	----
Leachable Anions & Nutrients (QC Lot: 1285357)											
VA23C6531-001	WTP Byproduct	Chloride, leachable	16887-00-6	E243.Cl	2.50	mg/L	10.8	8.66	2.19	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1285358)											
VA23C6531-001	WTP Byproduct	Fluoride, leachable	16984-48-8	E243.F	0.100	mg/L	0.575	0.573	0.002	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1285359)											
VA23C6531-001	WTP Byproduct	Nitrite (as N), leachable	14797-65-0	E243.NO2	0.0050	mg/L	0.324	0.289	11.3%	30%	----
Leachable Anions & Nutrients (QC Lot: 1285360)											
VA23C6531-001	WTP Byproduct	Sulfate, leachable	14808-79-8	E243.SO4	0.50	mg/L	1060	848	21.9%	30%	----
Leachable Anions & Nutrients (QC Lot: 1285362)											
VA23C6531-001	WTP Byproduct	Alkalinity, total (as CaCO3), leachable	----	E294	2.0	mg/L	96.2	93.3	3.06%	25%	----
Leachable Anions & Nutrients (QC Lot: 1285363)											
VA23C6531-001	WTP Byproduct	Phosphorus, total dissolved	7723-14-0	E381	0.0020	mg/L	0.0584	0.0521	11.3%	30%	----
Leachable Anions & Nutrients (QC Lot: 1285364)											
VA23C6531-001	WTP Byproduct	Ammonia, total, leachable (as N)	7664-41-7	E300	0.100	mg/L	1.23	1.15	6.77%	20%	----
Leachable Metals (QC Lot: 1285365)											

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Leachable Metals (QC Lot: 1285365) - continued											
VA23C6531-001	WTP Byproduct	Aluminum, leachable	7429-90-5	E446	0.0100	mg/L	0.237	0.244	2.89%	30%	----
		Antimony, leachable	7440-36-0	E446	0.00020	mg/L	0.00248	0.00229	8.10%	30%	----
		Arsenic, leachable	7440-38-2	E446	0.0020	mg/L	0.0086	0.0078	0.0008	Diff <2x LOR	----
		Barium, leachable	7440-39-3	E446	0.0020	mg/L	0.131	0.120	9.22%	30%	----
		Beryllium, leachable	7440-41-7	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Boron, leachable	7440-42-8	E446	0.020	mg/L	0.083	0.079	0.004	Diff <2x LOR	----
		Cadmium, leachable	7440-43-9	E446	0.000150	mg/L	<0.000150	<0.000150	0	Diff <2x LOR	----
		Calcium, leachable	7440-70-2	E446	0.20	mg/L	407	330	21.0%	30%	----
		Chromium, leachable	7440-47-3	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E446	0.00020	mg/L	0.00047	0.00041	0.00006	Diff <2x LOR	----
		Copper, leachable	7440-50-8	E446	0.0020	mg/L	0.0626	0.0608	2.83%	30%	----
		Iron, leachable	7439-89-6	E446	0.060	mg/L	<0.060	<0.060	0	Diff <2x LOR	----
		Lead, leachable	7439-92-1	E446	0.00020	mg/L	0.00023	<0.00020	0.00003	Diff <2x LOR	----
		Lithium, leachable	7439-93-2	E446	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Magnesium, leachable	7439-95-4	E446	0.100	mg/L	21.6	17.6	20.7%	30%	----
		Manganese, leachable	7439-96-5	E446	0.00100	mg/L	0.511	0.420	19.4%	30%	----
		Molybdenum, leachable	7439-98-7	E446	0.00020	mg/L	0.390	0.352	10.1%	30%	----
		Nickel, leachable	7440-02-0	E446	0.00100	mg/L	0.00170	0.00151	0.00019	Diff <2x LOR	----
		Phosphorus, leachable	7723-14-0	E446	0.60	mg/L	<0.60	<0.60	0	Diff <2x LOR	----
		Potassium, leachable	7440-09-7	E446	0.100	mg/L	9.52	8.54	10.8%	30%	----
		Selenium, leachable	7782-49-2	E446	0.00100	mg/L	0.0390	0.0358	8.55%	30%	----
		Silicon, leachable	7440-21-3	E446	0.100	mg/L	1.02	1.00	1.27%	40%	----
		Silver, leachable	7440-22-4	E446	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, leachable	7440-23-5	E446	0.100	mg/L	51.0	45.4	11.6%	30%	----
		Strontium, leachable	7440-24-6	E446	0.00100	mg/L	4.05	3.24	22.4%	30%	----
		Sulfur, leachable	7704-34-9	E446	0.50	mg/L	444	351	23.3%	30%	----
		Thallium, leachable	7440-28-0	E446	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E446	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E446	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E446	0.000020	mg/L	0.0166	0.0135	20.6%	30%	----
		Vanadium, leachable	7440-62-2	E446	0.0020	mg/L	0.0023	0.0021	0.0002	Diff <2x LOR	----
		Zinc, leachable	7440-66-6	E446	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Leachable Metals (QC Lot: 1285366)											

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Leachable Metals (QC Lot: 1285366) - continued											
VA23C6531-001	WTP Byproduct	Mercury, leachable	7439-97-6	E515	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1223131)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 1225425)						
Conductivity, leachable	----	E103	2	µS/cm	<2.0	----
Metals (QCLot: 1231629)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1231629) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1231630)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 1230207)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1230208)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----
Leachable Anions & Nutrients (QCLot: 1285355)						
Bromide, leachable	24959-67-9	E243.Br	0.05	mg/L	<0.050	----
Leachable Anions & Nutrients (QCLot: 1285356)						

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Leachable Anions & Nutrients (QCLot: 1285356) - continued						
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.005	mg/L	<0.0050	----
Leachable Anions & Nutrients (QCLot: 1285357)						
Chloride, leachable	16887-00-6	E243.Cl	0.5	mg/L	<0.50	----
Leachable Anions & Nutrients (QCLot: 1285358)						
Fluoride, leachable	16984-48-8	E243.F	0.02	mg/L	<0.020	----
Leachable Anions & Nutrients (QCLot: 1285359)						
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.001	mg/L	<0.0010	----
Leachable Anions & Nutrients (QCLot: 1285360)						
Sulfate, leachable	14808-79-8	E243.SO4	0.5	mg/L	<0.50	----
Leachable Anions & Nutrients (QCLot: 1285362)						
Alkalinity, total (as CaCO3), leachable	----	E294	2	mg/L	<2.0	----
Leachable Anions & Nutrients (QCLot: 1285363)						
Phosphorus, total dissolved	7723-14-0	E381	0.002	mg/L	<0.0020	----
Leachable Anions & Nutrients (QCLot: 1285364)						
Ammonia, total, leachable (as N)	7664-41-7	E300	0.005	mg/L	<0.0050	----
Leachable Metals (QCLot: 1285365)						
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	<0.0050	----
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	<0.00010	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	<0.0010	----
Barium, leachable	7440-39-3	E446	0.001	mg/L	<0.0010	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	<0.00050	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	<0.00050	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	<0.010	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	<0.000050	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	<0.10	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	<0.00050	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	<0.00010	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	<0.0010	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	<0.030	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	<0.00010	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	<0.0050	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	<0.050	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	<0.00050	----
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	<0.00010	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Leachable Metals (QCLot: 1285365) - continued						
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	<0.30	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	<0.050	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	<0.00050	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	<0.050	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	<0.000050	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	<0.050	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	<0.00050	----
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	<0.50	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	<0.00010	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	<0.00050	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	<0.010	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	<0.000010	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	<0.0010	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	<0.010	----
Leachable Metals (QCLot: 1285366)						
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1223131)									
Moisture	----	E144	0.25	%	50 %	99.6	90.0	110	----
Physical Tests (QCLot: 1225424)									
pH	----	E116	----	pH units	7.04 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 1225425)									
Conductivity, leachable	----	E103	2	µS/cm	146.9 µS/cm	92.0	90.0	110	----
Physical Tests (QCLot: 1231631)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1285361)									
Oxidation-reduction potential [ORP], leachable	----	E127	----	mV	220 mV	101	95.0	105	----
Metals (QCLot: 1231629)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.9	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	98.4	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	100	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.9	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	93.5	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	94.1	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.6	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.8	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.7	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	92.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	91.9	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	93.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	90.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	103	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	99.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	97.5	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.8	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	110	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.4	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.1	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1231629) - continued									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	96.9	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.8	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	94.7	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.1	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.6	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.0	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	93.6	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100.0	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.5	80.0	120	----
Metals (QCLot: 1231630)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.7	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1285355)									
Bromide, leachable	24959-67-9	E243.Br	0.05	mg/L	0.125 mg/L	92.3	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1285356)									
Nitrate (as N), leachable	14797-55-8	E243.NO3	0.005	mg/L	0.625 mg/L	98.6	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1285357)									
Chloride, leachable	16887-00-6	E243.Cl	0.5	mg/L	25 mg/L	96.9	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1285358)									
Fluoride, leachable	16984-48-8	E243.F	0.02	mg/L	0.25 mg/L	95.8	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1285359)									
Nitrite (as N), leachable	14797-65-0	E243.NO2	0.001	mg/L	0.125 mg/L	96.0	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1285360)									
Sulfate, leachable	14808-79-8	E243.SO4	0.5	mg/L	25 mg/L	99.5	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1285362)									
Alkalinity, total (as CaCO3), leachable	----	E294	2	mg/L	500 mg/L	105	85.0	115	----
Leachable Anions & Nutrients (QCLot: 1285364)									
Ammonia, total, leachable (as N)	7664-41-7	E300	0.005	mg/L	0.2 mg/L	104	85.0	115	----
Leachable Metals (QCLot: 1285365)									
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	0.2 mg/L	105	70.0	130	----
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	0.1 mg/L	92.8	70.0	130	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	0.1 mg/L	102	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Leachable Metals (QCLot: 1285365) - continued									
Barium, leachable	7440-39-3	E446	0.001	mg/L	0.025 mg/L	102	70.0	130	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	0.01 mg/L	91.3	70.0	130	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	0.1 mg/L	94.9	50.0	130	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	0.1 mg/L	91.8	70.0	130	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	0.01 mg/L	98.6	70.0	130	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	5 mg/L	93.5	70.0	130	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	0.025 mg/L	100	70.0	130	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	0.025 mg/L	98.4	70.0	130	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	0.025 mg/L	96.6	70.0	130	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	0.1 mg/L	104	70.0	130	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	0.05 mg/L	99.4	70.0	130	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	0.025 mg/L	91.7	70.0	130	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	5 mg/L	102	70.0	130	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	0.025 mg/L	103	70.0	130	----
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	0.025 mg/L	94.9	70.0	130	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	0.05 mg/L	99.5	70.0	130	----
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	1 mg/L	111	70.0	130	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	5 mg/L	101	70.0	130	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	0.1 mg/L	103	70.0	130	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	1 mg/L	102	70.0	130	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	0.01 mg/L	91.0	50.0	130	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	5 mg/L	103	70.0	130	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	0.025 mg/L	98.2	70.0	130	----
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	5 mg/L	106	70.0	130	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	0.11 mg/L	82.7	70.0	130	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	0.05 mg/L	96.0	50.0	130	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	0.025 mg/L	93.6	50.0	130	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	0.0005 mg/L	105	70.0	130	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	0.05 mg/L	100	70.0	130	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	0.05 mg/L	99.3	70.0	130	----
Leachable Metals (QCLot: 1285366)									
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	0.0005 mg/L	94.2	50.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1230207)										
VA23C6531-001	WTP Byproduct	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	96.3	50.0	140	----
TCLP Metals (QCLot: 1230208)										
VA23C6531-001	WTP Byproduct	Antimony, TCLP	7440-36-0	E444	4.99 mg/L	5 mg/L	99.8	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.5 mg/L	12.5 mg/L	100	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.269 mg/L	0.25 mg/L	108	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.74 mg/L	10 mg/L	97.4	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.246 mg/L	0.25 mg/L	98.3	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	257 mg/L	250 mg/L	103	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.24 mg/L	1.25 mg/L	99.0	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.248 mg/L	0.25 mg/L	99.4	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.42 mg/L	2.5 mg/L	96.8	50.0	140	----
		Iron, TCLP	7439-89-6	E444	249 mg/L	250 mg/L	99.4	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.5 mg/L	10 mg/L	105	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	260 mg/L	250 mg/L	104	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.48 mg/L	2.5 mg/L	99.1	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.99 mg/L	5 mg/L	99.8	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.086 mg/L	0.1 mg/L	85.8	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.11 mg/L	5 mg/L	102	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.78 mg/L	10 mg/L	97.8	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	82.9	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1231629)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	94.7	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.4	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	106	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	117	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	92.5	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	107	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	99.0	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	93.5	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.6	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	97.7	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	98.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.3	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	100	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	106	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	96.1	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	99.6	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	96.7	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	91.2	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	106	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	103	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1231629) - continued									
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	101	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	95.0	70.0	130	----
Metals (QCLot: 1231630)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0157

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference

VA23C6531

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minim
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mini
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mini
Street:	PO BOX 12	Email 1 or Fax On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mini
City/Province:	Likely. BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharg
Postal Code:	V0L 1N0	Email 3	Additional fees may apply to rush requests on weeke
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Recipients**	Date and Time Required for all E&P TATs:
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please
Company:		Email 1 or Fax On File	
Contact:	On File	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Can Dang	Sampler: DS

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	ICP-MS aqua regia digestion	Total Carbon (C-IR07)	Total Sulphur (S-IR06)	Total inorganic carbon (HCL)	Shake Flask extraction (ph, conductiv	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	WTP Byproduct	1-Nov-23	9:32	Soil	4	R	R	R	R	R	R			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				6	3	6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: Nov. 2, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: CW	Date: Nov 3	Time: 1215

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FRONT

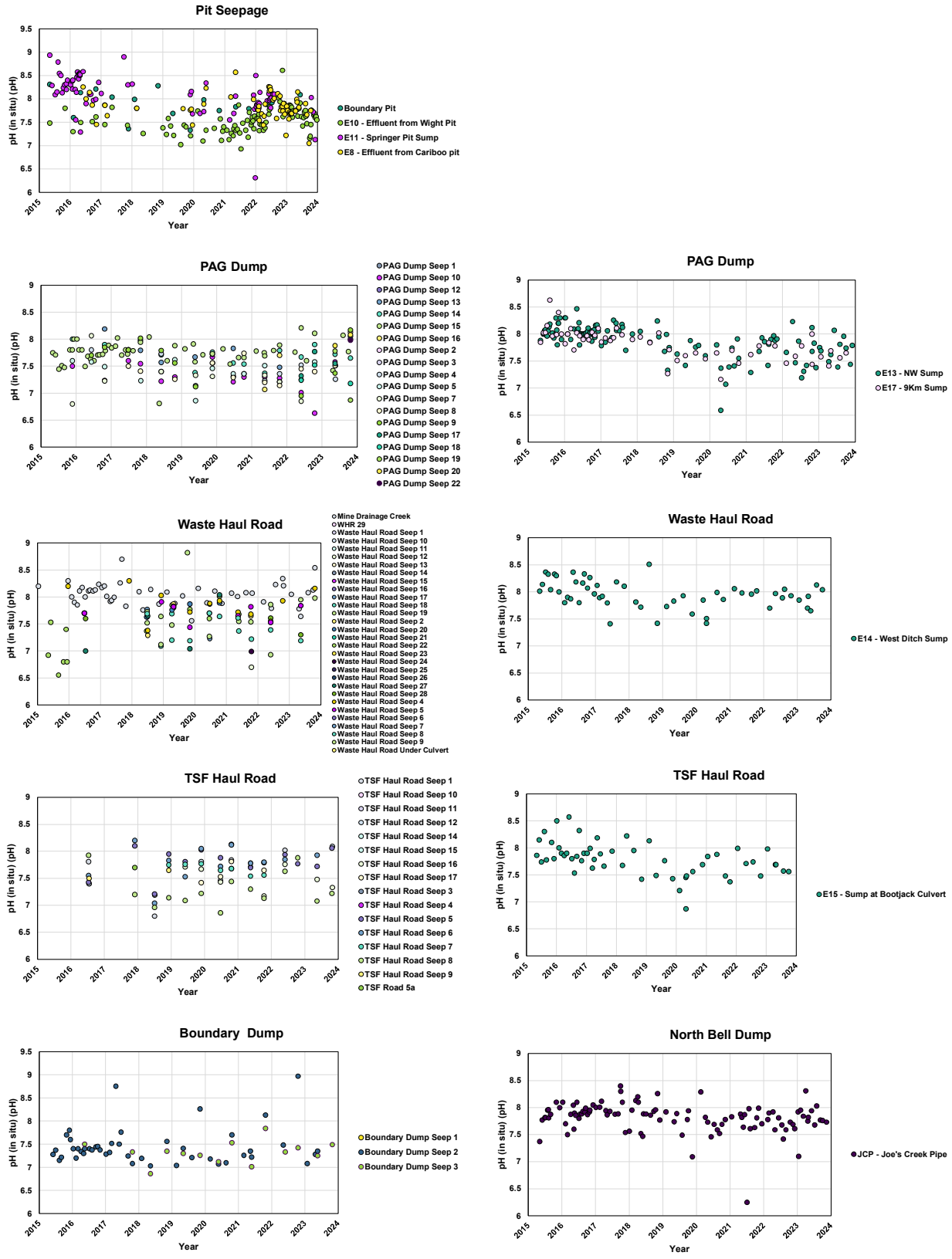
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Appendix G. Seep and Contact Water Chemistry Plots

Appendix G: Water Quality Time Series Plots

Figure 1: Field pH values at seep and contact water monitoring stations 2015 to 2023



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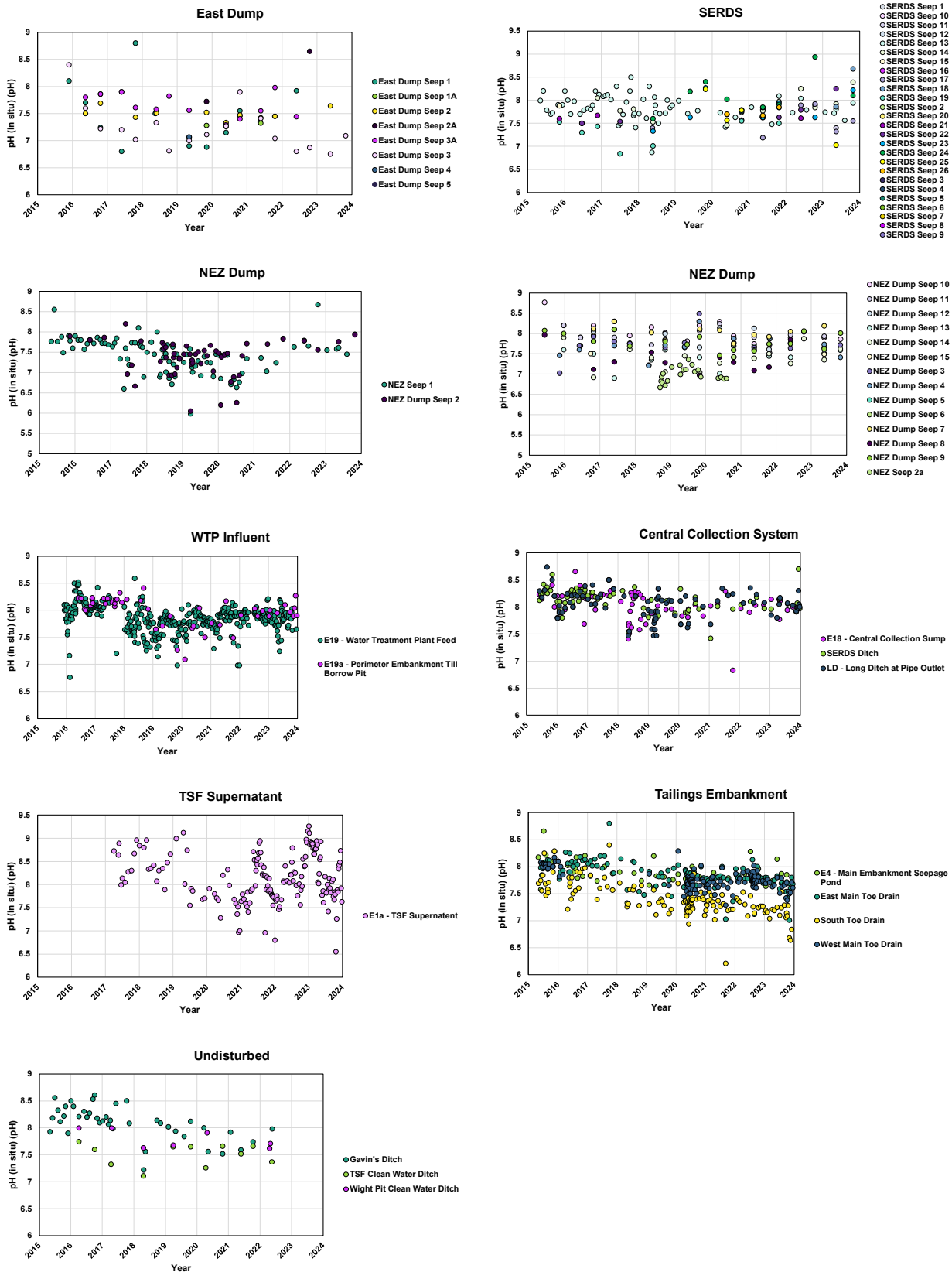
Appendix G: Water Quality Time Series Plots



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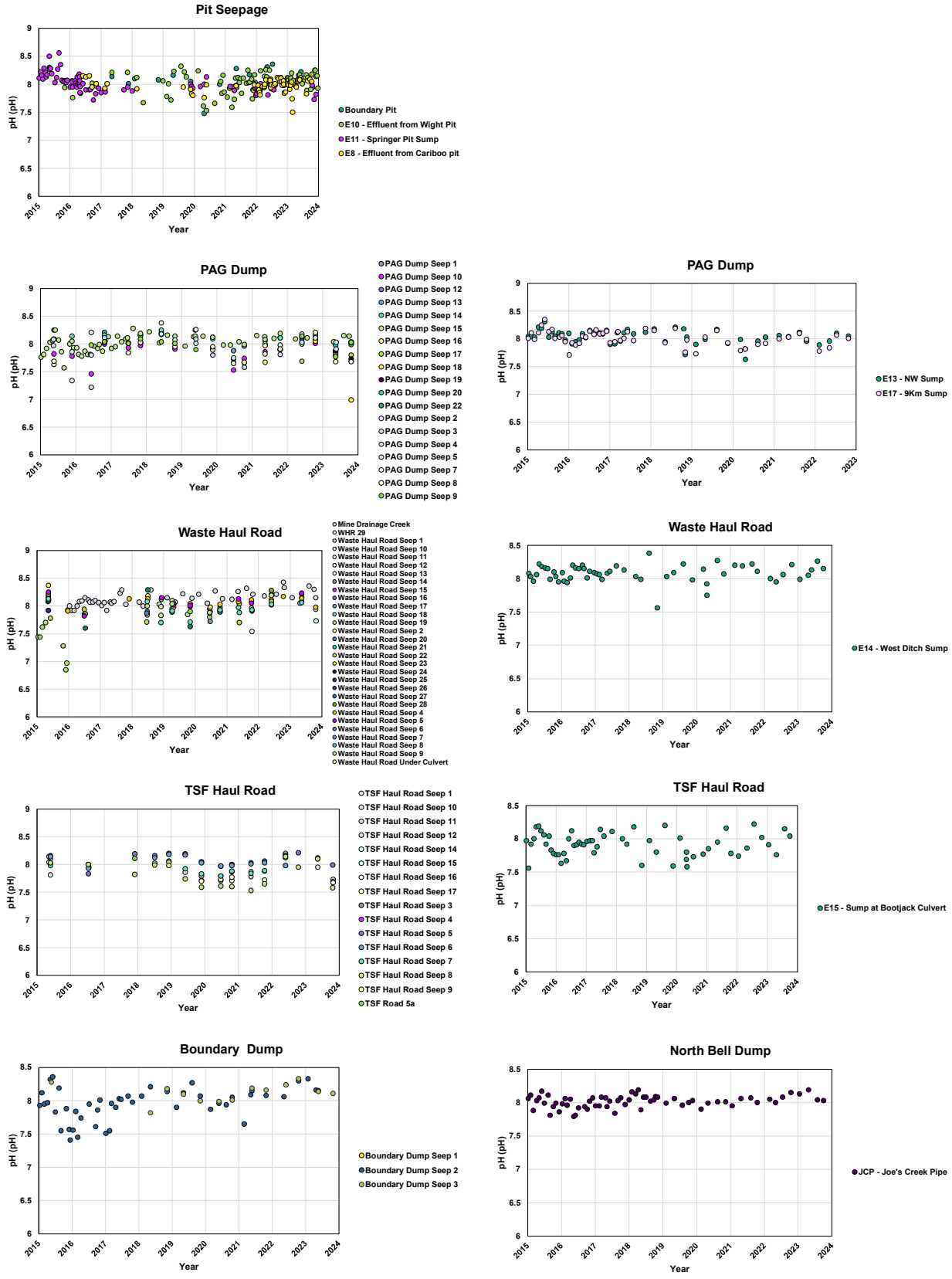
Appendix G: Water Quality Time Series Plots

Figure 2: Laboratory pH values at seep and contact water monitoring stations 2015 to 2023



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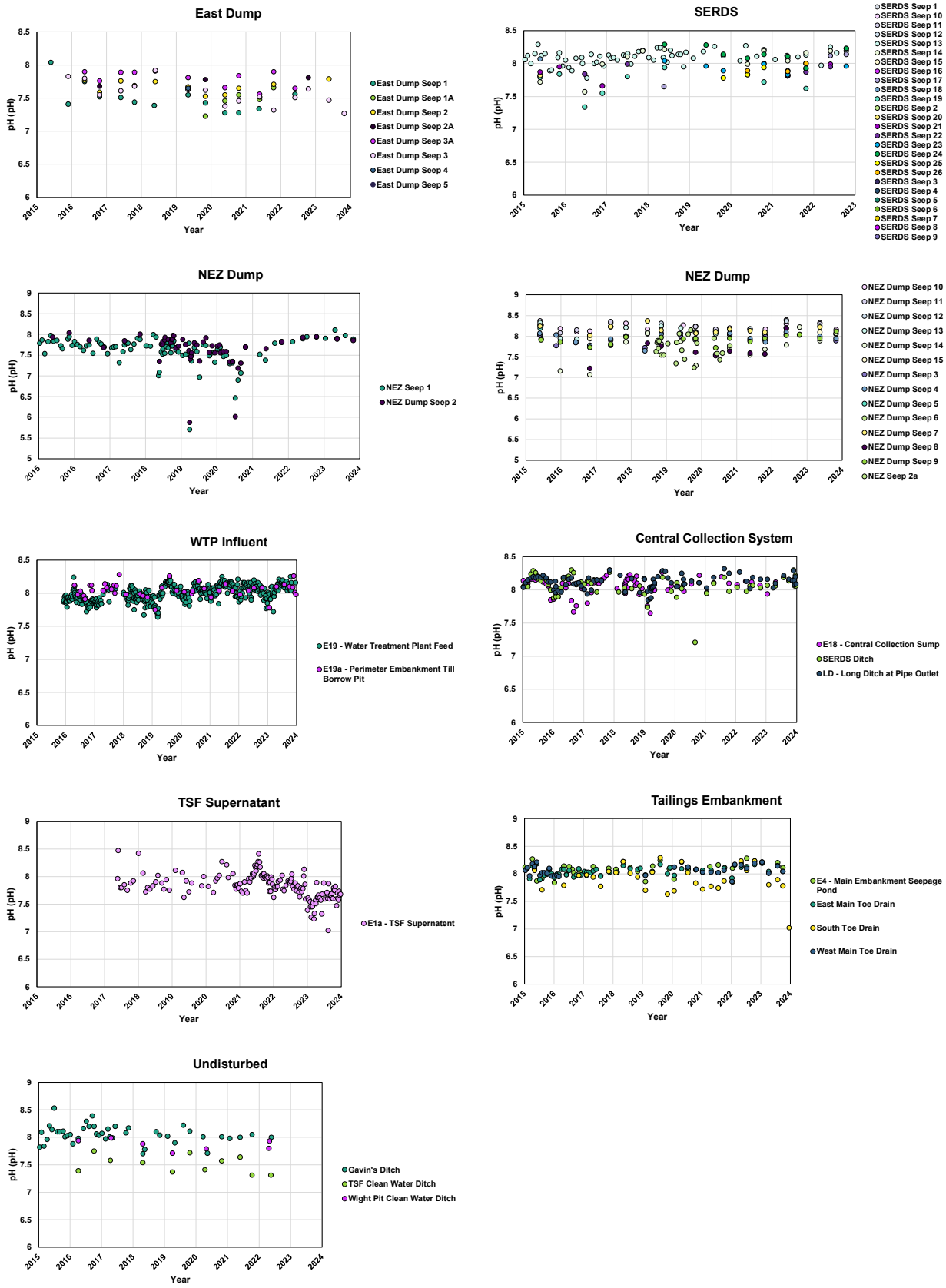
Appendix G: Water Quality Time Series Plots



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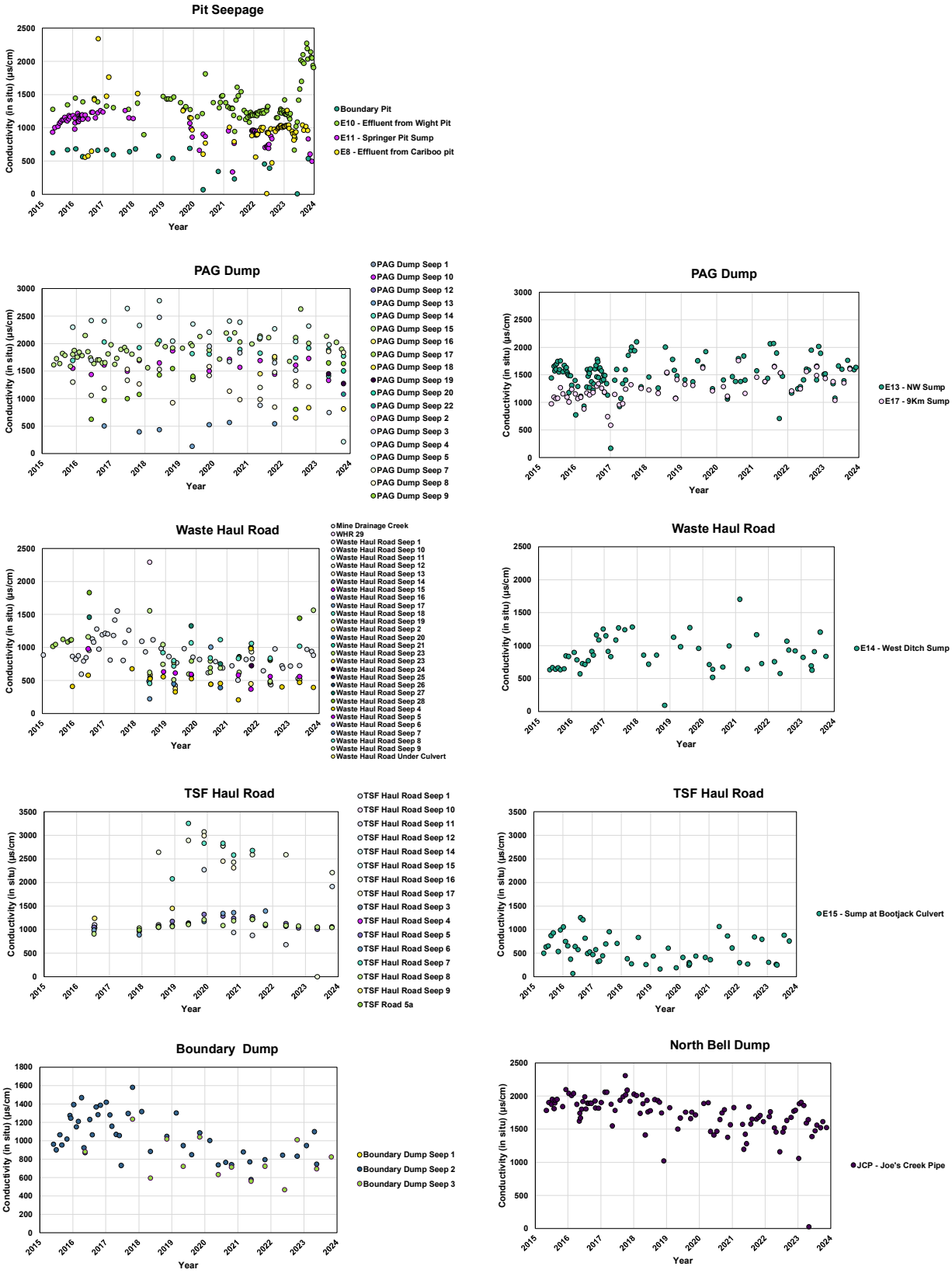
Appendix G: Water Quality Time Series Plots

Figure 3: Field conductivity values at seep and contact water monitoring stations 2015 to 2023



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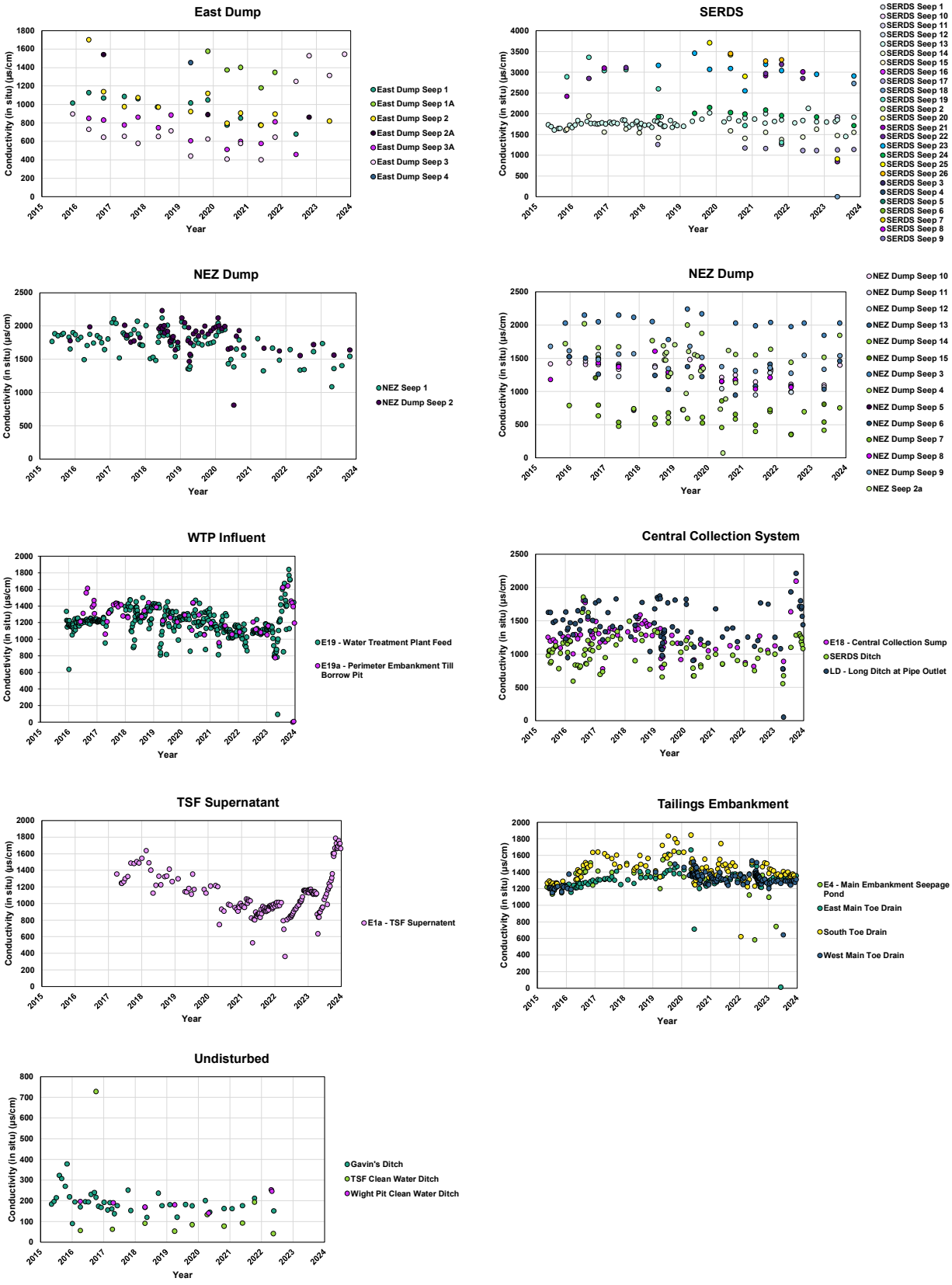
Appendix G: Water Quality Time Series Plots



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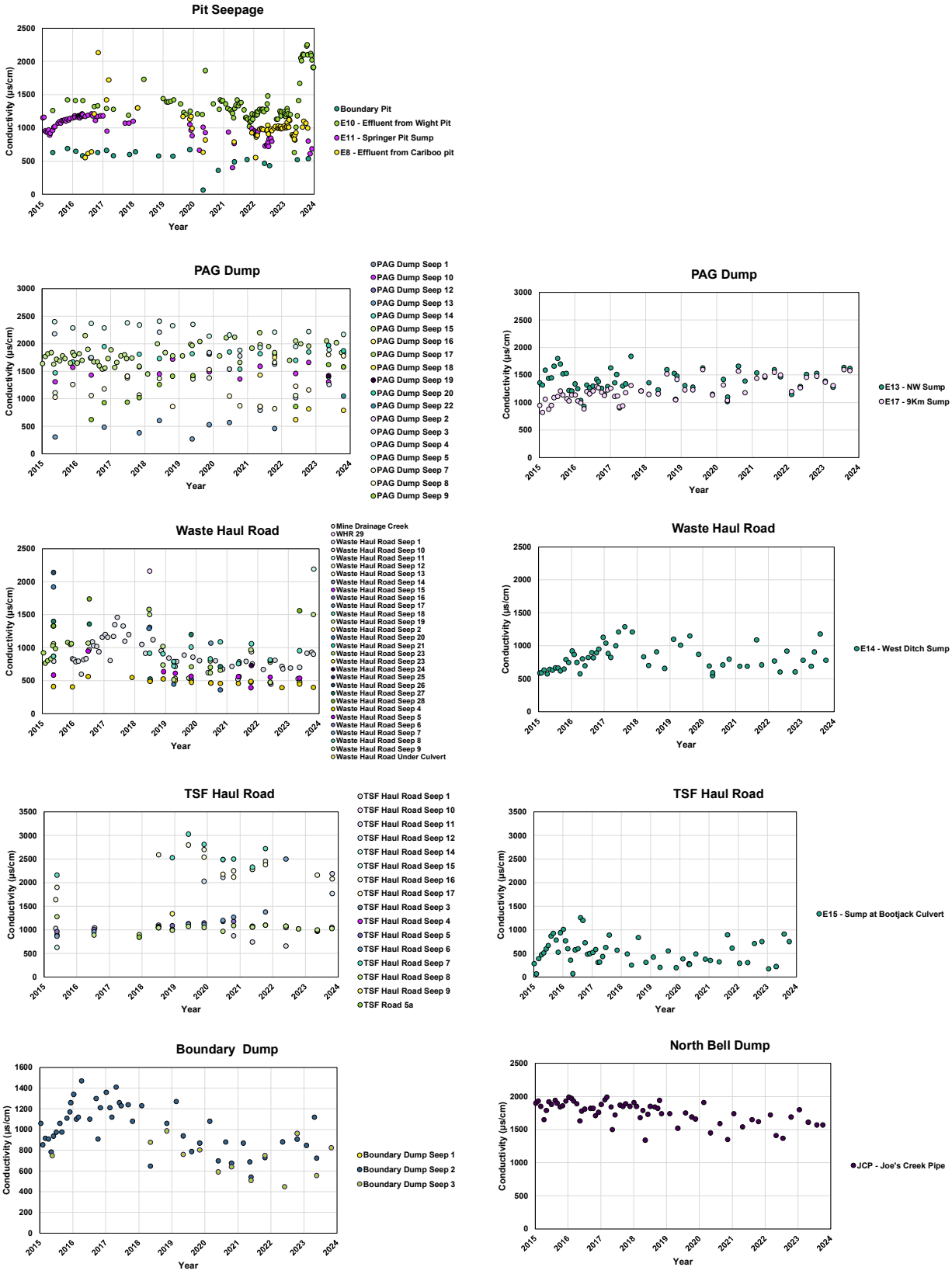
Appendix G: Water Quality Time Series Plots

Figure 4: Laboratory conductivity values at seep and contact water monitoring stations 2015 to 2023



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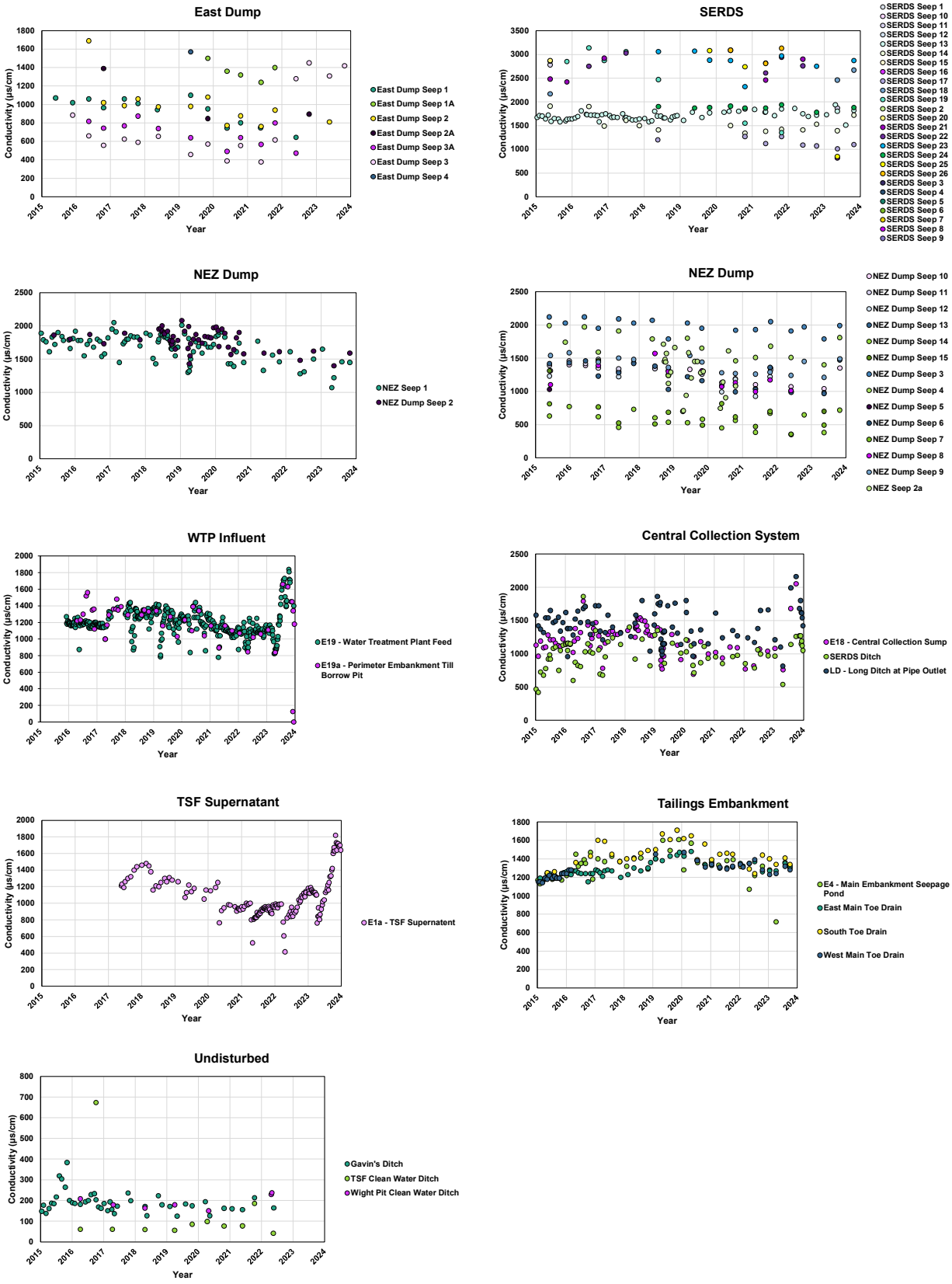
Appendix G: Water Quality Time Series Plots



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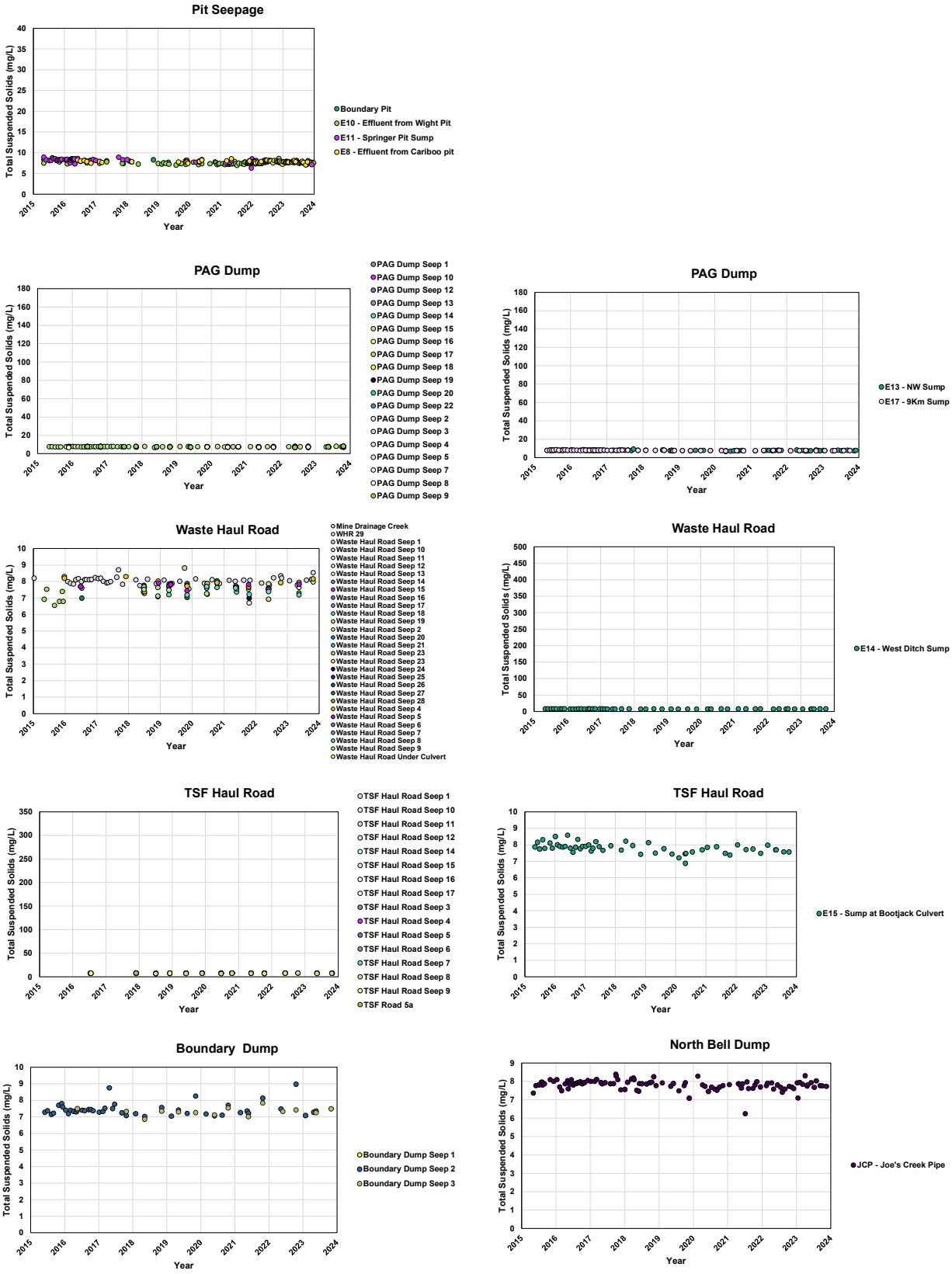
Appendix G: Water Quality Time Series Plots

Figure 5: Total suspended solids values at seep and contact water monitoring stations 2015 to 2023



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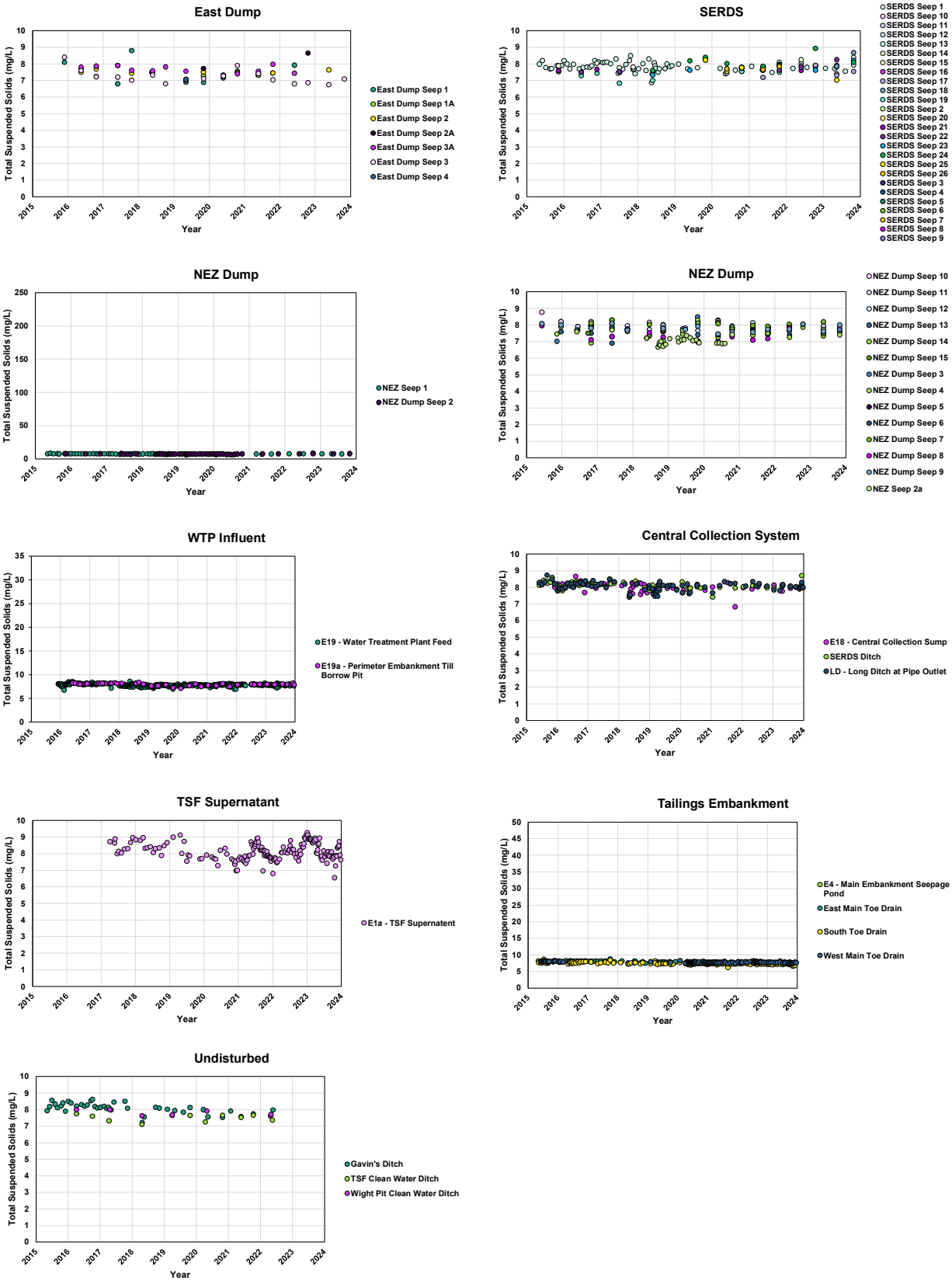
Appendix G: Water Quality Time Series Plots



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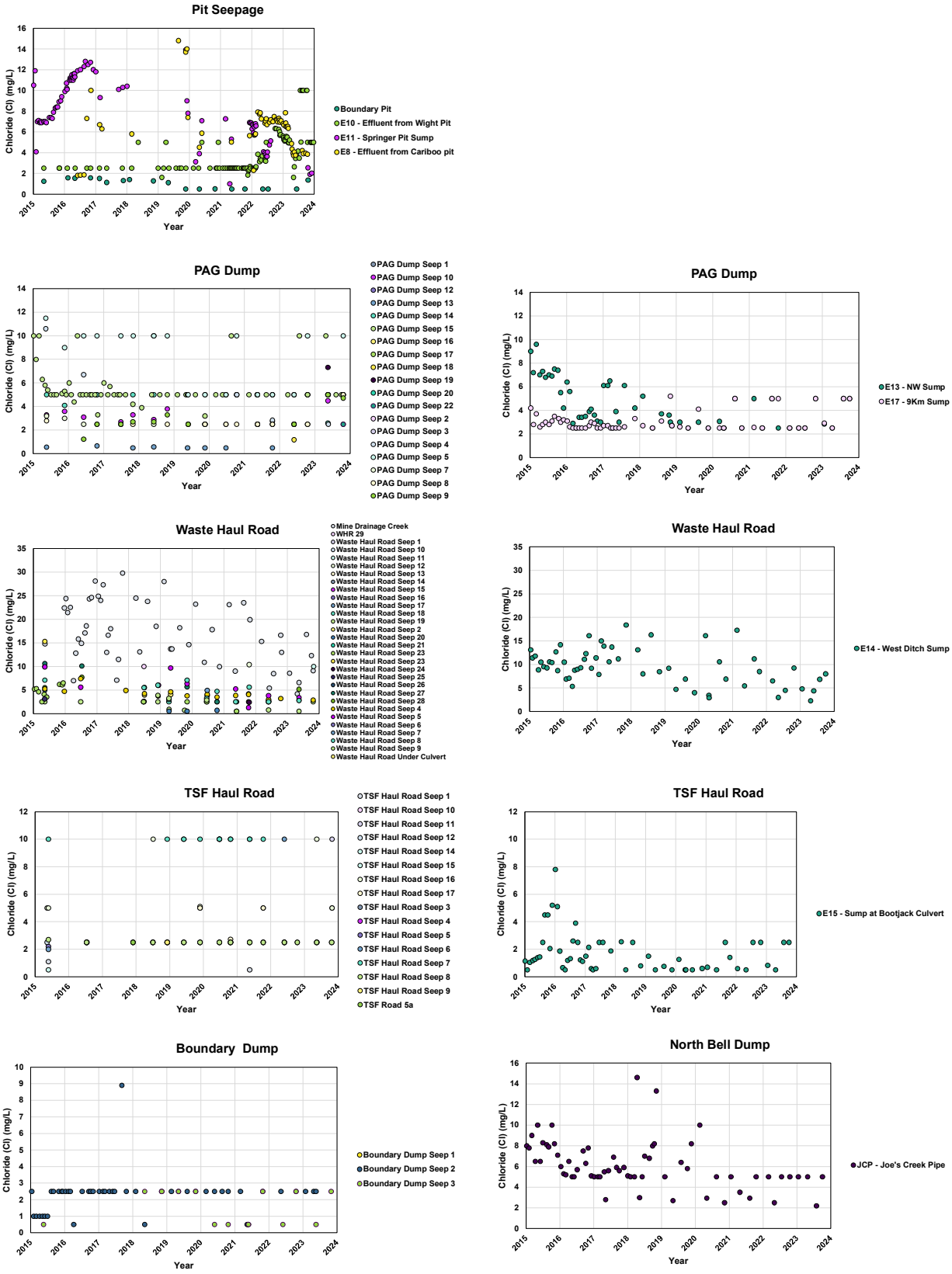
Appendix G: Water Quality Time Series Plots

Figure 6: Chloride (Cl) values at seep and contact water monitoring stations 2015 to 2023



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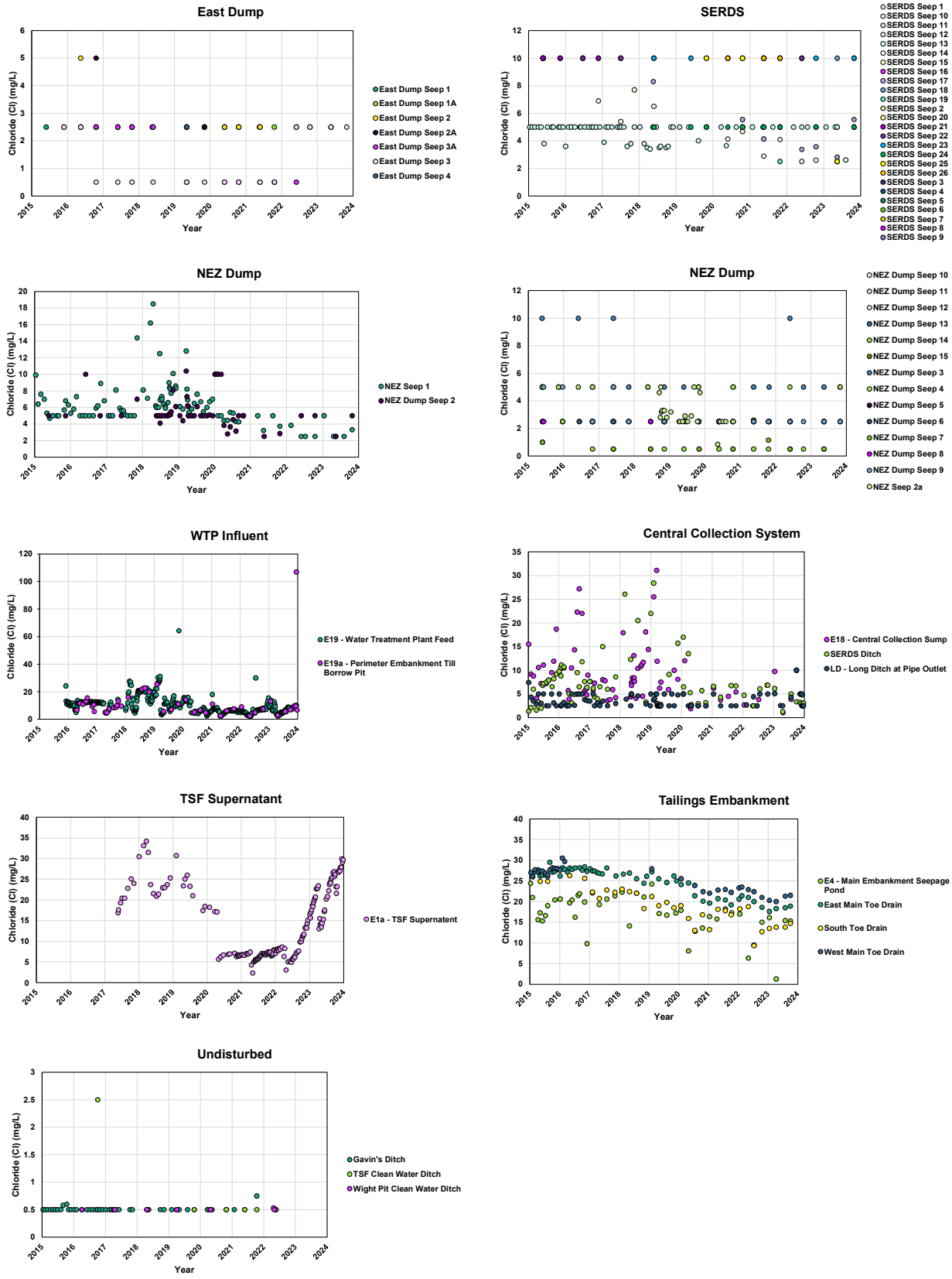
Appendix G: Water Quality Time Series Plots



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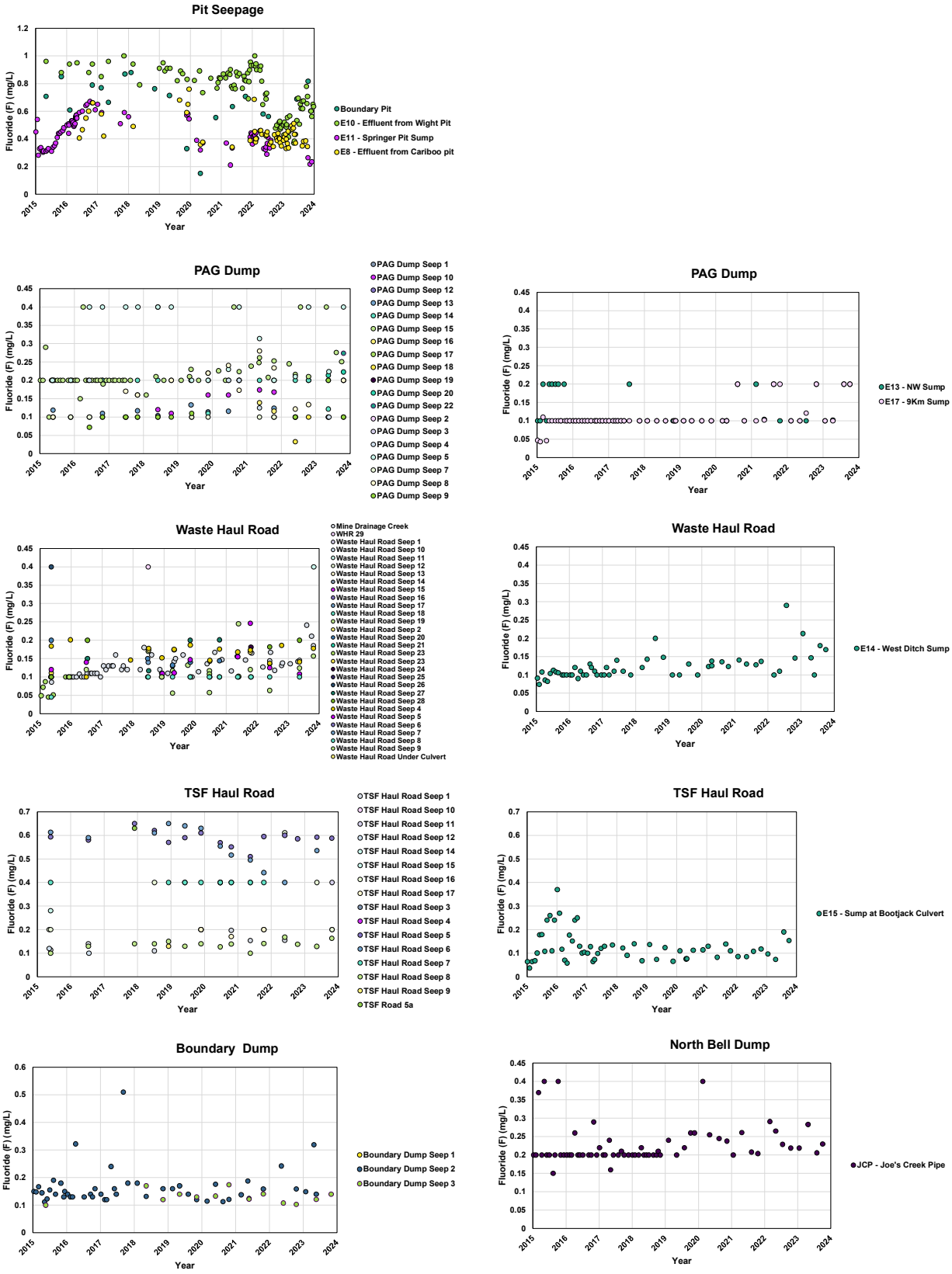
Appendix G: Water Quality Time Series Plots

Figure 7: Fluoride values at seep and contact water monitoring stations 2015 to 2023



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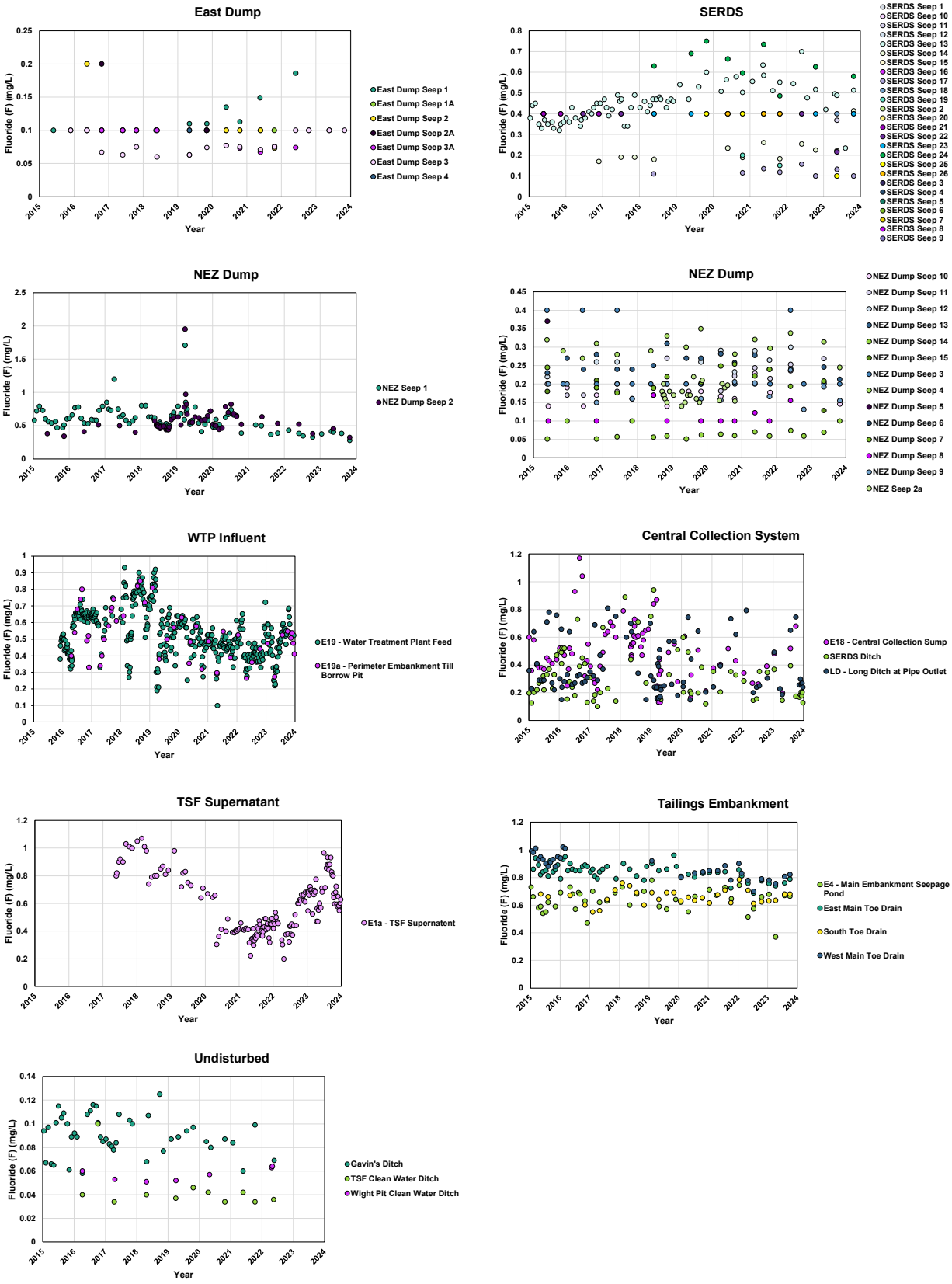
Appendix G: Water Quality Time Series Plots



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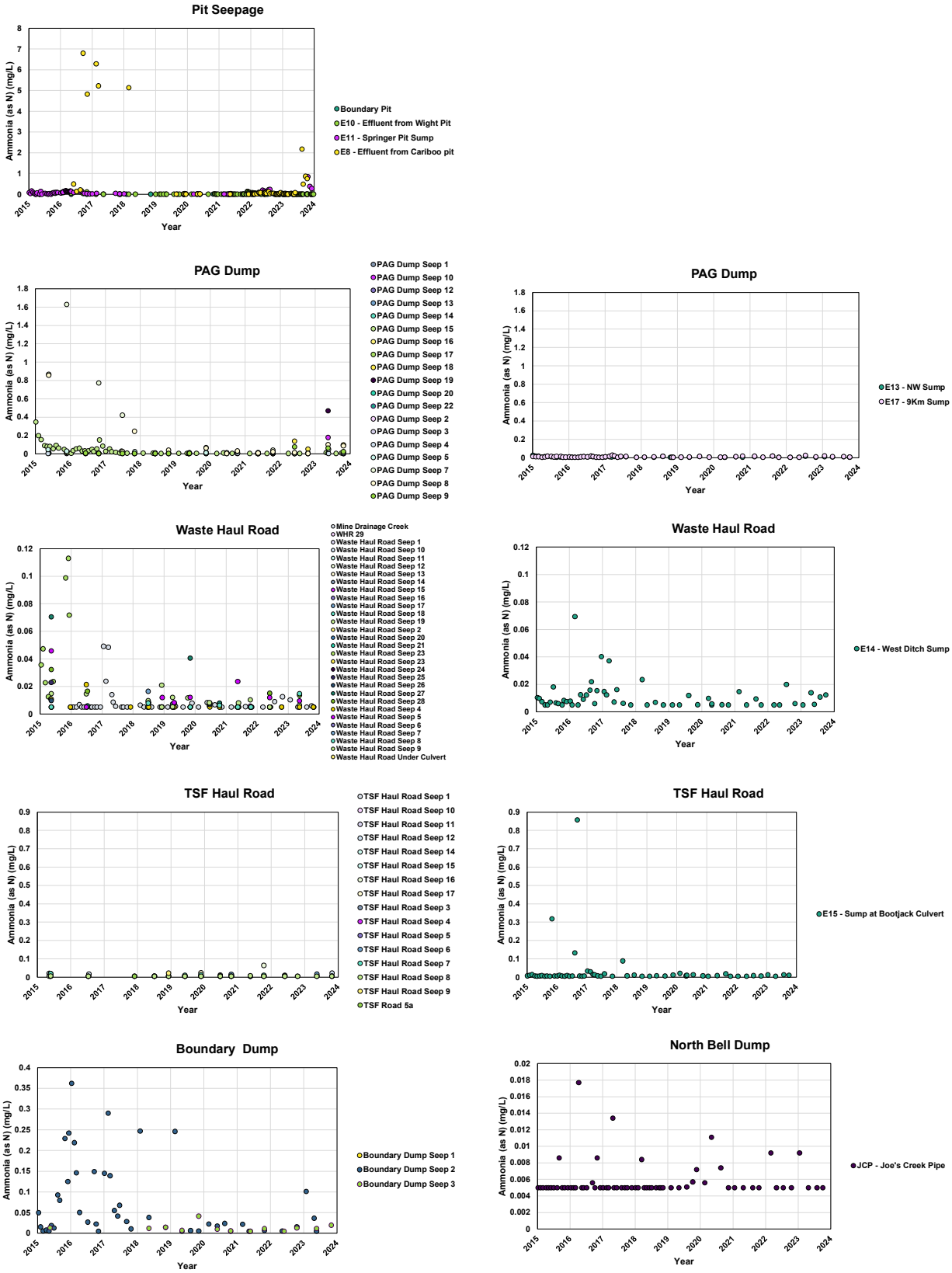
Appendix G: Water Quality Time Series Plots

Figure 8: Ammonia (as N) values at seep and contact water monitoring stations 2015 to 2023



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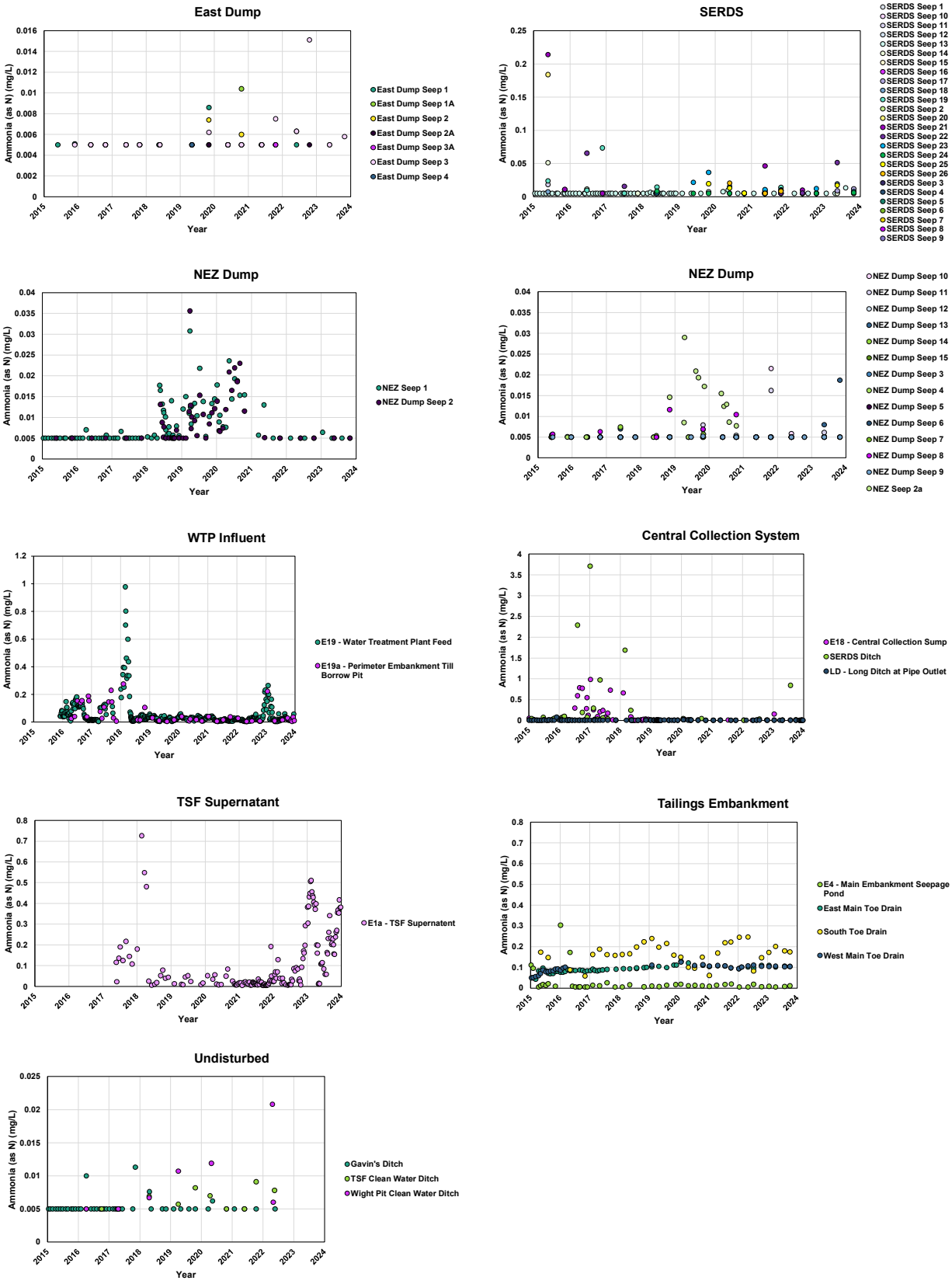
Appendix G: Water Quality Time Series Plots



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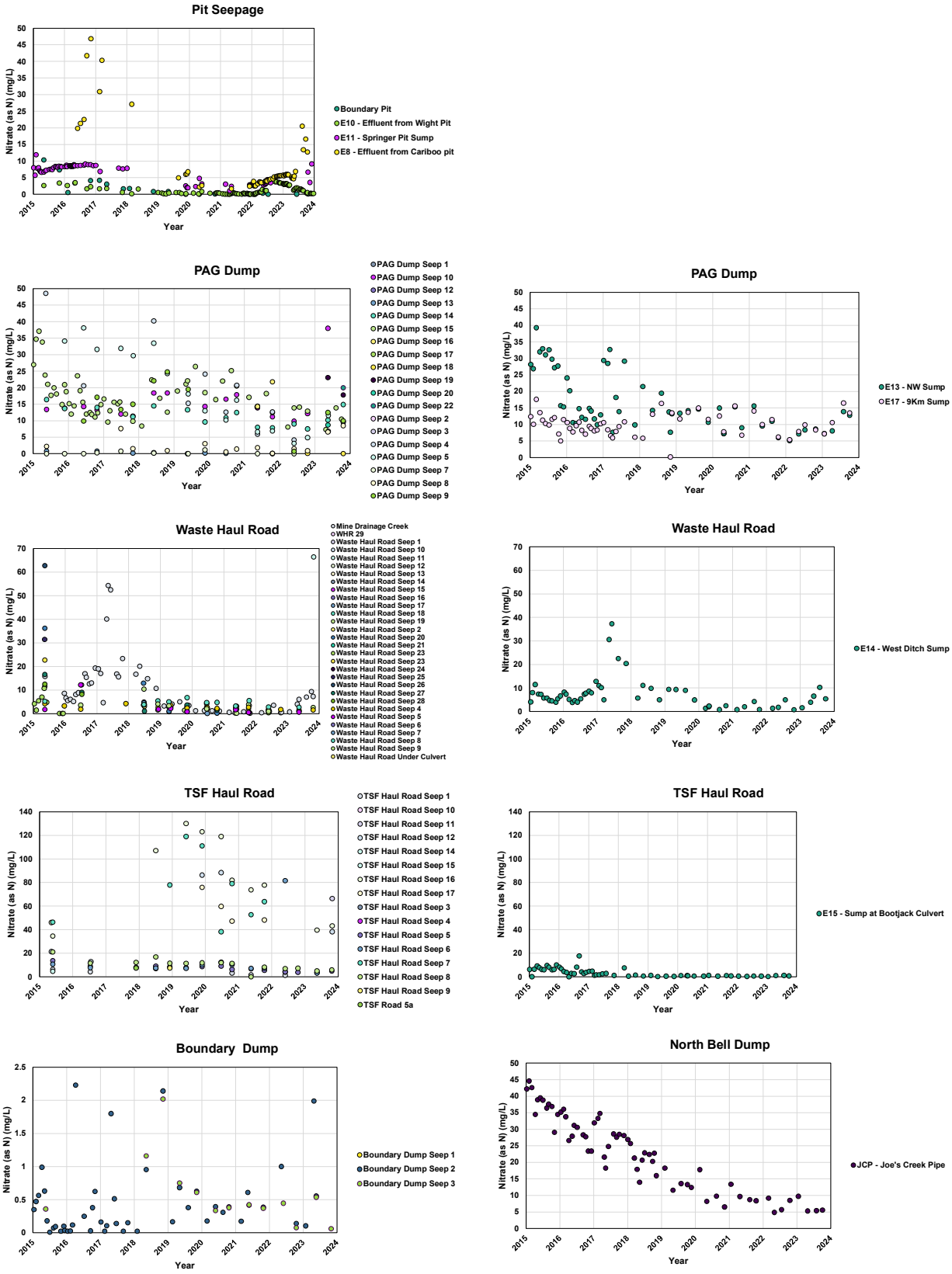
Appendix G: Water Quality Time Series Plots

Figure 9: Nitrate (as N) values at seep and contact water monitoring stations 2015 to 2023



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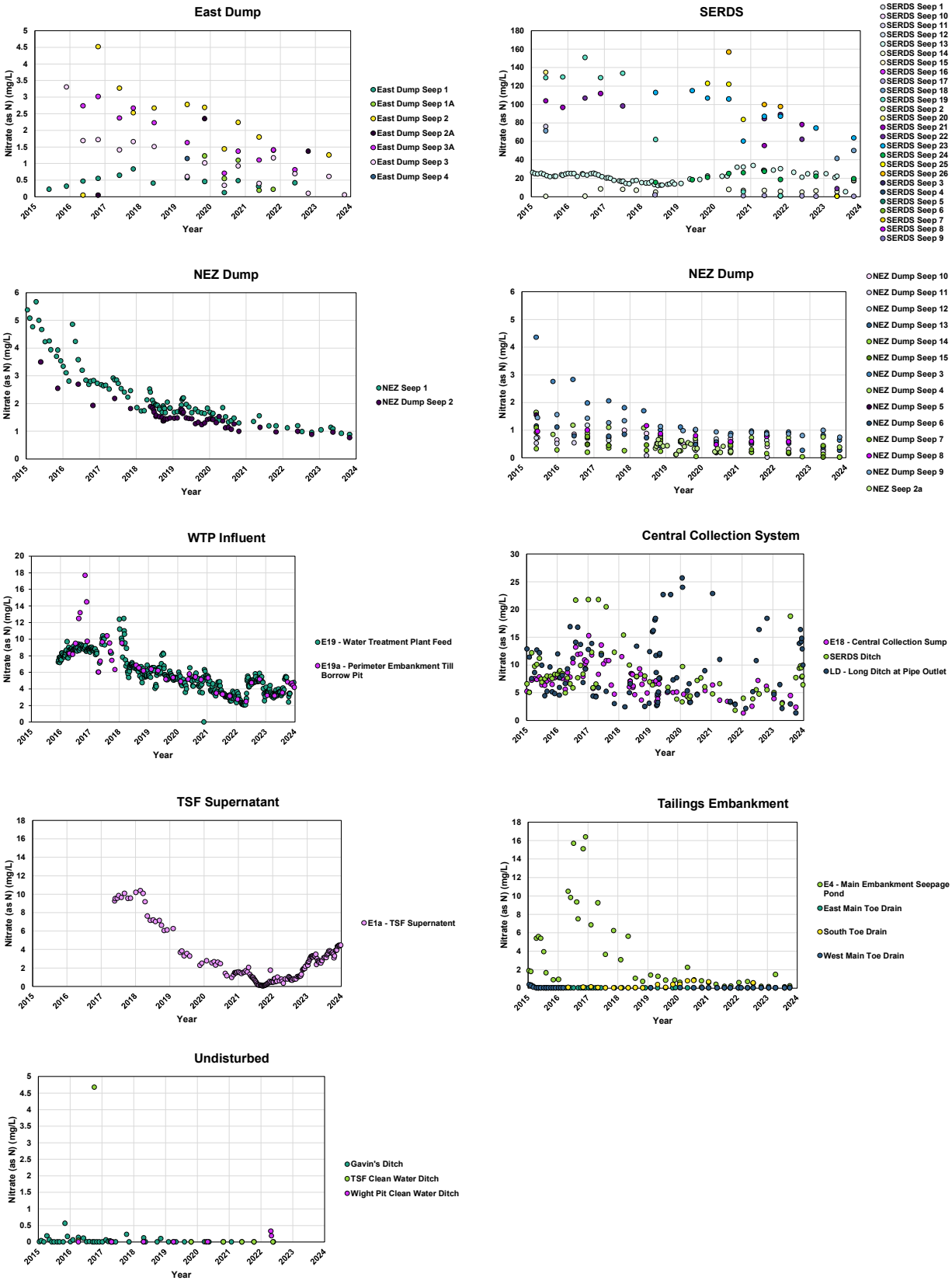
Appendix G: Water Quality Time Series Plots



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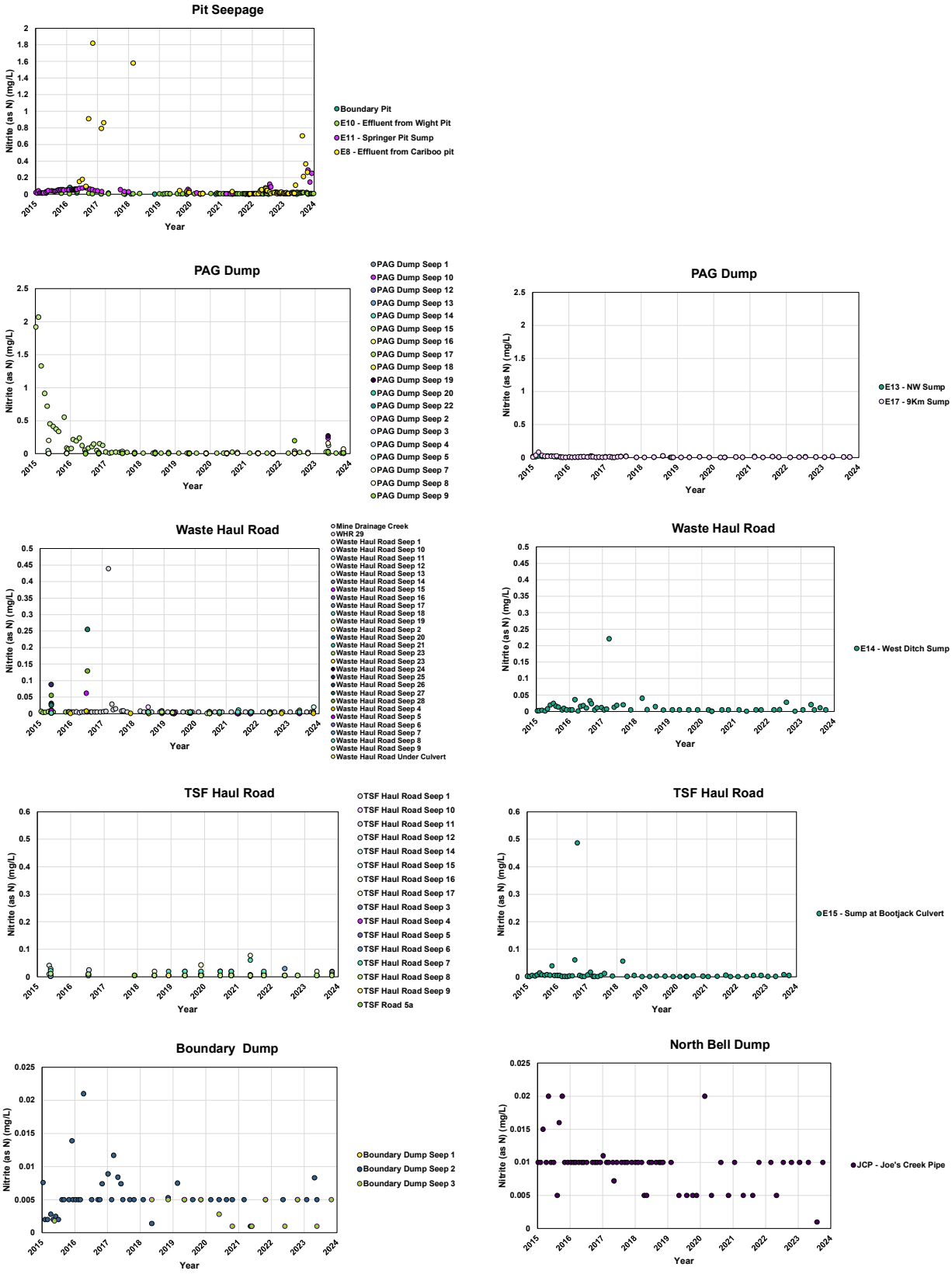
Appendix G: Water Quality Time Series Plots

Figure 10: Nitrite (as N) values at seep and contact water monitoring stations 2015 to 2023



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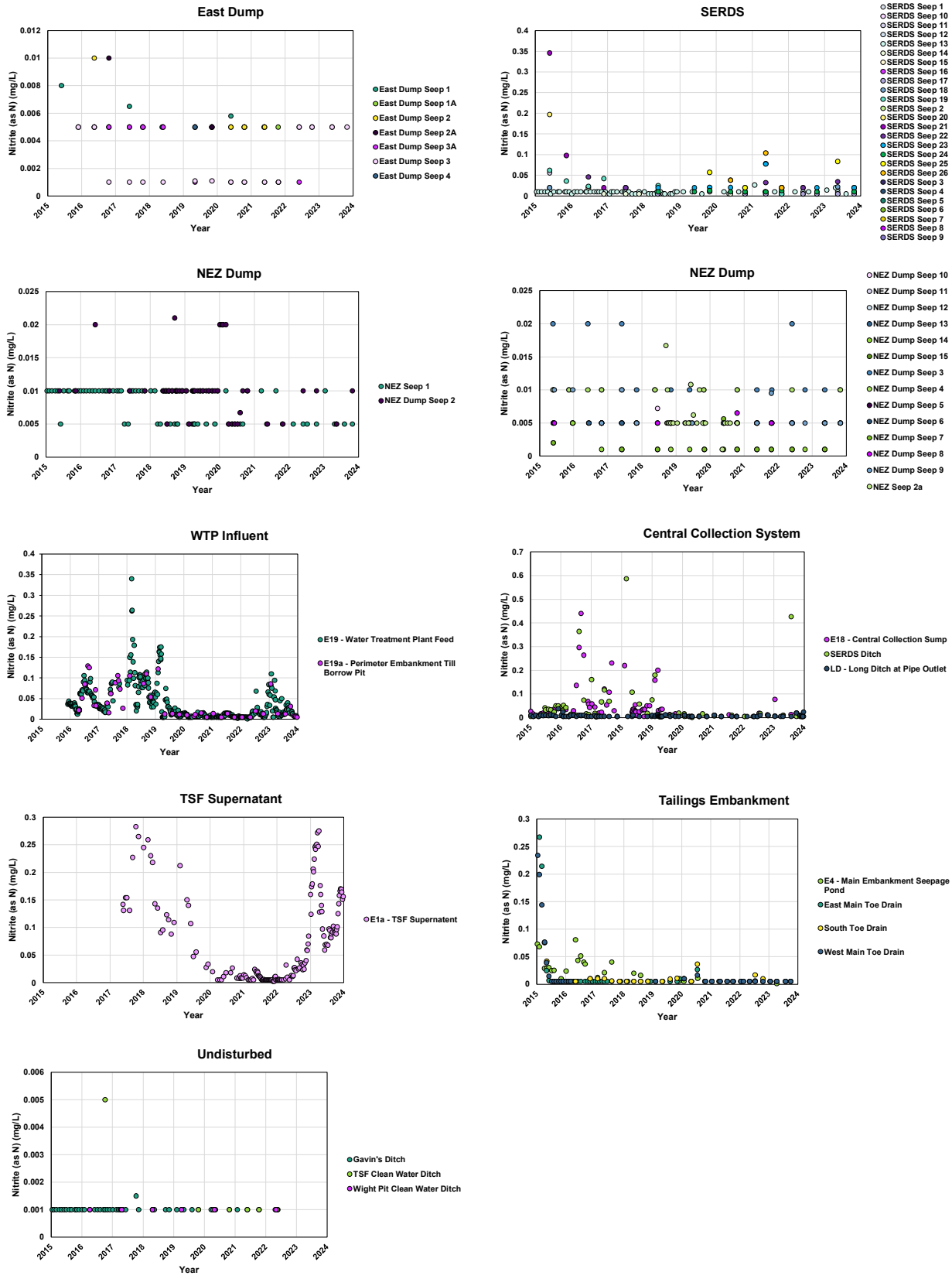
Appendix G: Water Quality Time Series Plots



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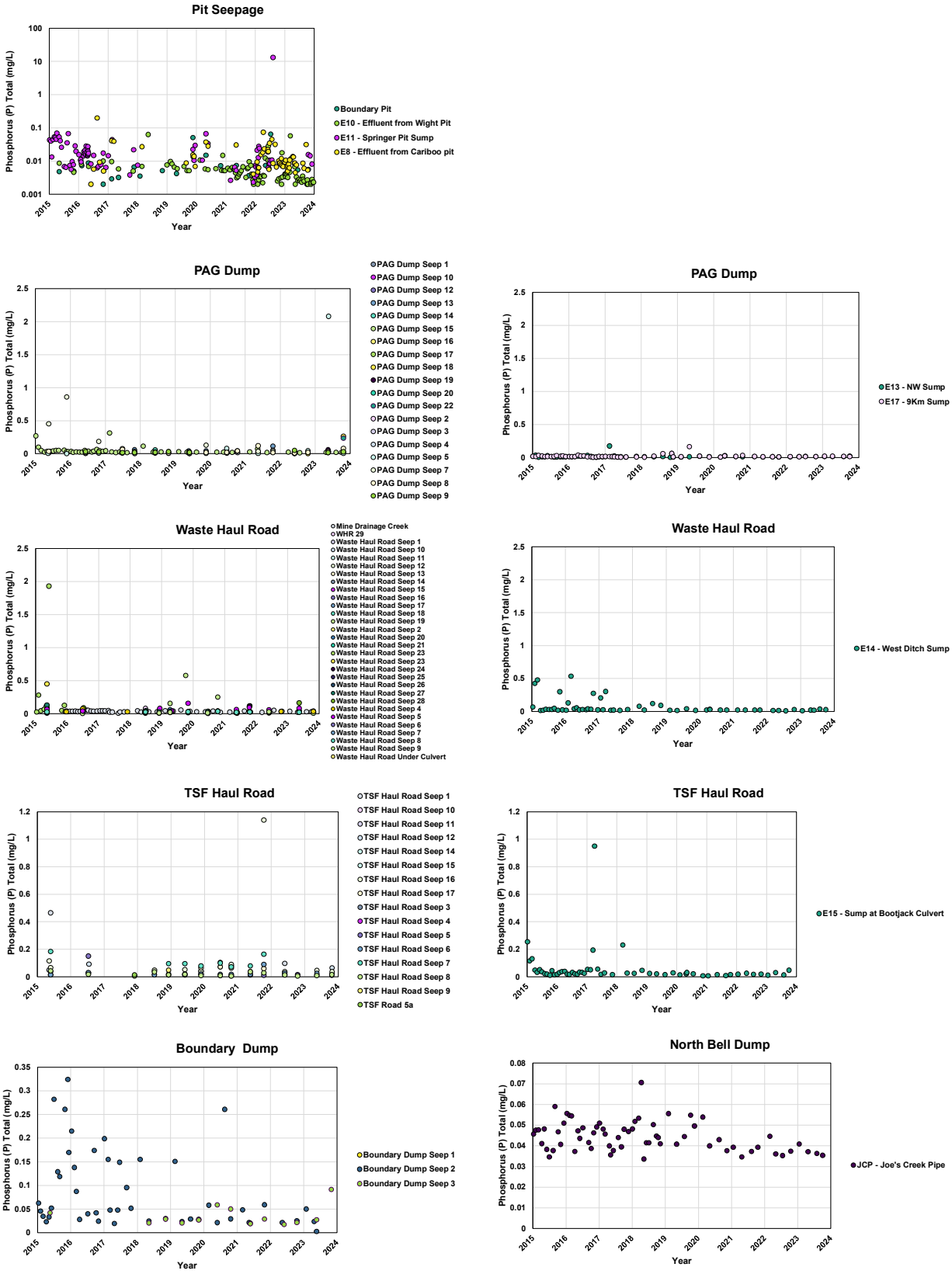
Appendix G: Water Quality Time Series Plots

Figure 11: Total Phosphorus values at seep and contact water monitoring stations 2015 to 2023



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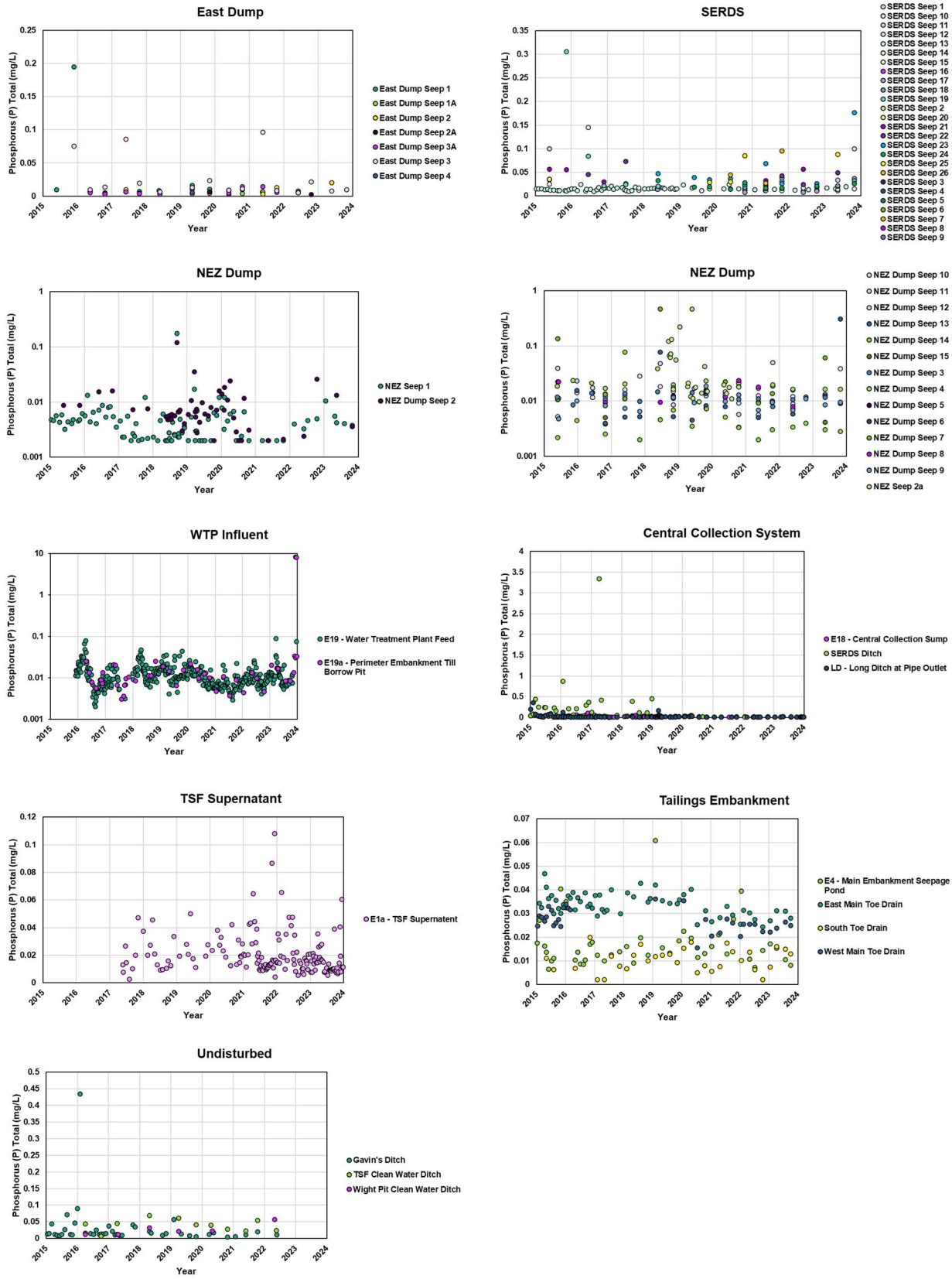
Appendix G: Water Quality Time Series Plots



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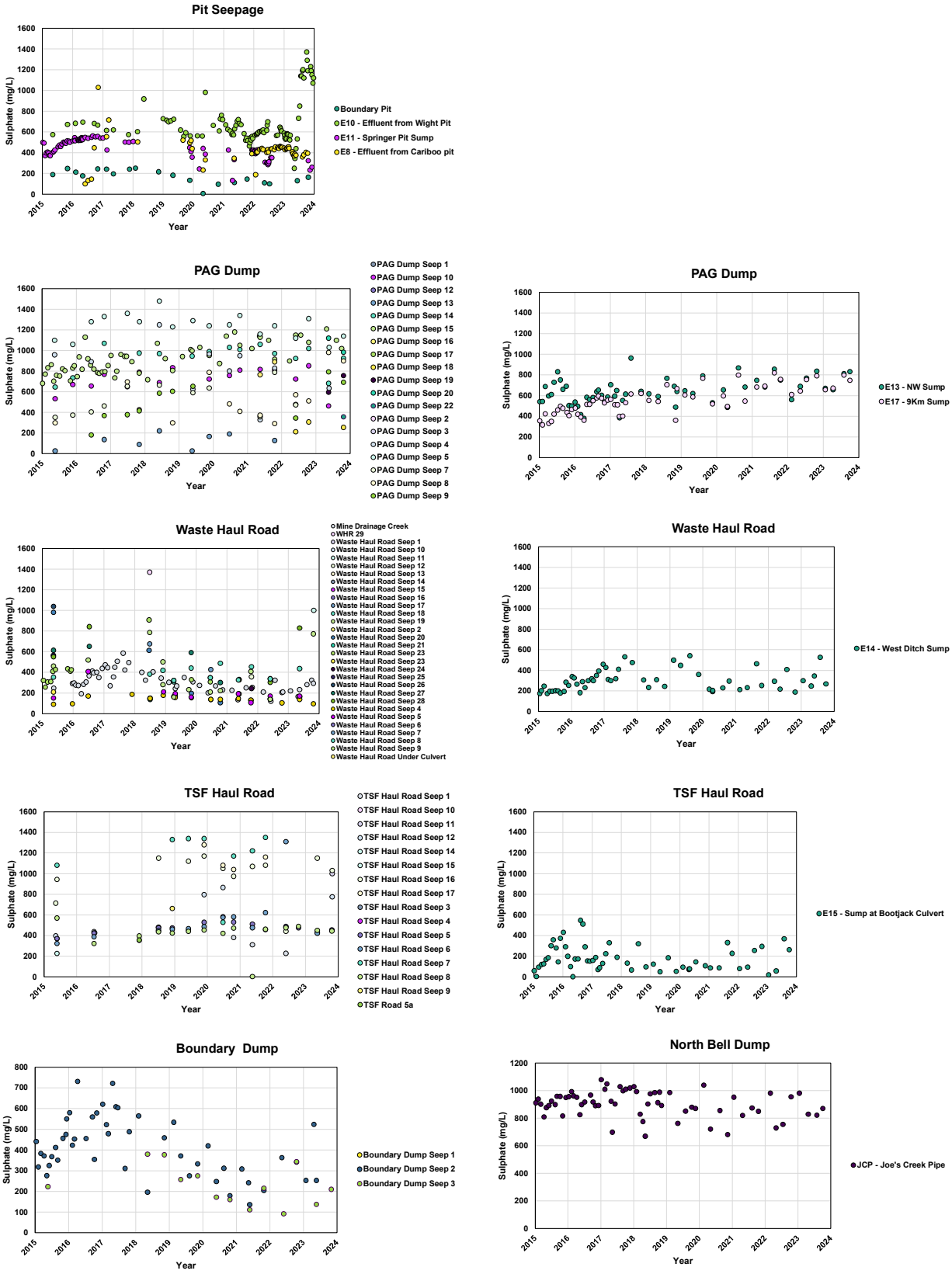
Appendix G: Water Quality Time Series Plots

Figure 12: Sulphate (as SO4) values at seep and contact water monitoring stations 2015 to 2023



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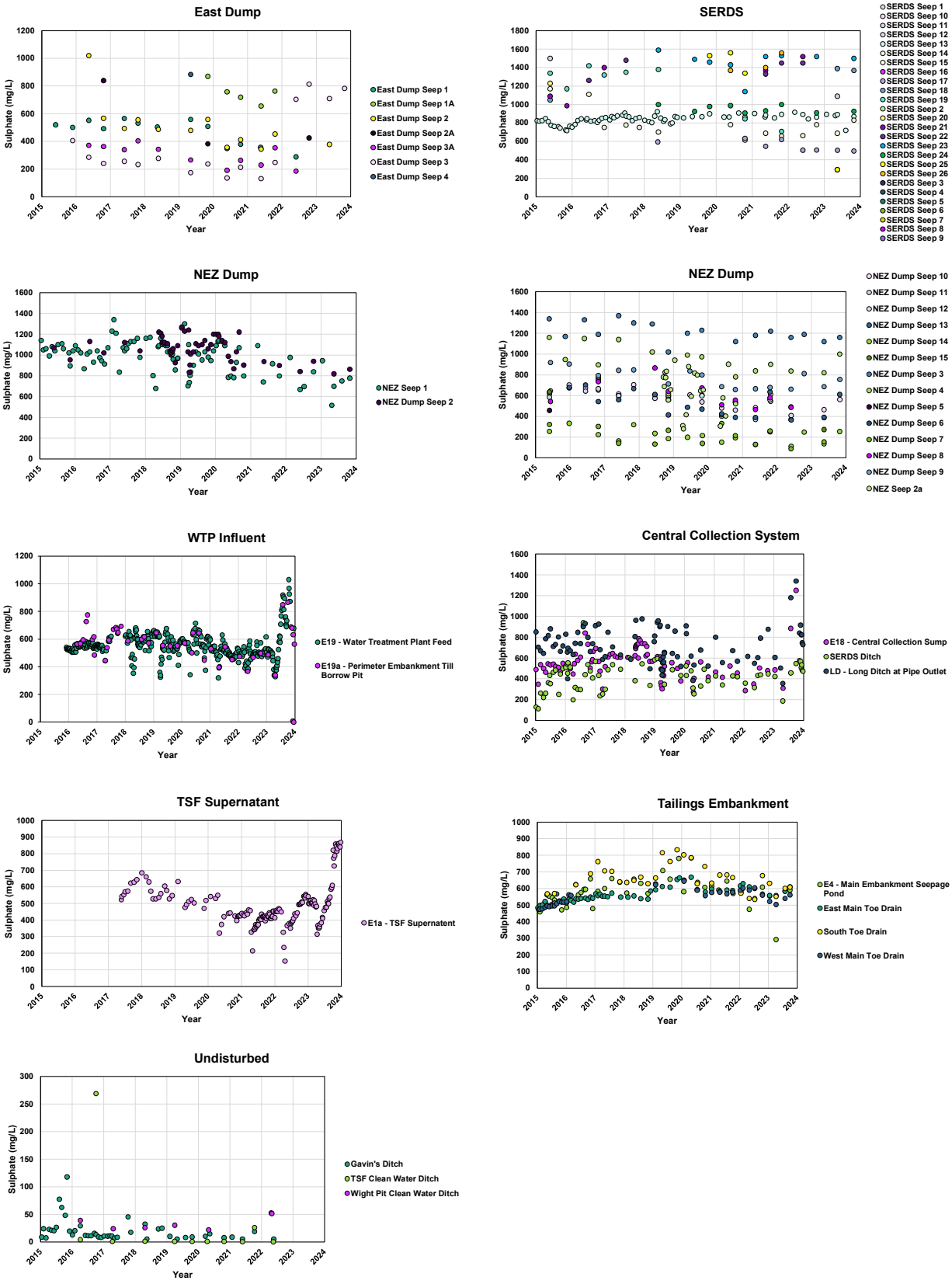
Appendix G: Water Quality Time Series Plots



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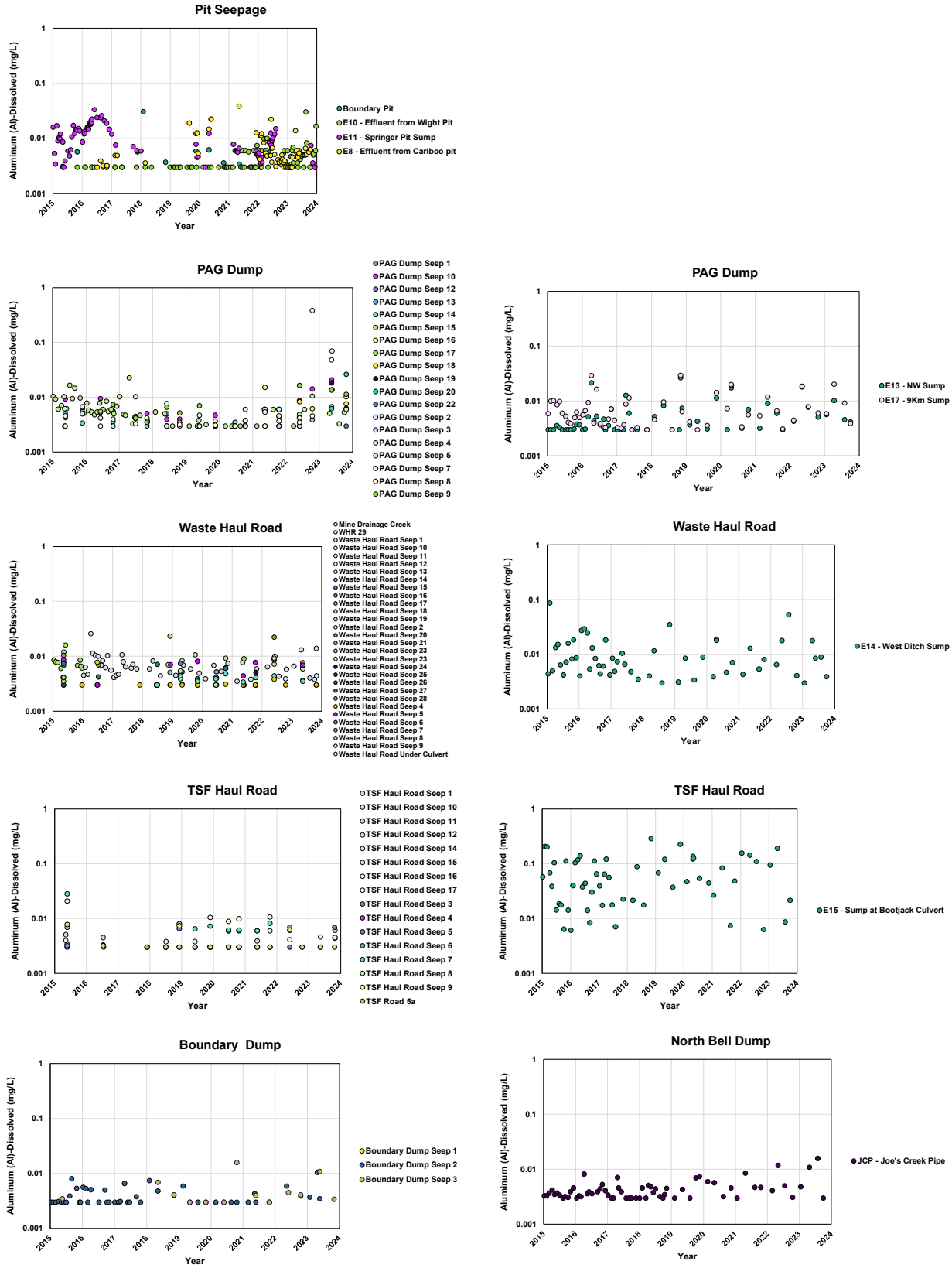
Appendix G: Water Quality Time Series Plots

Figure 13: Aluminum (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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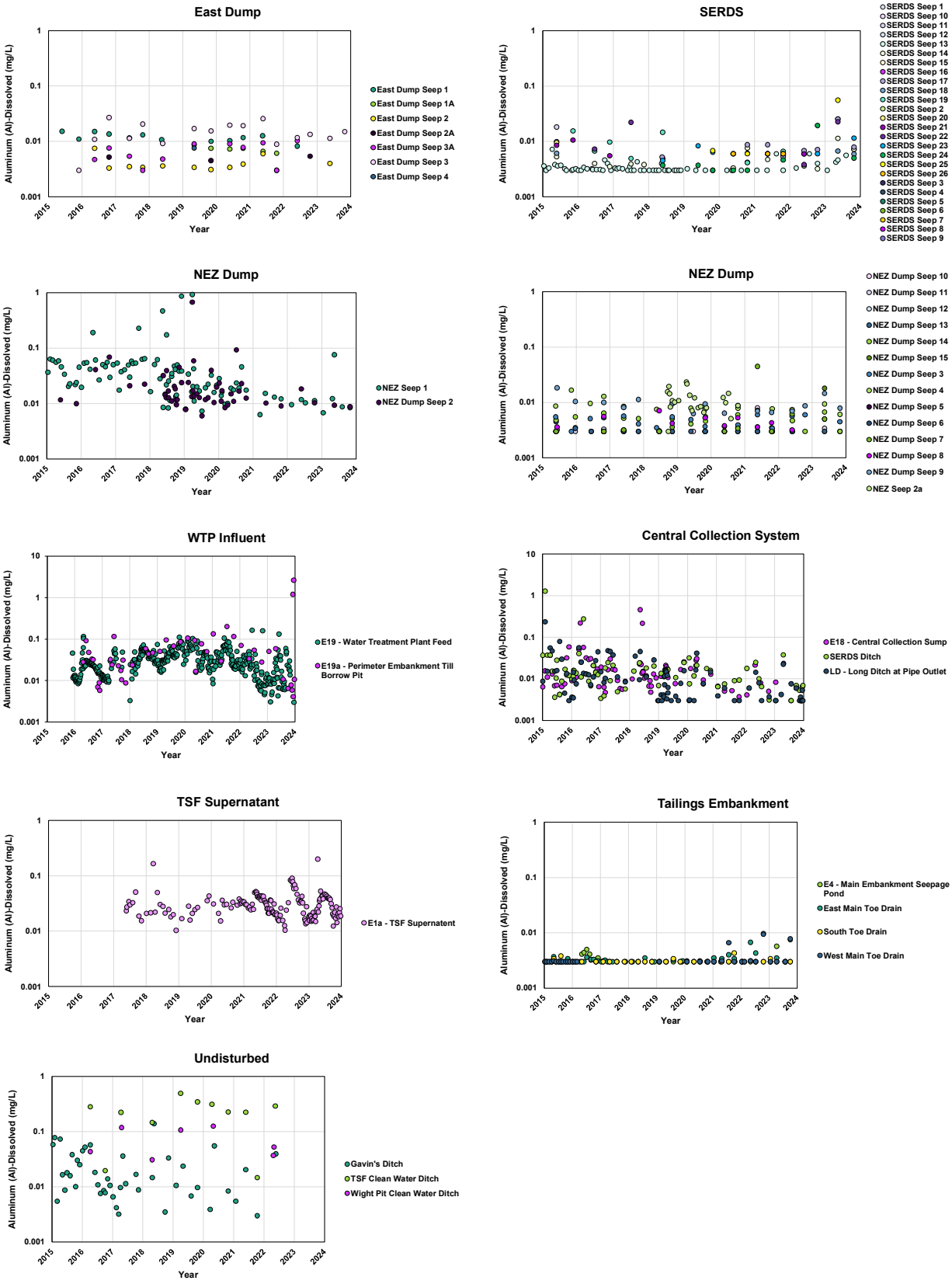
Appendix G: Water Quality Time Series Plots



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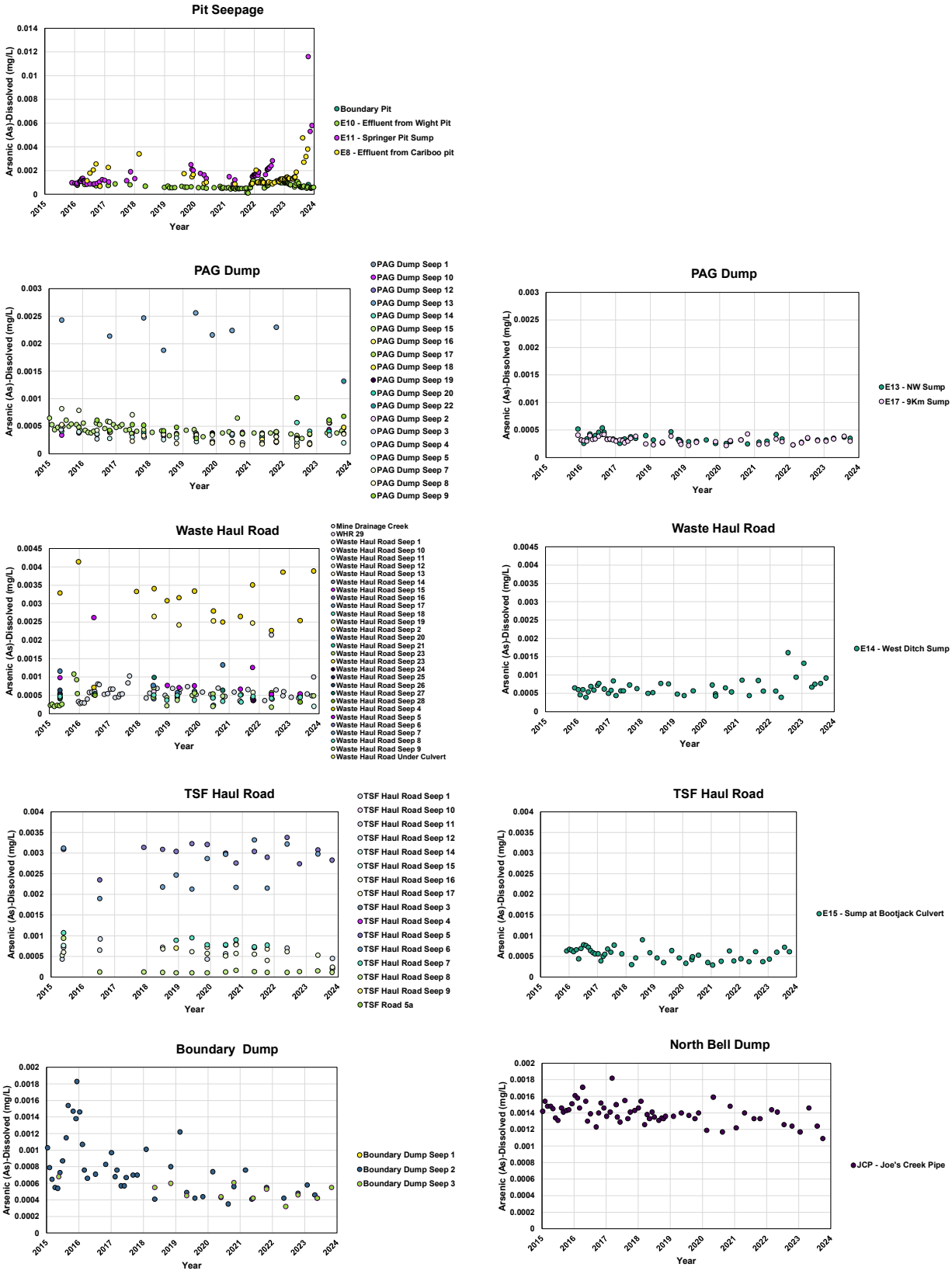
Appendix G: Water Quality Time Series Plots

Figure 14: Arsenic (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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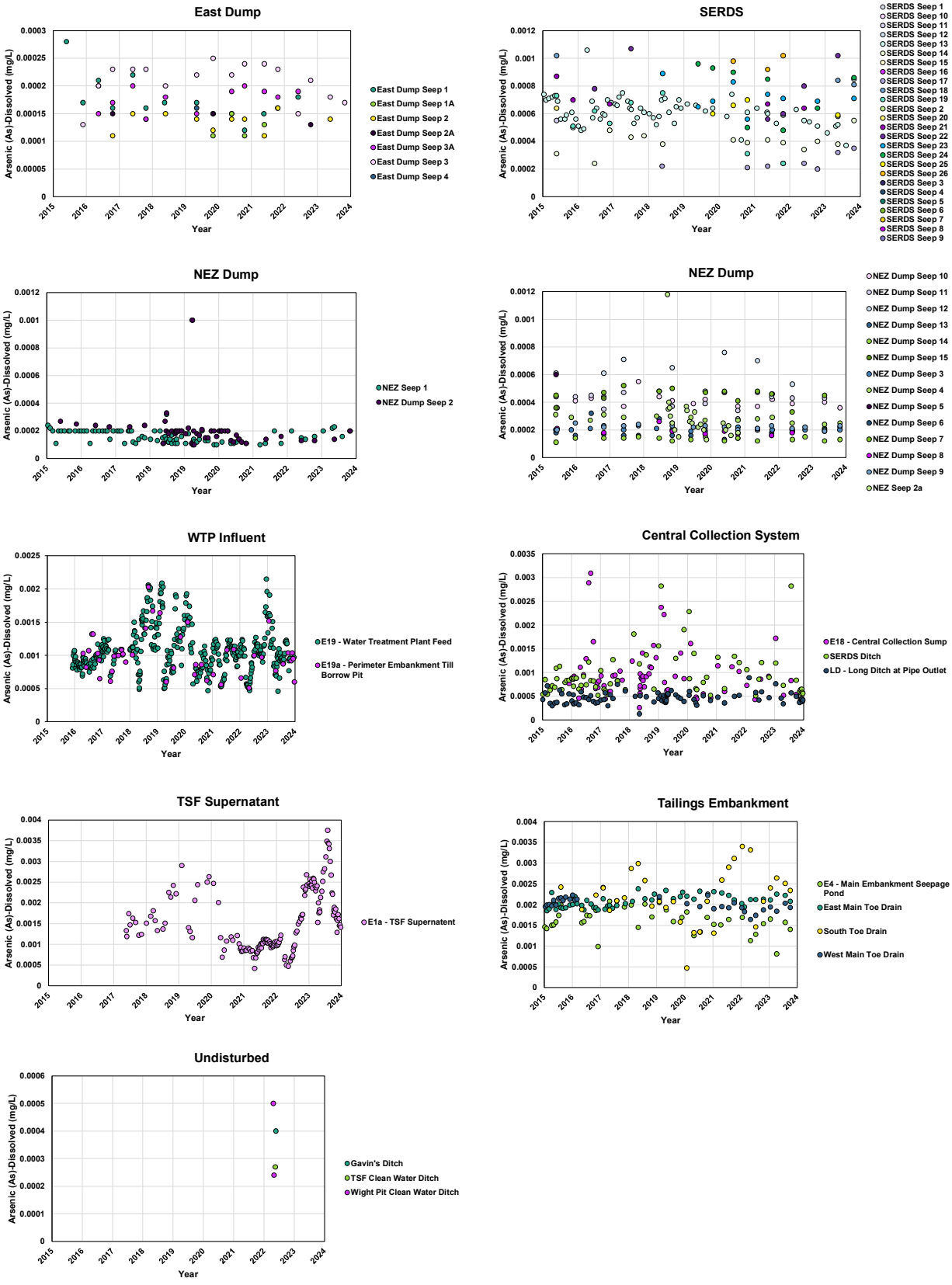
Appendix G: Water Quality Time Series Plots



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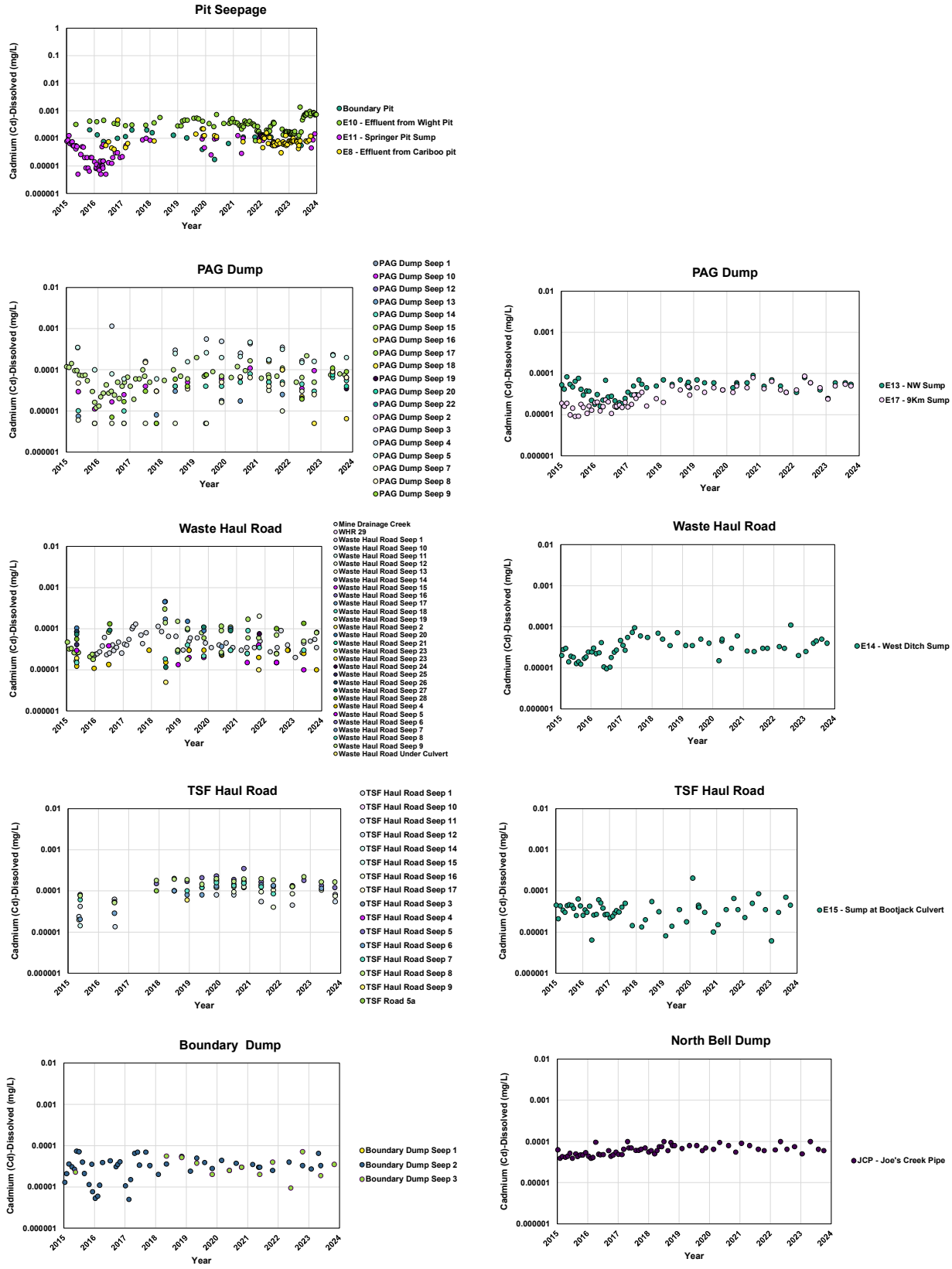
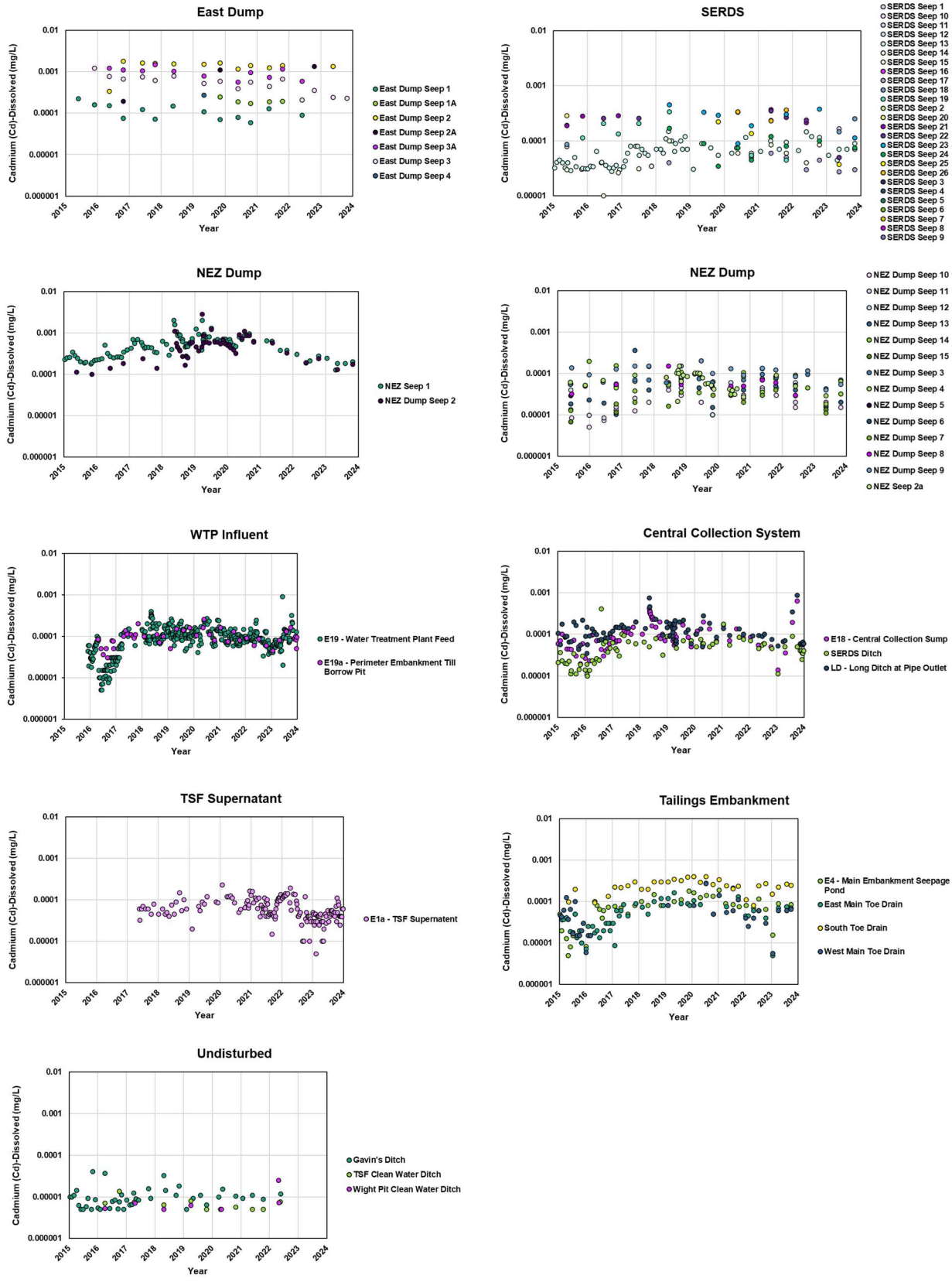
Appendix G: Water Quality Time Series Plots

Figure 15: Cadmium (dissolved) values at seep and contact water monitoring stations 2015 to 2023



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Appendix G: Water Quality Time Series Plots



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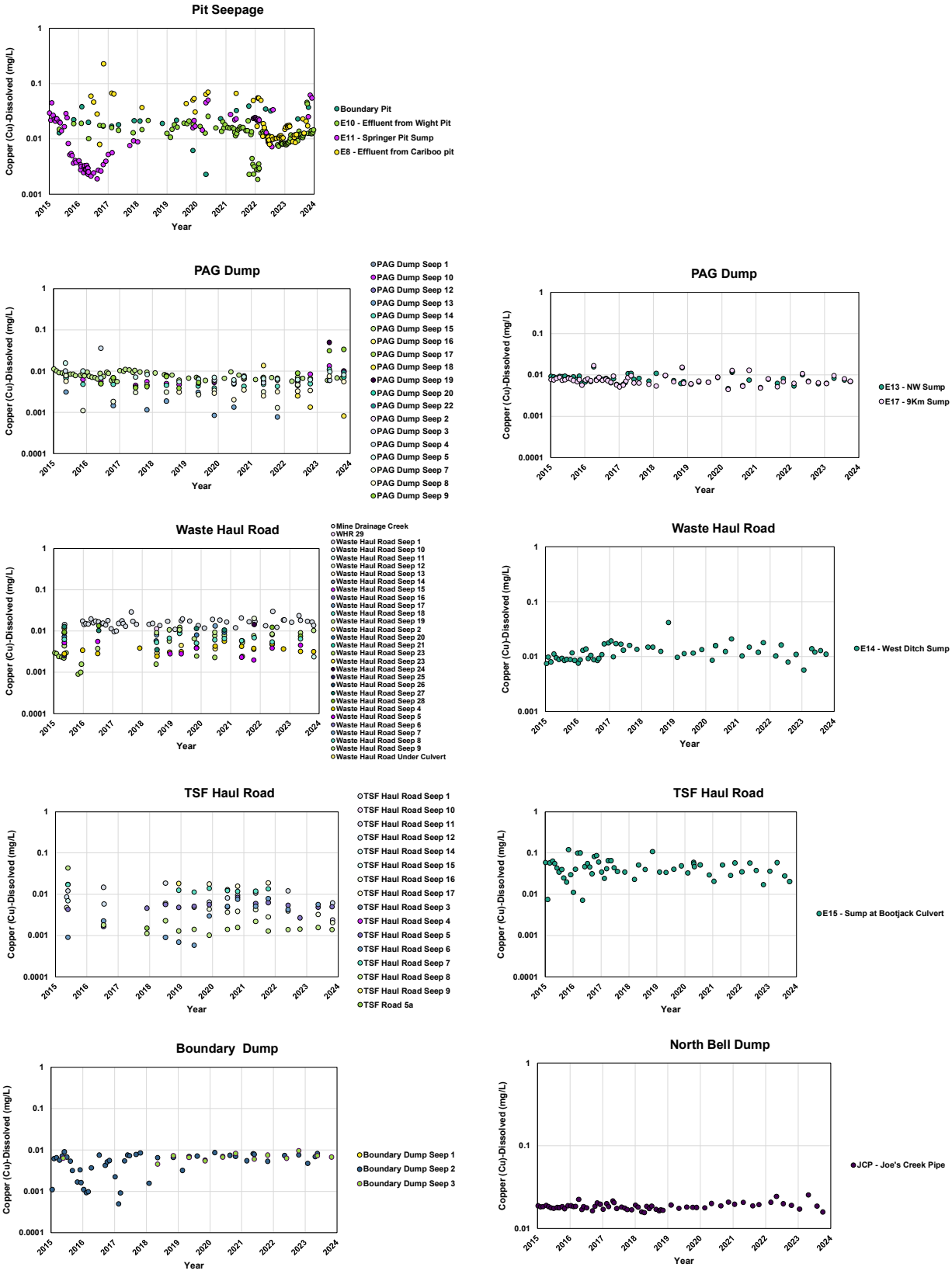
Appendix G: Water Quality Time Series Plots

Figure 16: Copper (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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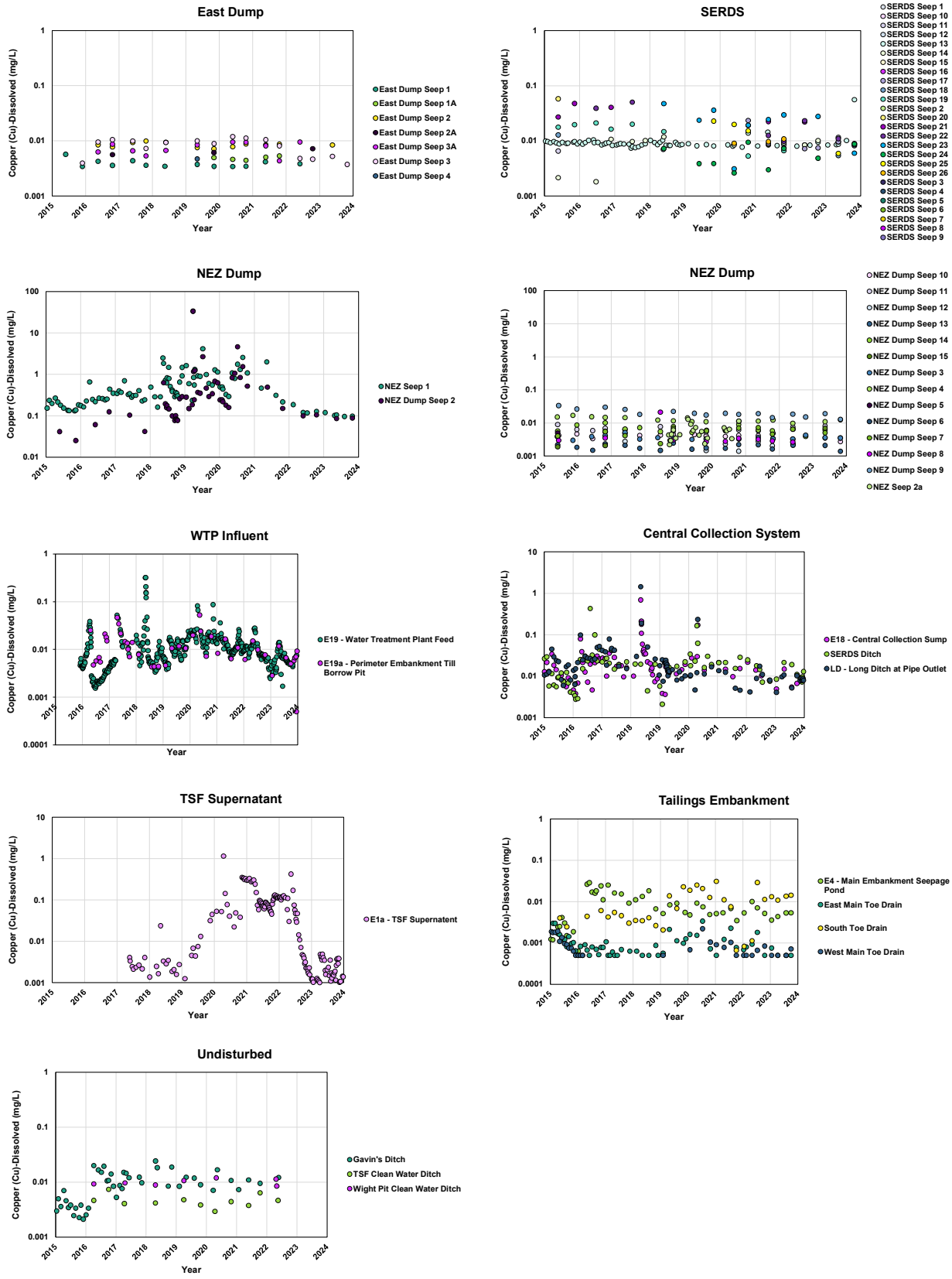
Appendix G: Water Quality Time Series Plots



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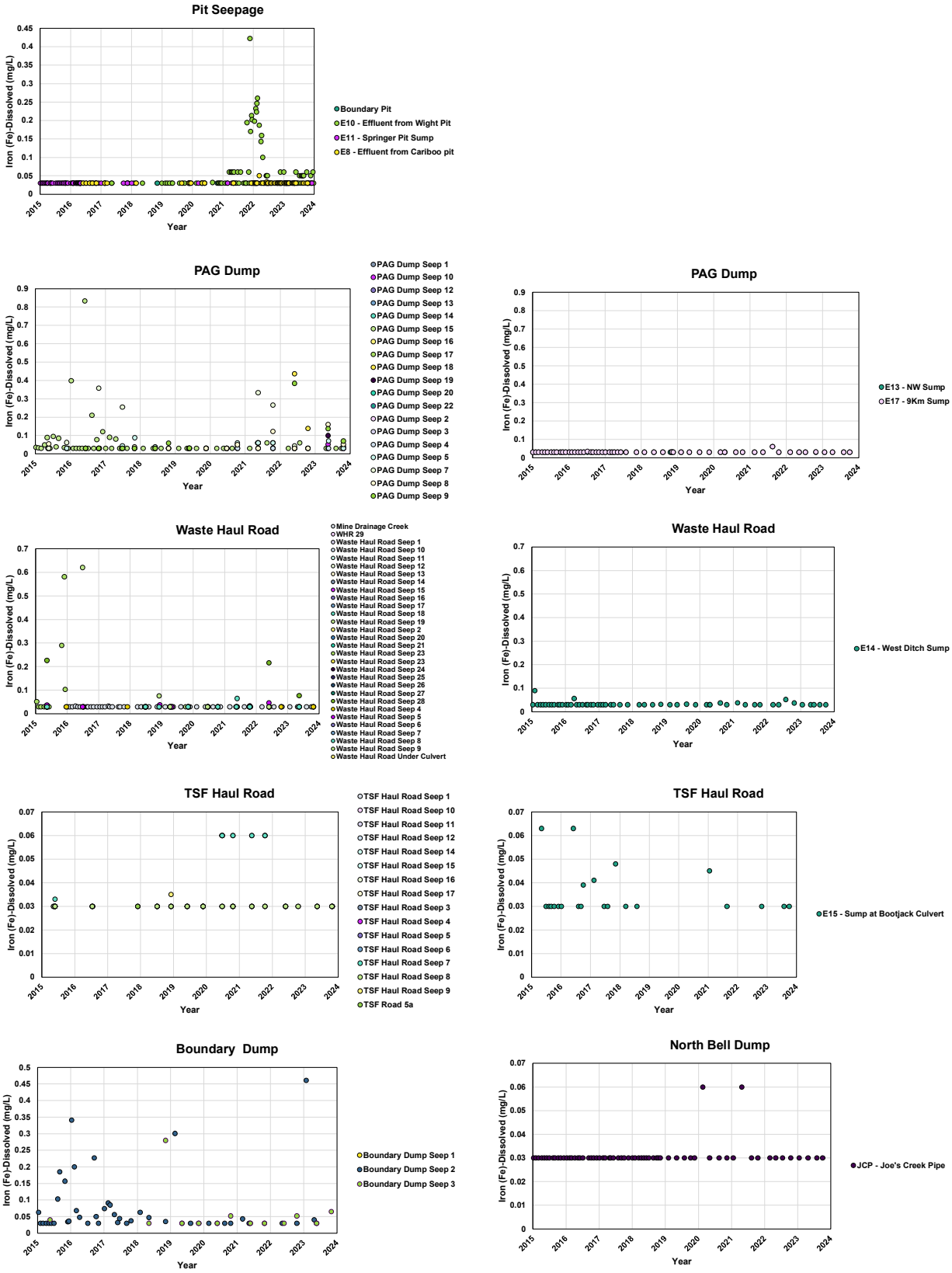
Appendix G: Water Quality Time Series Plots

Figure 17: Iron (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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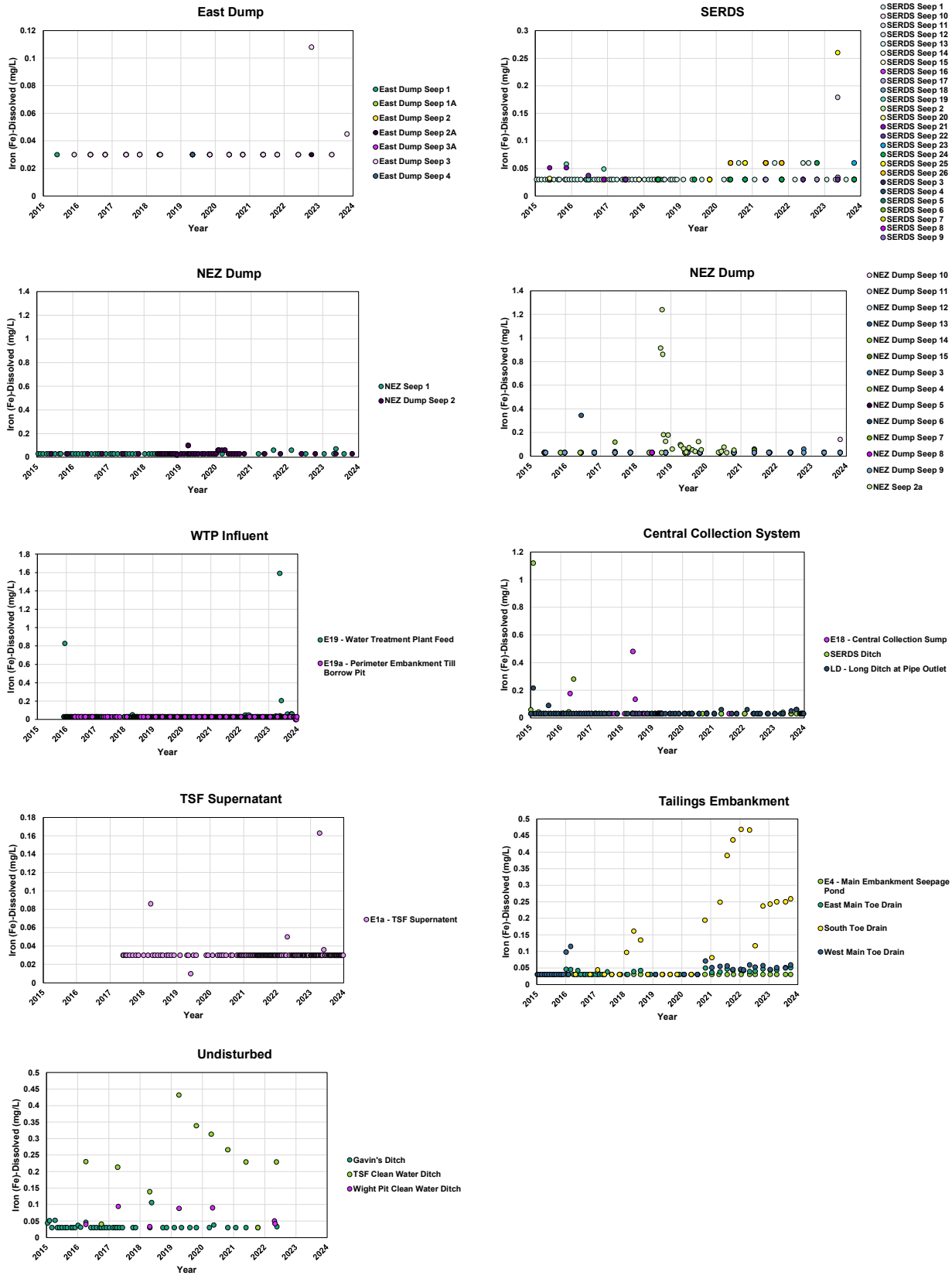
Appendix G: Water Quality Time Series Plots



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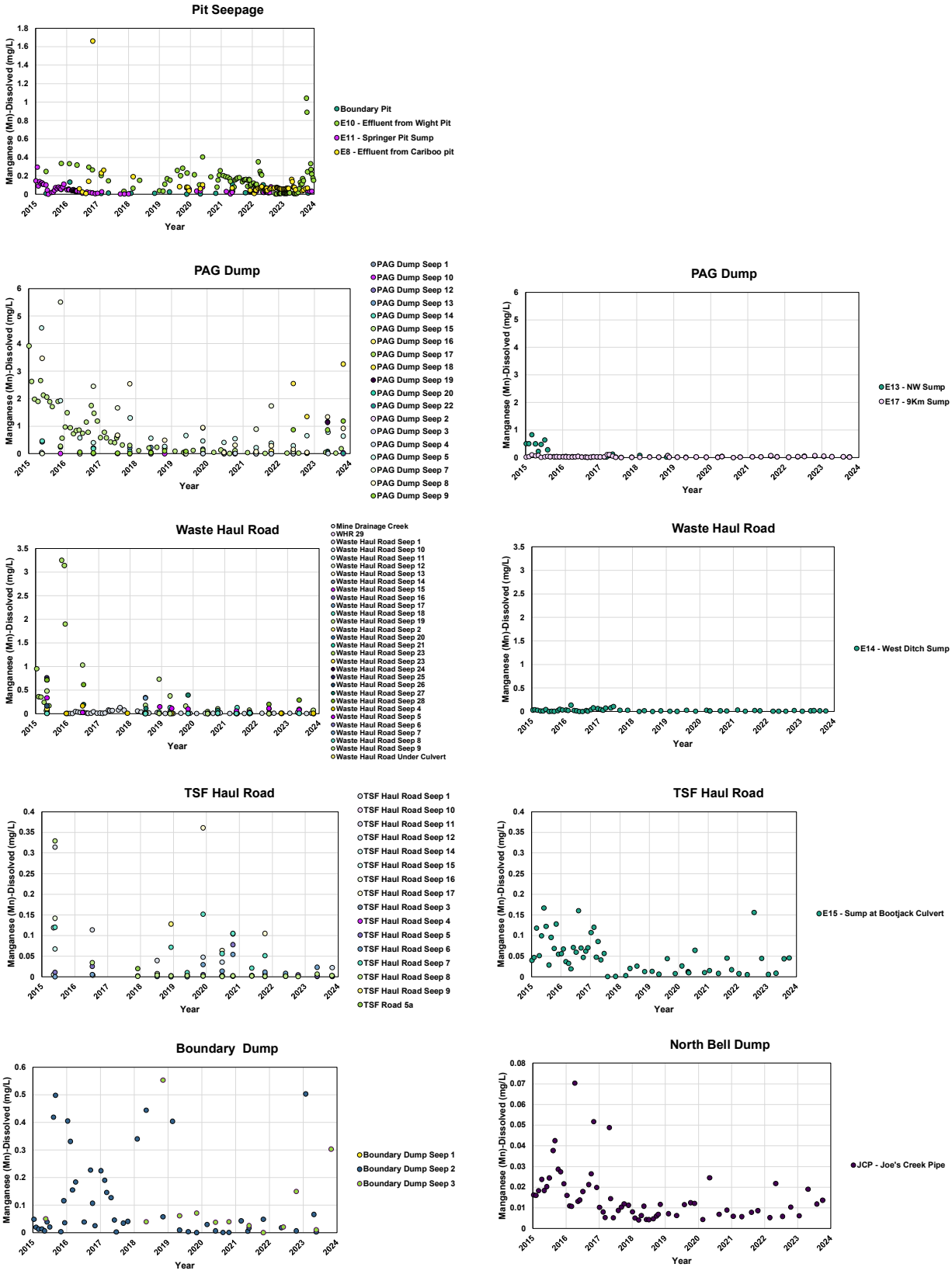
Appendix G: Water Quality Time Series Plots

Figure 18: Manganese (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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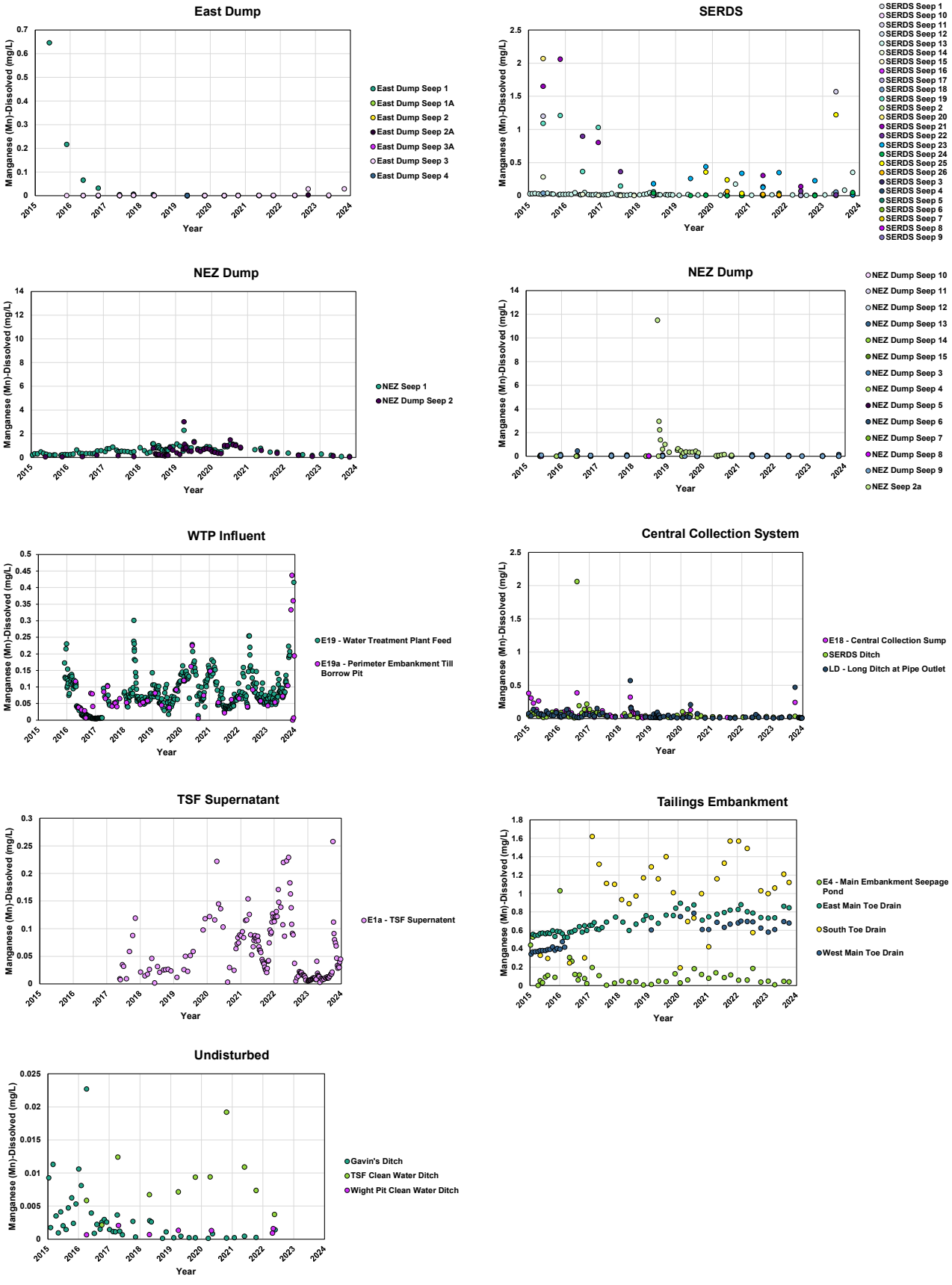
Appendix G: Water Quality Time Series Plots



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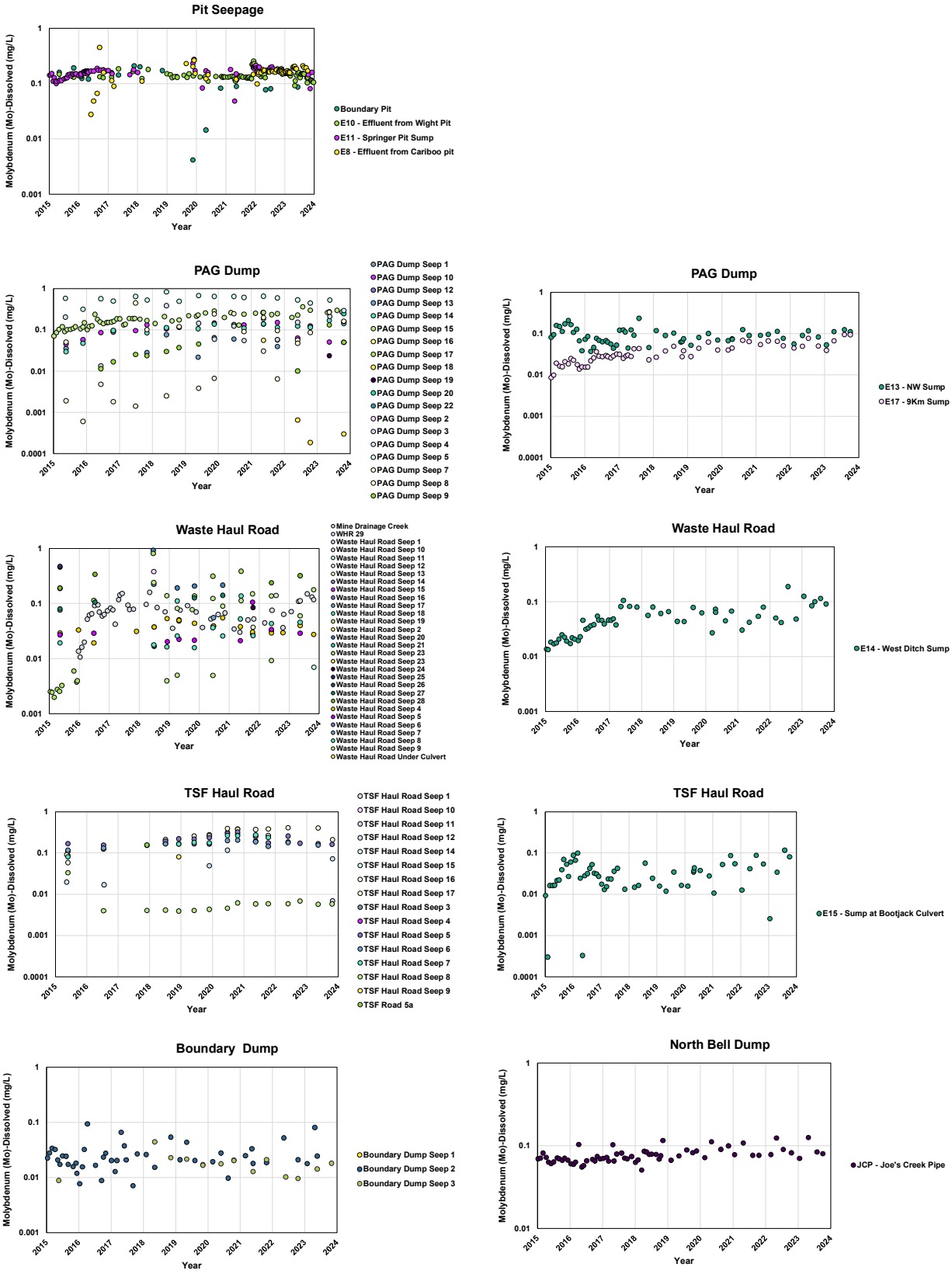
Appendix G: Water Quality Time Series Plots

Figure 19: Molybdenum (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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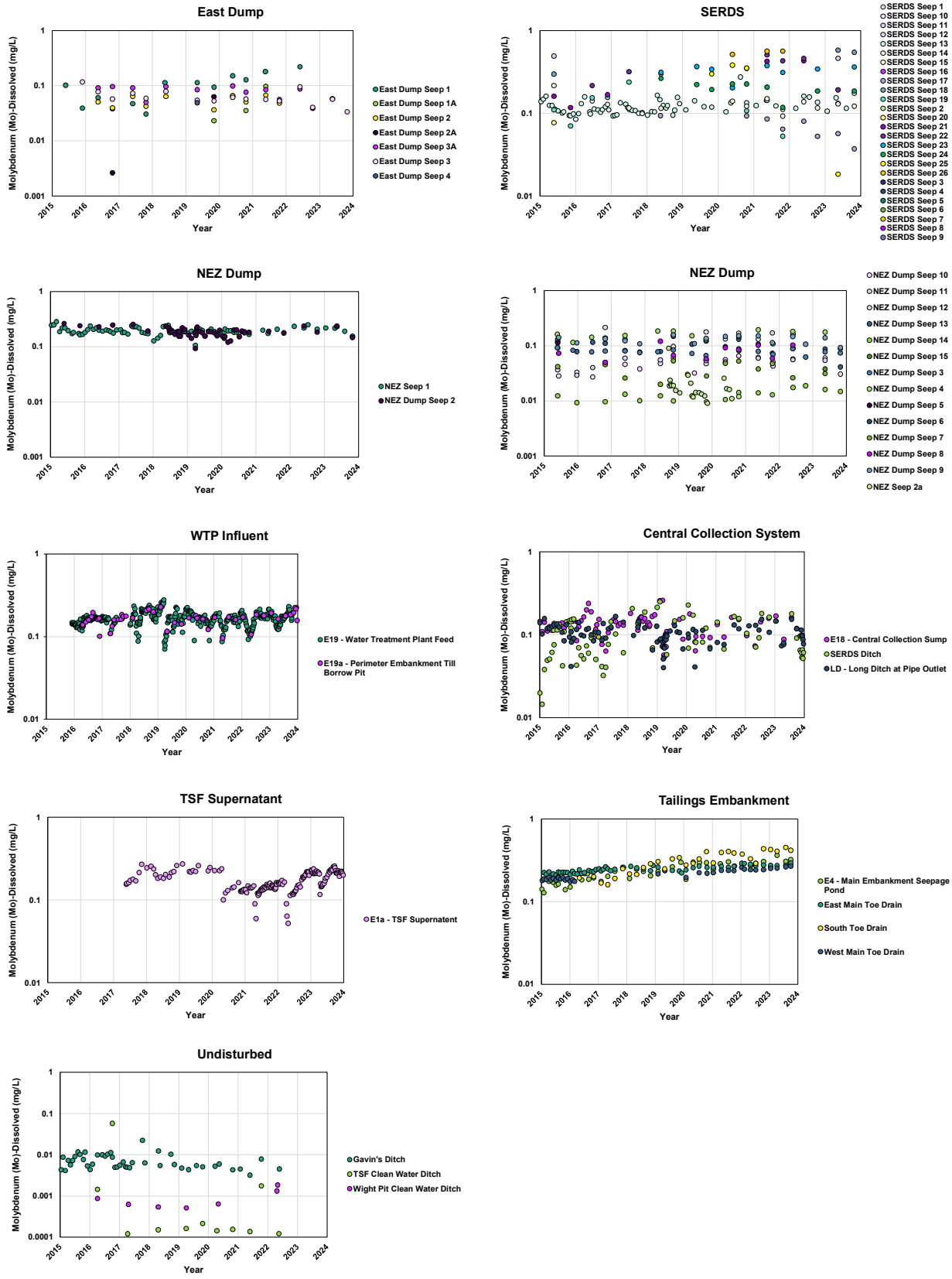
Appendix G: Water Quality Time Series Plots



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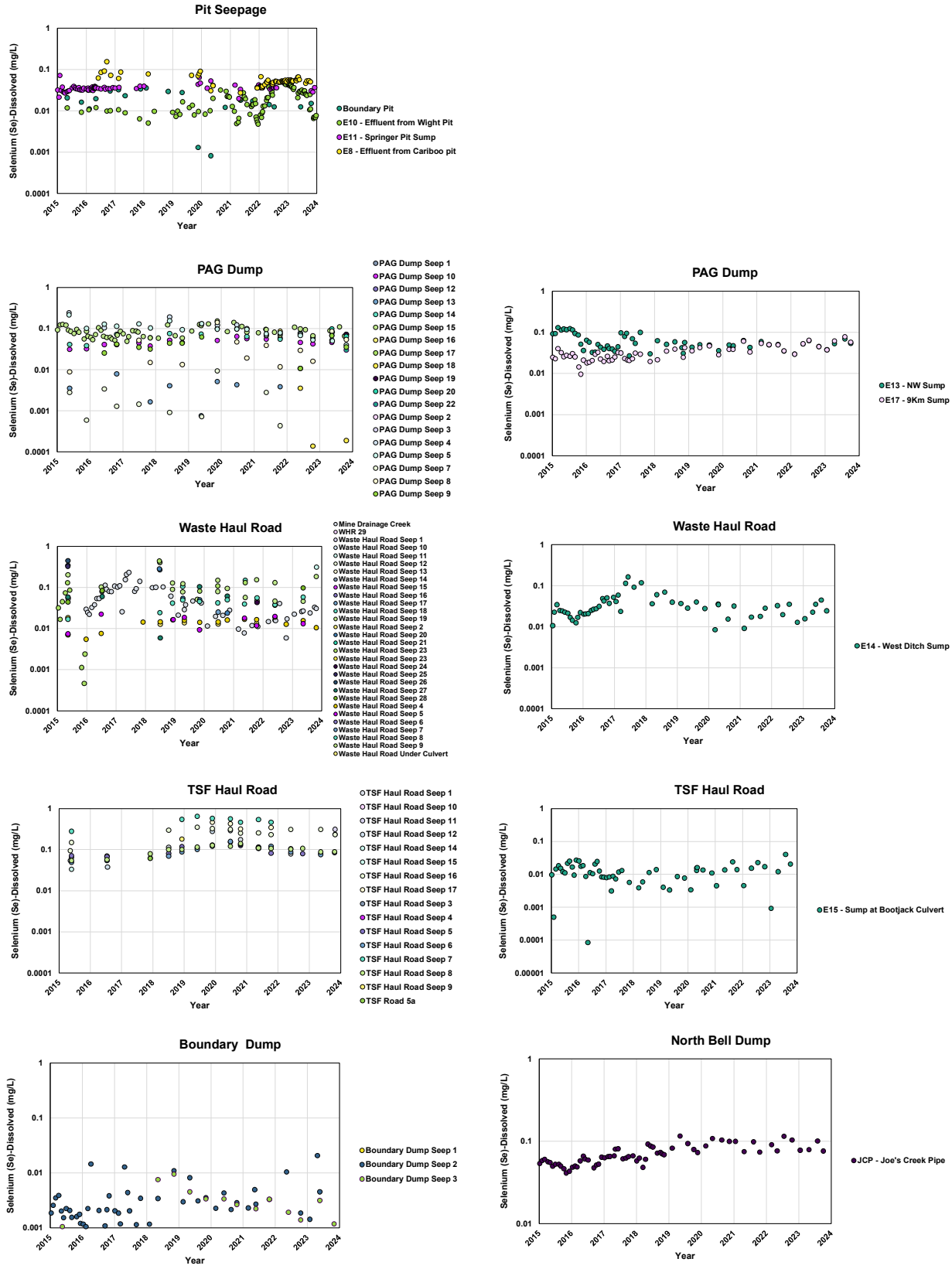
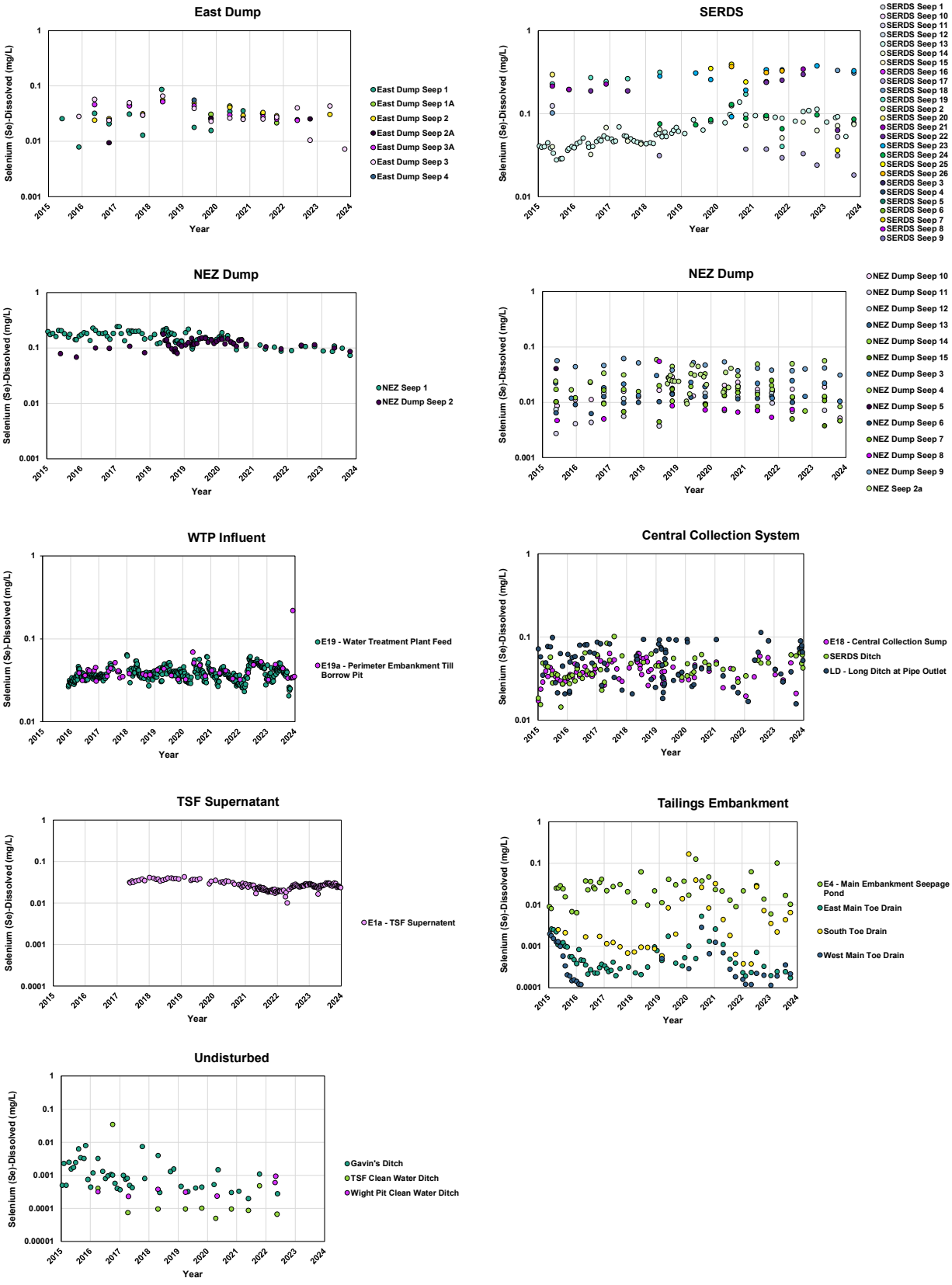
Appendix G: Water Quality Time Series Plots

Figure 20: Selenium (dissolved) values at seep and contact water monitoring stations 2015 to 2023



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

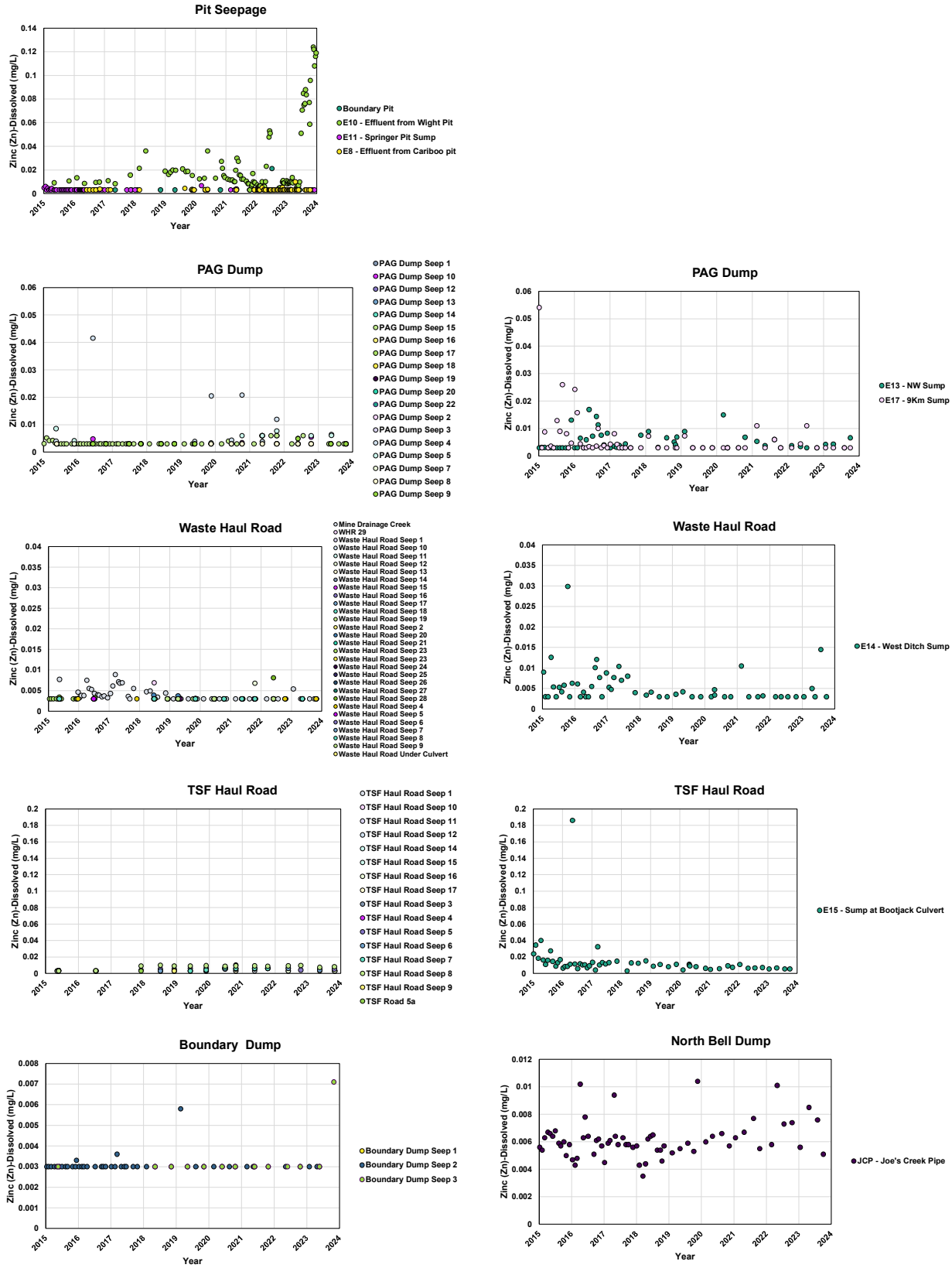
Appendix G: Water Quality Time Series Plots



Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Appendix G: Water Quality Time Series Plots

Figure 21: Zinc (dissolved) values at seep and contact water monitoring stations 2015 to 2023



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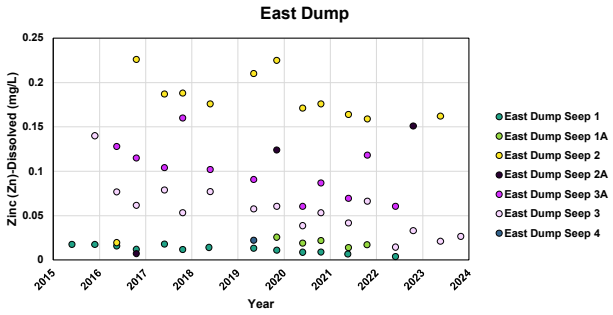
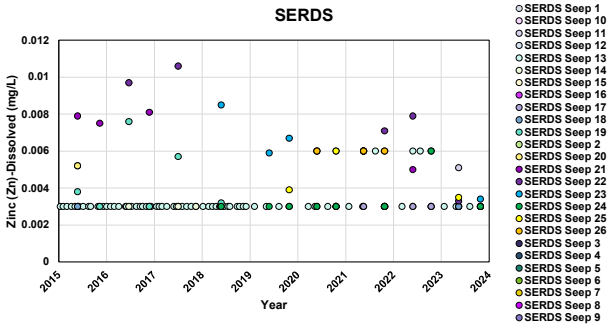
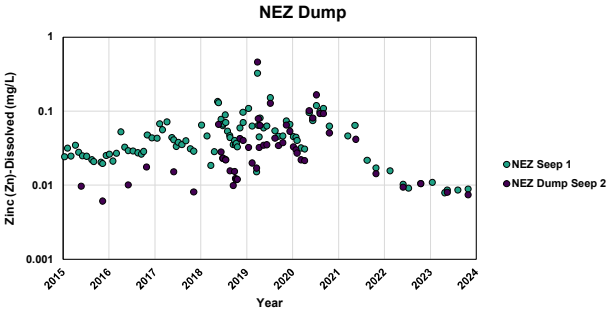
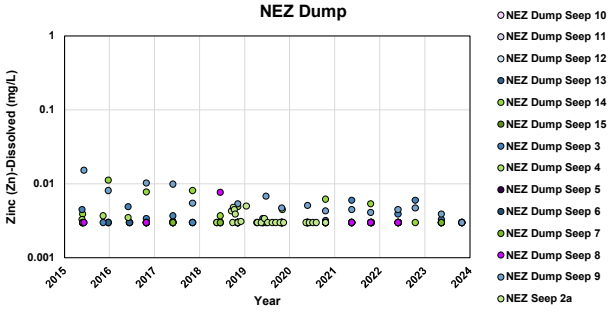
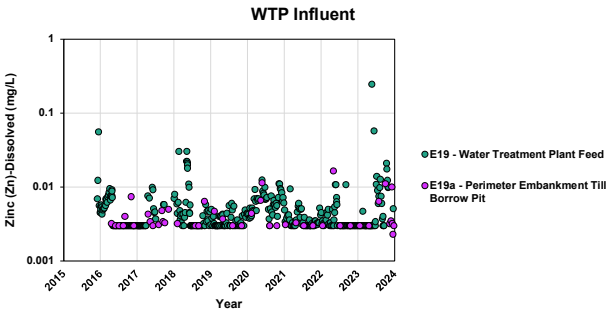
Appendix G: Water Quality Time Series Plots

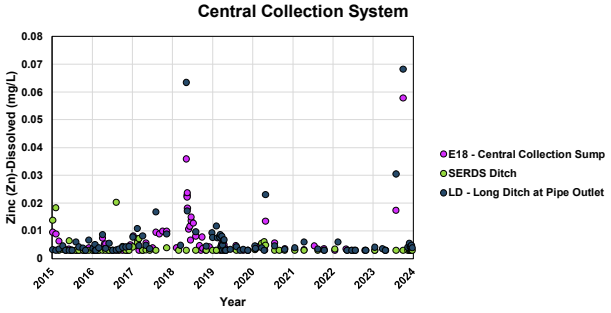


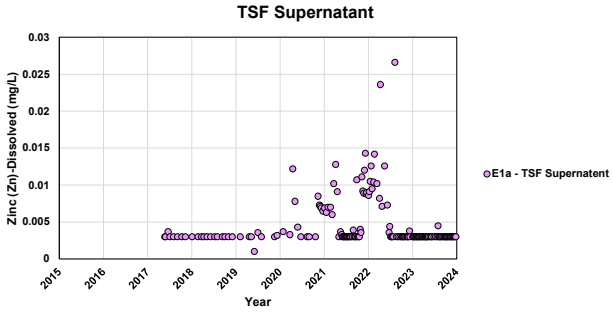


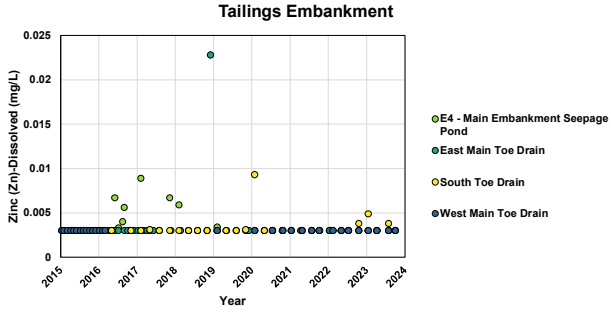


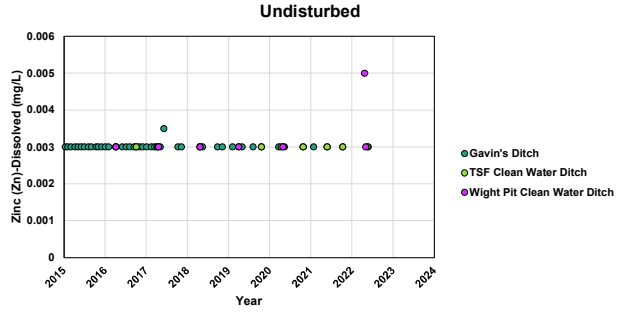












Sources: https://srk.sharepoint.com/sites/NACAPR003074/Internal/!020_Project_Data/010_SRK/Annual_Reporting/Contact_Water/[2023_ContactWQ_CAPR002434_rev01_SJL_KWJ.xlsb]

Appendix H. Geochemical Source Terms Comparison

Appendix H: Geochemical Source Terms Comparison

Table 1: Comparison of Waste Rock Seepage Data Used for Source Terms from 2015 to 2022 to Current Monitoring Data

Parameter	All Seeps without NEZ Seep 1 and 2				All Seeps without NEZ Seep 1 and 2			
	2015 to 2022				2023			
	n	Lower	Average	Upper	n	Lower	Average	Upper
Conductivity (in situ) (µs/cm)	743	1100	1200	1200	124	910	1100	1300
pH (in situ) (pH)	741	7.6	7.6	7.7	124	7.6	7.7	7.7
Alkalinity (CaCO3) (mg/L)	855	110	110	110	115	100	110	120
Aluminum (Al)-D (mg/L)	857	0.005	0.0052	0.0054	115	0.0061	0.0071	0.0083
Ammonia (as N) (mg/L)	855	0.0095	0.01	0.011	115	0.0084	0.0099	0.012
Antimony (Sb)-D (mg/L)	857	0.00021	0.00022	0.00024	115	0.0002	0.00023	0.00026
Arsenic (As)-D (mg/L)	857	0.00044	0.00046	0.00048	115	0.00038	0.00043	0.00049
Barium (Ba)-D (mg/L)	857	0.036	0.037	0.038	115	0.032	0.036	0.04
Beryllium (Be)-D (mg/L)	857	0.00014	0.00015	0.00015	115	0.0001	0.0001	0.0001
Bismuth (Bi)-D (mg/L)	857	0.000086	0.000092	0.000098	115	0.000058	0.000062	0.000066
Boron (B)-D (mg/L)	857	0.05	0.052	0.055	115	0.053	0.059	0.066
Cadmium (Cd)-D (mg/L)	857	0.000059	0.000064	0.000069	115	0.00005	0.00006	0.000072
Calcium (Ca)-D (mg/L)	857	200	200	210	115	180	200	220
Chloride (Cl) (mg/L)	855	3.4	3.5	3.7	115	2.9	3.4	3.8
Chromium (Cr)-D (mg/L)	857	0.00051	0.00052	0.00052	115	0.0005	0.00051	0.00051
Cobalt (Co)-D (mg/L)	857	0.00018	0.0002	0.00021	115	0.00015	0.00017	0.0002
Copper (Cu)-D (mg/L)	857	0.0058	0.0061	0.0064	115	0.0064	0.0073	0.0084
Fluoride (F) (mg/L)	855	0.19	0.2	0.21	115	0.18	0.2	0.22
Iron (Fe)-D (mg/L)	857	0.036	0.038	0.039	115	0.034	0.039	0.044
Lead (Pb)-D (mg/L)	857	0.000058	0.000059	0.000061	115	0.000059	0.000063	0.000067
Lithium (Li)-D (mg/L)	857	0.0022	0.0023	0.0025	115	0.0022	0.0025	0.0028
Magnesium (Mg)-D (mg/L)	857	36	37	39	115	33	37	42
Manganese (Mn)-D (mg/L)	857	0.019	0.023	0.027	115	0.013	0.019	0.029
Molybdenum (Mo)-D (mg/L)	857	0.061	0.066	0.072	115	0.063	0.079	0.097
Nickel (Ni)-D (mg/L)	857	0.00063	0.00064	0.00066	115	0.0006	0.00064	0.00069
Nitrate (as N) (mg/L)	855	2.9	3.4	3.8	115	2.1	3	4.3
Nitrite (as N) (mg/L)	855	0.0082	0.009	0.0099	115	0.007	0.0085	0.01
Orthophosphate-D (as P) (mg/L)	855	0.0067	0.0073	0.0079	115	0.0041	0.005	0.0061
Phosphorus (P) T D (mg/L)	855	0.011	0.011	0.012	115	0.0099	0.011	0.013

Potassium (K)-D (mg/L)	857	1.8	1.9	2	115	1.7	1.8	2
Selenium (Se)-D (mg/L)	857	0.029	0.032	0.035	115	0.028	0.035	0.045
Silicon (Si)-D (mg/L)	857	6.3	6.4	6.6	115	6.2	6.5	6.8
Silver (Ag)-D (mg/L)	857	0.000011	0.000012	0.000012	115	0.000012	0.000013	0.000014
Sodium (Na)-D (mg/L)	857	13	14	14	115	13	14	16
Strontium (Sr)-D (mg/L)	857	1.3	1.4	1.5	115	1.2	1.4	1.6
Sulphate (mg/L)	855	490	510	540	115	470	540	620
Thallium (Tl)-D (mg/L)	857	0.000011	0.000012	0.000012	115	0.000012	0.000012	0.000013
Tin (Sn)-D (mg/L)	857	0.00011	0.00012	0.00012	115	0.00012	0.00012	0.00013
Titanium (Ti)-D (mg/L)	857	0.011	0.011	0.011	115	0.01	0.01	0.01
Uranium (U)-D (mg/L)	857	0.00068	0.00075	0.00083	115	0.00071	0.00089	0.0011
Vanadium (V)-D (mg/L)	857	0.00076	0.00078	0.00081	115	0.0007	0.00076	0.00082
Zinc (Zn)-D (mg/L)	857	0.0041	0.0043	0.0046	115	0.0036	0.0042	0.0048

Table 2: Comparison of NEZ Dump Influenced by Sulphur Stockpile Seepage Data Used for Source Terms from 2015 to 2022 to Current Monitoring Data

Parameter	NEZ Dump Seeps Influenced by Sulphur Stockpile				NEZ Dump Seeps Influenced by Sulphur Stockpile			
	2015 to 2022				2023			
	n	Lower	Average	Upper	n	Lower	Average	Upper
Conductivity (in situ) (µs/cm)	177	1500	1600	1700	12	1300	1400	1600
pH (in situ) (pH)	177	7.3	7.4	7.5	12	7.5	7.7	7.8
Alkalinity (CaCO3) (mg/L)	187	51	54	58	12	64	66	68
Aluminum (Al)-D (mg/L)	187	0.019	0.021	0.024	12	0.0074	0.013	0.022
Ammonia (as N) (mg/L)	187	0.0077	0.0085	0.0095	12	0.0049	0.0052	0.0055
Antimony (Sb)-D (mg/L)	187	0.00026	0.00028	0.0003	12	0.00028	0.0003	0.00033
Arsenic (As)-D (mg/L)	187	0.00017	0.00018	0.00019	12	0.00018	0.00019	0.00022
Barium (Ba)-D (mg/L)	187	0.038	0.039	0.04	12	0.028	0.031	0.034
Beryllium (Be)-D (mg/L)	187	0.00016	0.00018	0.00021	12	0.0001	0.0001	0.0001
Bismuth (Bi)-D (mg/L)	187	0.000078	0.000089	0.0001	12	0.000053	0.000067	0.000084
Boron (B)-D (mg/L)	187	0.067	0.069	0.071	12	0.055	0.058	0.061
Cadmium (Cd)-D (mg/L)	187	0.0003	0.00034	0.00038	12	0.00016	0.00018	0.00021
Calcium (Ca)-D (mg/L)	187	290	300	310	12	210	230	250
Chloride (Cl) (mg/L)	187	5.2	5.6	6	12	2.6	3.1	3.8
Chromium (Cr)-D (mg/L)	187	0.0005	0.00051	0.00053	12	0.0005	0.0005	0.0005
Cobalt (Co)-D (mg/L)	187	0.0019	0.0024	0.0029	12	0.00038	0.00064	0.0011
Copper (Cu)-D (mg/L)	187	0.14	0.18	0.23	12	0.094	0.1	0.11
Fluoride (F) (mg/L)	187	0.46	0.49	0.52	12	0.34	0.37	0.41
Iron (Fe)-D (mg/L)	187	0.033	0.036	0.039	12	0.028	0.035	0.043
Lead (Pb)-D (mg/L)	187	0.000064	0.000068	0.000072	12	0.00006	0.000075	0.000094
Lithium (Li)-D (mg/L)	187	0.0041	0.0046	0.0051	12	0.0029	0.0031	0.0034
Magnesium (Mg)-D (mg/L)	187	58	60	61	12	39	44	49
Manganese (Mn)-D (mg/L)	187	0.32	0.37	0.44	12	0.073	0.11	0.17
Molybdenum (Mo)-D (mg/L)	187	0.13	0.15	0.17	12	0.18	0.2	0.22
Nickel (Ni)-D (mg/L)	187	0.0039	0.0045	0.0052	12	0.0015	0.0017	0.0018
Nitrate (as N) (mg/L)	187	1.6	1.8	2	12	0.91	0.99	1.1
Nitrite (as N) (mg/L)	187	0.0081	0.0086	0.0092	12	0.0049	0.0059	0.0073
Orthophosphate-D (as P) (mg/L)	187	0.0016	0.0018	0.002	12	0.001	0.001	0.001
Phosphorus (P) T D (mg/L)	187	0.0031	0.0034	0.0037	12	0.0026	0.0031	0.0037

Potassium (K)-D (mg/L)	187	2.2	2.2	2.3	12	1.7	1.8	1.9
Selenium (Se)-D (mg/L)	187	0.1	0.11	0.12	12	0.083	0.09	0.098
Silicon (Si)-D (mg/L)	187	4.8	4.9	5	12	3.7	4	4.3
Silver (Ag)-D (mg/L)	187	0.000013	0.000014	0.000014	12	0.000011	0.000013	0.000017
Sodium (Na)-D (mg/L)	187	19	20	20	12	15	17	18
Strontium (Sr)-D (mg/L)	187	3.5	3.6	3.7	12	3.1	3.3	3.6
Sulphate (mg/L)	187	920	950	990	12	650	740	840
Thallium (Tl)-D (mg/L)	187	0.000013	0.000014	0.000014	12	0.000011	0.000013	0.000017
Tin (Sn)-D (mg/L)	187	0.00013	0.00014	0.00014	12	0.00011	0.00013	0.00017
Titanium (Ti)-D (mg/L)	187	0.01	0.011	0.011	12	0.01	0.01	0.01
Uranium (U)-D (mg/L)	187	0.00063	0.00069	0.00077	12	0.001	0.0011	0.0012
Vanadium (V)-D (mg/L)	187	0.00068	0.00073	0.00079	12	0.00053	0.00067	0.00084
Zinc (Zn)-D (mg/L)	187	0.021	0.024	0.028	12	0.0081	0.0087	0.0094

Table 3: Pit Wall NAG Average Source Term Compared to 2023 Monitoring Results from the Boundary Pit

Parameter	Unit	Source Term Case	Boundary Pit	Boundary Pit
		NAG Average	6/13/2023	10/24/2023
Alkalinity	mg CaCO3/L	190	130	120
Cl	mg/L	-	0.5	1.4
F	mg/L	-	0.69	0.82
P	mg/L	-	0.0051	0.002
SO4	mg/L	110	130	160
Al	mg/L	0.073	0.0051	0.003
Sb	mg/L	0.00081	0.00068	0.00086
As	mg/L	0.0023	0.00091	0.00081
Ba	mg/L	0.031	0.037	0.032
Be	mg/L	0.0001	0.0001	0.0001
Bi	mg/L	-	0.00005	0.00005
B	mg/L	0.38	0.031	0.034
Cd	mg/L	0.00024	0.000055	0.00011
Ca	mg/L	130	84	92
Cr	mg/L	0.00059	0.0005	0.0005
Co	mg/L	0.0012	0.0001	0.0001
Cu	mg/L	0.064	0.023	0.037
Fe	mg/L	0.14	0.03	0.03
Pb	mg/L	0.00076	0.00005	0.00005
Li	mg/L	-	0.0088	0.0098
Mg	mg/L	11	8.1	9.3
Mn	mg/L	0.035	0.014	0.014
Mo	mg/L	0.089	0.086	0.11
Ni	mg/L	0.001	0.0005	0.0005
K	mg/L	2.3	1.4	1.4
Se	mg/L	0.046	0.012	0.015
Si	mg/L	8.6	4.5	4.5
Ag	mg/L	0.0000028	0.00001	0.00001
Na	mg/L	10	4.9	5.5
Sr	mg/L	0.27	2.7	3.2
Tl	mg/L	-	0.00001	0.00001
Sn	mg/L	0.0001	0.0001	0.0001
Ti	mg/L	-	0.01	0.01
U	mg/L	-	0.0034	0.0038
V	mg/L	-	0.0005	0.0005
Zn	mg/L	0.025	0.003	0.003

Table 4: Comparison of Tailings Embankment Seepage Data Used for Source Terms from 2015 to 2022 to Current Monitoring Data

Parameter	2015 to 2022				2023			
	n	Lower	Average	Upper	n	Lower	Average	Upper
pH (in situ) (pH)	947	7.8	7.9	7.9	160	7.6	7.7	7.8
Alkalinity (CaCO3) (mg/L)	684	76	82	88	69	0	0	0
Aluminum (Al)-D (mg/L)	649	0.0039	0.0042	0.0045	69	0.011	0.014	0.017
Ammonia (as N) (mg/L)	683	0.035	0.038	0.041	69	0.098	0.13	0.18
Antimony (Sb)-D (mg/L)	649	0.00031	0.00033	0.00035	69	0.00064	0.00084	0.0011
Arsenic (As)-D (mg/L)	647	0.0015	0.0015	0.0016	69	0.0019	0.0021	0.0022
Barium (Ba)-D (mg/L)	649	0.05	0.051	0.053	69	0.046	0.05	0.054
Beryllium (Be)-D (mg/L)	649	0.00014	0.00015	0.00017	69	0.0001	0.0001	0.0001
Bismuth (Bi)-D (mg/L)	649	0.00017	0.00018	0.0002	69	0.00005	0.000051	0.000052
Boron (B)-D (mg/L)	547	0.12	0.12	0.12	69	0.12	0.13	0.14
Cadmium (Cd)-D (mg/L)	647	0.000078	0.000084	0.00009	69	0.000039	0.000047	0.000057
Calcium (Ca)-D (mg/L)	648	110	110	120	69	130	140	150
Chloride (Cl) (mg/L)	453	18	19	20	69	17	19	21
Chromium (Cr)-D (mg/L)	649	0.00049	0.00051	0.00054	69	0.0005	0.0005	0.0005
Cobalt (Co)-D (mg/L)	649	0.00023	0.00025	0.00027	69	0.00014	0.00017	0.00022
Copper (Cu)-D (mg/L)	650	0.0026	0.0028	0.0031	69	0.0016	0.0021	0.0027
D Organic Carbon (mg/L)	661	3.8	3.9	4	70	4.1	5	6
Fluoride (F) (mg/L)	341	0.69	0.71	0.74	69	0.65	0.68	0.71
Iron (Fe)-D (mg/L)	650	0.026	0.027	0.029	69	0.032	0.037	0.042
Lead (Pb)-D (mg/L)	650	0.00005	0.000052	0.000054	69	0.00005	0.000051	0.000052
Lithium (Li)-D (mg/L)	648	0.0053	0.0056	0.0059	69	0.011	0.012	0.014
Magnesium (Mg)-D (mg/L)	648	18	19	19	69	17	18	20
Manganese (Mn)-D (mg/L)	650	0.12	0.14	0.16	69	0.021	0.034	0.056
Molybdenum (Mo)-D (mg/L)	650	0.1	0.11	0.12	69	0.22	0.24	0.25
Nickel (Ni)-D (mg/L)	650	0.00057	0.00059	0.00061	69	0.00053	0.00057	0.00063
Nitrate (as N) (mg/L)	550	0.7	0.82	0.96	69	0.62	0.99	1.6
Nitrite (as N) (mg/L)	599	0.02	0.022	0.025	69	0.031	0.046	0.068
Phosphorus (P) T D (mg/L)	667	0.013	0.014	0.015	69	0.0048	0.0057	0.0069
Potassium (K)-D (mg/L)	650	8.3	8.8	9.3	69	14	15	16
Selenium (Se)-D (mg/L)	650	0.0038	0.0042	0.0047	69	0.0086	0.013	0.019

Silicon (Si)-D (mg/L)	648	4.9	5.1	5.3	69	4.7	5.1	5.4
Silver (Ag)-D (mg/L)	649	0.000011	0.000011	0.000011	69	0.0000099	0.00001	0.00001
Sodium (Na)-D (mg/L)	646	51	54	57	69	85	92	99
Strontium (Sr)-D (mg/L)	650	1.3	1.4	1.5	69	1.7	1.9	2.1
Sulphate (mg/L)	680	300	320	340	69	520	550	590
Thallium (Tl)-D (mg/L)	648	0.000027	0.000029	0.000032	69	0.0000099	0.00001	0.00001
Tin (Sn)-D (mg/L)	648	0.0001	0.00011	0.00011	69	0.000099	0.0001	0.0001
Titanium (Ti)-D (mg/L)	649	0.0064	0.0069	0.0073	69	0.01	0.01	0.01
Uranium (U)-D (mg/L)	648	0.0013	0.0014	0.0014	69	0.00091	0.0011	0.0013
Vanadium (V)-D (mg/L)	649	0.00093	0.00097	0.001	69	0.0011	0.0013	0.0016
Zinc (Zn)-D (mg/L)	650	0.0025	0.0026	0.0028	69	0.003	0.0031	0.0031

Appendix I. 2023 Contact and Seep Sampling Water Quality Summary Statistics

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

		Boundary Dump Seep 1	Boundary Dump Seep 2					Boundary Dump Seep 3				
Parameter	**Unit**		Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	N =	-	3					2				
pH	s.u.	-	7.1	7.1	7.3	7.3	7.4	7.3	7.3	7.4	7.5	7.5
Conductivity	µS/cm	-	750	770	950	1100	1100	700	700	760	820	820
Temprature	°C	-	0.7	0.93	3	3.9	4	1.5	1.8	4.2	6.5	6.8
Turbidity	NTU	-	0.2	0.49	3.1	4.5	4.7	3	3.1	3.2	3.4	3.4
Physical Tests	N =	-	3					2				
Conductivity	µS/cm	-	720	740	850	1100	1100	560	570	690	810	830
Hardness (as CaCO3)	mg/L	-	320	330	450	590	600	270	280	360	440	450
pH	s.u.	-	8.2	8.2	8.2	8.3	8.3	8.1	8.1	8.1	8.1	8.1
Total Suspended Solids	mg/L	-	1	1.1	1.7	3.1	3.2	2.3	3.8	17	31	32
Total Dissolved Solids	mg/L	-	540	550	600	890	920	360	370	470	570	580
Turbidity	NTU	-	0.24	0.25	0.31	1.2	1.3	0.29	0.74	4.8	8.8	9.3
Anions and Nutrients	N =	-	3					2				
Alkalinity, Total (as CaCO3)	mg/L	-	130	130	140	220	230	160	160	200	230	240
Ammonia, Total (as N)	mg/L	-	0.005	0.0081	0.036	0.095	0.1	0.012	0.012	0.016	0.019	0.02
Chloride	mg/L	-	2.5	2.5	2.5	2.5	2.5	0.5	0.6	1.5	2.4	2.5
Fluoride	mg/L	-	0.14	0.14	0.15	0.3	0.32	0.12	0.12	0.13	0.14	0.14
Nitrate (as N)	mg/L	-	0.11	0.15	0.56	1.8	2	0.061	0.085	0.3	0.51	0.54
Nitrite (as N)	mg/L	-	0.005	0.005	0.005	0.008	0.0083	0.001	0.0012	0.003	0.0048	0.005
Total Nitrogen	mg/L	-	0.39	0.49	1.4	2.1	2.2	0.3	0.33	0.52	0.72	0.74
Orthophosphate-Dissolved (as P)	mg/L	-	0.0028	0.0033	0.0077	0.011	0.012	0.013	0.013	0.015	0.016	0.017
Phosphorus - Total Dissolved	mg/L	-	0.0023	0.0042	0.022	0.046	0.049	0.02	0.02	0.022	0.024	0.024
Phosphorus - Total	mg/L	-	0.0028	0.0049	0.024	0.048	0.05	0.028	0.031	0.06	0.088	0.092
Sulfate	mg/L	-	250	250	250	500	520	140	140	170	210	210
Organic Carbon	N =	-	3					2				
Dissolved Organic Carbon	mg/L	-	4.8	4.9	5.8	7.9	8.1	5.7	5.7	5.9	6.1	6.1
Total Metals	N =	-	3					2				
Aluminum	mg/L	-	0.013	0.014	0.023	0.032	0.033	0.069	0.093	0.31	0.53	0.55
Antimony	mg/L	-	0.0001	0.0001	0.00014	0.00023	0.00024	0.00012	0.00012	0.00013	0.00013	0.00013
Arsenic	mg/L	-	0.00046	0.00046	0.0005	0.00066	0.00068	0.00048	0.0005	0.00071	0.00091	0.00093
Barium	mg/L	-	0.02	0.021	0.03	0.032	0.032	0.02	0.021	0.028	0.036	0.037
Beryllium	mg/L	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	mg/L	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	mg/L	-	0.051	0.052	0.056	0.059	0.059	0.061	0.061	0.062	0.063	0.063
Cadmium	mg/L	-	0.000027	0.000027	0.000029	0.000061	0.000065	0.000017	0.000021	0.000065	0.00011	0.00011
Calcium	mg/L	-	100	110	160	180	190	96	99	120	150	150
Chromium	mg/L	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	mg/L	-	0.0001	0.00011	0.0002	0.00022	0.00022	0.0001	0.00013	0.00038	0.00063	0.00066
Copper	mg/L	-	0.008	0.008	0.0083	0.0099	0.01	0.015	0.016	0.03	0.043	0.045
Iron	mg/L	-	0.042	0.042	0.045	0.52	0.58	0.077	0.11	0.38	0.64	0.67
Lead	mg/L	-	0.00005	0.000051	0.000058	0.000088	0.000091	0.000055	0.000071	0.00021	0.00035	0.00037
Lithium	mg/L	-	0.0014	0.0014	0.0017	0.0031	0.0032	0.0014	0.0014	0.0019	0.0023	0.0023
Magnesium	mg/L	-	13	14	20	31	32	10	10	14	17	17
Manganese	mg/L	-	0.0038	0.01	0.067	0.51	0.56	0.011	0.028	0.18	0.33	0.35
Molybdenum	mg/L	-	0.018	0.019	0.025	0.076	0.082	0.015	0.015	0.017	0.018	0.018
Nickel	mg/L	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00052	0.00068	0.00083	0.00085
Potassium	mg/L	-	0.8	0.83	1.1	1.3	1.3	0.82	0.83	0.95	1.1	1.1
Selenium	mg/L	-	0.0013	0.0017	0.0045	0.019	0.021	0.0014	0.0015	0.0023	0.0031	0.0032
Silicon	mg/L	-	4.9	5	6	6.8	6.9	6.1	6.2	6.9	7.7	7.8
Silver	mg/L	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000013	0.000015	0.000015
Sodium	mg/L	-	4.1	4.2	5.5	7.1	7.3	3.5	3.6	4.2	4.9	5
Strontium	mg/L	-	0.88	0.91	1.2	2.6	2.7	0.56	0.59	0.86	1.1	1.2
Thallium	mg/L	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	mg/L	-	0.0001	0.0001	0.0001	0.00033	0.00036	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	mg/L	-	0.01	0.01	0.01	0.01	0.01	0.01	0.011	0.017	0.023	0.024
Uranium	mg/L	-	0.00069	0.00069	0.00073	0.0013	0.0013	0.00051	0.00052	0.00067	0.00082	0.00084
Vanadium	mg/L	-	0.0006	0.00062	0.00081	0.00095	0.00097	0.00065	0.00072	0.0013	0.0019	0.002
Zinc	mg/L	-	0.003	0.003	0.003	0.003	0.003	0.003	0.0032	0.0054	0.0076	0.0078
Dissolved Metals	N =	-	3					2				
Aluminum	mg/L	-	0.0035	0.0035	0.0037	0.0098	0.011	0.0034	0.0038	0.0072	0.011	0.011
Antimony	mg/L	-	0.0001	0.0001	0.00012	0.00022	0.00023	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	mg/L	-	0.00042	0.00042	0.00046	0.00057	0.00058	0.00042	0.00043	0.00049	0.00054	0.00055
Barium	mg/L	-	0.019	0.02	0.028	0.034	0.034	0.018	0.019	0.023	0.027	0.027
Beryllium	mg/L	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	mg/L	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	mg/L	-	0.051	0.052	0.056	0.057	0.057	0.058	0.058	0.059	0.059	0.059
Cadmium	mg/L	-	0.000027	0.000028	0.000033	0.000062	0.000065	0.000019	0.00002	0.000027	0.000034	0.000035
Calcium	mg/L	-	100	110	150	180	190	93	96	120	150	150
Chromium	mg/L	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	mg/L	-	0.0001	0.00011	0.0002	0.00021	0.00021	0.0001	0.00011	0.00017	0.00022	0.00023
Copper	mg/L	-	0.0048	0.005	0.0069	0.0081	0.0082	0.0067	0.0068	0.007	0.0073	0.0073
Iron	mg/L	-	0.03	0.031	0.04	0.42	0.46	0.03	0.032	0.048	0.063	0.065
Lead	mg/L	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	mg/L	-	0.0016	0.0016	0.0016	0.003	0.0032	0.0012	0.0012	0.0016	0.0019	0.0019
Magnesium	mg/L	-	14	14	19	31	32	10	11	14	17	18
Manganese	mg/L	-	0.0031	0.0094	0.067	0.46	0.5	0.011	0.025	0.16	0.29	0.3
Molybdenum	mg/L	-	0.018	0.019	0.025	0.075	0.081	0.014	0.014	0.016	0.018	0.018
Nickel	mg/L	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00051	0.00065	0.00078	0.00079
Potassium	mg/L	-	0.81	0.84	1.1	1.3	1.4	0.79	0.8	0.9	1	1
Selenium	mg/L	-	0.0014	0.0018	0.0046	0.019	0.021	0.0012	0.0013	0.0022	0.0031	0.0032
Silicon	mg/L	-	4.9	4.9	5.5	6.6	6.7	5.5	5.6	6.1	6.7	6.8
Silver	mg/L	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	mg/L	-	4	4.1	5.3	7.3	7.6	3.5	3.6	4.3	5.1	5.1
Strontium	mg/L	-	0.86	0.89	1.2	2.6	2.7	0.54	0.57	0.86	1.1	1.2
Thallium	mg/L	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	mg/L	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	mg/L	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

		Boundary Dump Seep 1	Boundary Dump Seep 2					Boundary Dump Seep 3				
Uranium	mg/L	-	0.00071	0.00073	0.00084	0.0013	0.0013	0.00056	0.00057	0.00069	0.00081	0.00082
Vanadium	mg/L	-	0.0005	0.00051	0.00057	0.00089	0.00092	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc	mg/L	-	0.003	0.003	0.003	0.003	0.003	0.003	0.0032	0.0051	0.0069	0.0071

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Boundary Pit					E10 - Effluent from Wight Pit					E11 - Springer Pit Sump					E11c - Springer Pit Dewatering Well				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	2					30					3					19				
pH	7.8	7.8	7.9	8.1	8.1	7.2	7.3	7.7	7.9	7.9	7.1	7.2	7.7	8	8	7.4	7.5	7.9	8	8
Conductivity	5.2	32	270	510	540	660	920	1400	2200	2300	500	510	600	810	830	760	770	820	940	1600
Temprature	5.8	6.4	12	18	18	2.6	2.8	5.8	19	20	7.3	7.4	8.2	8.6	8.7	3.2	6.1	7.8	11	13
Turbidity	0.33	0.36	0.63	0.9	0.93	0.15	0.23	0.71	2.5	16	1.1	1.1	1.1	1.7	1.7	0.19	0.25	1.4	32	46
Physical Tests	2					30					3					19				
Conductivity	520	520	530	530	540	630	900	1400	2200	2300	610	620	680	790	800	730	750	810	900	1200
Hardness (as CaCO3)	240	240	260	270	270	300	450	710	1300	1500	220	220	270	330	340	310	310	340	370	380
pH	7.9	8	8.1	8.2	8.2	7.9	7.9	8.1	8.2	8.3	7.7	7.7	7.8	8	8	7.2	7.7	8	8.1	8.1
Total Suspended Solids	1	1	1.3	1.5	1.5	1	1	1	3.2	26	3	3.1	4	7.6	8	1	1	1.7	14	23
Total Dissolved Solids	370	370	380	390	390	500	700	1100	2100	2400	430	440	490	570	580	540	540	610	640	640
Turbidity	0.59	0.61	0.75	0.89	0.91	0.13	0.19	0.36	0.98	17	0.75	0.82	1.5	2.6	2.7	0.1	0.16	1.2	7.1	9
Anions and Nutrients	2					30					3					19				
Alkalinity, Total (as CaCO3)	120	120	120	130	130	77	88	110	160	160	45	46	53	54	54	14	56	67	80	93
Ammonia, Total (as N)	0.0059	0.0059	0.0062	0.0064	0.0064	0.005	0.005	0.005	0.0098	0.028	0.28	0.29	0.39	0.8	0.85	0.16	0.18	0.23	0.28	0.29
Chloride	0.5	0.54	0.93	1.3	1.4	1.6	3	5.1	10	10	1.9	1.9	2	2.5	2.6	3.1	3.3	4.4	5.1	5.2
Fluoride	0.69	0.69	0.75	0.81	0.82	0.37	0.39	0.56	0.7	0.78	0.22	0.22	0.24	0.26	0.26	0.31	0.33	0.39	0.45	0.5
Nitrate (as N)	0.048	0.051	0.08	0.11	0.11	0.22	0.24	1.5	3.2	3.2	3.5	3.9	6.7	8.9	9.1	0.52	0.88	1.6	11	13
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.005	0.0064	0.01	0.021	0.024	0.15	0.16	0.25	0.29	0.29	0.077	0.094	0.2	0.54	0.85
Total Nitrogen	0.3	0.3	0.32	0.35	0.35	0.27	0.28	1.6	3.3	3.3	4.1	4.5	7.9	9.7	9.9	0.81	1.2	2.1	14	14
Orthophosphate-Dissolved (as P)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0018	0.0025	0.001	0.001	0.001	0.0015	0.0016	0.001	0.001	0.0014	0.0031	0.0037
Phosphorus - Total Dissolved	0.002	0.0022	0.0036	0.0049	0.0051	0.002	0.002	0.002	0.0047	0.0058	0.0023	0.0024	0.0028	0.0032	0.0032	0.002	0.0039	0.0061	0.0088	0.01
Phosphorus - Total	0.0054	0.0054	0.0055	0.0056	0.0056	0.002	0.002	0.0028	0.0094	0.057	0.0081	0.0087	0.014	0.015	0.016	0.007	0.0075	0.0099	0.041	0.049
Sulfate	130	130	150	160	160	250	390	660	1300	1400	230	230	260	320	320	290	310	340	370	370
Organic Carbon	2					30					3					19				
Dissolved Organic Carbon	3.2	3.3	3.8	4.3	4.4	1.1	1.2	1.7	2	2.8	0.65	0.66	0.71	0.81	0.82	1.4	1.4	1.6	2.4	2.5
Total Metals	2					30					3					19				
Aluminum	0.028	0.028	0.029	0.03	0.03	0.006	0.006	0.015	0.071	0.93	0.12	0.13	0.16	0.22	0.22	0.0052	0.0071	0.052	0.65	1.1
Antimony	0.00065	0.00066	0.00076	0.00086	0.00087	0.00048	0.00064	0.00085	0.00099	0.001	0.005	0.0052	0.0072	0.008	0.0081	0.001	0.0011	0.0013	0.0032	0.0033
Arsenic	0.00086	0.00087	0.00092	0.00097	0.00098	0.0005	0.00056	0.00081	0.0011	0.0017	0.006	0.006	0.0062	0.013	0.013	0.0025	0.0027	0.0031	0.0037	0.0038
Barium	0.032	0.033	0.036	0.04	0.04	0.021	0.022	0.04	0.057	0.069	0.047	0.048	0.051	0.074	0.077	0.019	0.02	0.024	0.034	0.043
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.00025	0.00025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.034	0.034	0.035	0.035	0.035	0.072	0.097	0.14	0.18	0.2	0.28	0.29	0.32	0.32	0.32	0.2	0.21	0.23	0.27	0.28
Cadmium	0.00005	0.000053	0.000078	0.0001	0.00011	0.00011	0.00014	0.00034	0.00092	0.001	0.00003	0.000037	0.0001	0.00016	0.00017	0.000018	0.00002	0.00005	0.000097	0.00012
Calcium	83	84	88	92	93	100	150	230	460	480	76	77	90	100	100	94	95	100	110	110
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0025	0.0005	0.0005	0.0005	0.00057	0.00058	0.0005	0.0005	0.0005	0.00051	0.00057
Cobalt	0.0001	0.0001	0.00012	0.00013	0.00013	0.0001	0.0001	0.0002	0.0076	0.015	0.00032	0.00032	0.00032	0.00042	0.00043	0.0001	0.00011	0.00021	0.0006	0.00098
Copper	0.028	0.029	0.036	0.042	0.043	0.0083	0.0092	0.013	0.059	0.071	0.034	0.037	0.071	0.076	0.076	0.002	0.0021	0.011	0.037	0.056
Iron	0.034	0.034	0.035	0.036	0.036	0.03	0.03	0.048	0.13	1.1	0.13	0.13	0.15	0.23	0.24	0.03	0.03	0.065	1.2	2.8
Lead	0.00006	0.000062	0.00008	0.000098	0.0001	0.00005	0.000059	0.0001	0.00046	0.00082	0.00008	0.000081	0.000093	0.00011	0.00011	0.00005	0.00005	0.000056	0.00021	0.0003
Lithium	0.009	0.0091	0.0097	0.01	0.01	0.0052	0.0068	0.0092	0.015	0.015	0.0047	0.0048	0.0057	0.0063	0.0064	0.0058	0.0058	0.0062	0.0072	0.0073
Magnesium	8.6	8.6	8.9	9.1	9.1	14	21	32	61	66	8.8	8.9	9.4	11	11	19	19	21	24	24
Manganese	0.025	0.025	0.026	0.027	0.027	0.0076	0.01	0.043	0.78	1.2	0.034	0.034	0.037	0.04	0.04	0.081	0.085	0.11	0.13	0.14
Molybdenum	0.084	0.085	0.096	0.11	0.11	0.092	0.11	0.15	0.16	0.17	0.088	0.095	0.16	0.16	0.16	0.14	0.15	0.21	0.31	0.38
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00051	0.001	0.0031	0.0041	0.0005	0.0005	0.0005	0.00084	0.00088	0.0005	0.0005	0.0005	0.00073	0.00086
Potassium	1.4	1.4	1.5	1.6	1.6	1.1	1.6	2.4	2.7	2.7	0.76	0.76	0.82	0.89	0.9	0.85	0.92	1	1.3	1.4
Selenium	0.013	0.013	0.015	0.016	0.017	0.0064	0.0069	0.03	0.044	0.045	0.029	0.03	0.034	0.039	0.039	0.0095	0.011	0.014	0.039	0.039
Silicon	4.8	4.8	4.8	4.9	4.9	4.5	4.6	5.5	7.2	7.9	7.8	7.8	8	8	8	6	6.3	7.1	8.4	8.7
Silver	0.000014	0.000014	0.000016	0.000017	0.000017	0.00001	0.00001	0.00002	0.00005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	5.4	5.4	5.5	5.5	5.5	12	17	27	33	33	30	30	34	39	40	26	28	32	34	37
Strontium	2.6	2.6	2.8	3	3	3	4.7	7.4	14	14	0.89	0.91	1.1	1.3	1.3	0.7	0.74	0.87	0.94	0.94
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00013	0.00043
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.036	0.05	0.01	0.01	0.013	0.014	0.014	0.01	0.01	0.01	0.04	0.068
Uranium	0.0032	0.0032	0.0036	0.0039	0.004	0.0019	0.0025	0.0034	0.0073	0.0078	0.0034	0.0034	0.0041	0.0045	0.0045	0.0043	0.0045	0.0054	0.0066	0.0069
Vanadium	0.0005	0.0005	0.00052	0.00053	0.00053	0.00084	0.001	0.0012	0.0025	0.0045	0.0038	0.0039	0.0045	0.0056	0.0057	0.0018	0.0018	0.0023	0.0034	0.0052
Zinc	0.003	0.003	0.003	0.003	0.003	0.0059	0.0073	0.037	0.11	0.12	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004
Dissolved Metals	2					30					3					19				
Aluminum	0.003	0.0031	0.0041	0.005	0.0051	0.003	0.003	0.0049	0.013	0.03	0.003	0.0031	0.0036	0.007	0.0074	0.003	0.0031	0.0043	0.0058	0.0062
Antimony	0.00068	0.00069	0.00077	0.00085	0.00086	0.00047	0.00058	0.00079	0.00096	0.00098	0.0045	0.0047	0.0065	0.0093	0.0096	0.001	0.001	0.0014	0.003	0.0032
Arsenic	0.00081	0.00082	0.00086	0.00091	0.00091	0.0005	0.00052	0.00072	0.001	0.0011	0.0053	0.0053	0.0058	0.011	0.012	0.0021	0.0026	0.003	0.0034	0.0037
Barium	0.032	0.032	0.034	0.037	0.037	0.021	0.022	0.039	0.054	0.054	0.043	0.043	0.048	0.069	0.071	0.019	0.019	0.023	0.026	0.027
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.00025	0.00025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.031	0.031	0.033	0.034	0.034	0.07	0.093	0.13	0.18	0.19	0.3	0.3	0.32	0.33	0.33	0.2	0.2	0.22	0.25	0.26
Cadmium	0.000055	0.000058	0.00008	0.0001	0.00011	0.000094	0.00013	0.00053	0.0009	0.0014	0.000045	0.000049	0.000088	0.00014	0.00015	0.00002	0.000029	0.000049	0.000077	0.000095
Calcium	84	84	88	91	92	98	140	230	440	490	73	75	91	120	120	91	95	100	110	110
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0018	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0061	0.012	0.0001	0.00011	0.00018	0.00027	0.00028	0.0001	0.0001	0.00012	0.00029	0.00035
Copper	0.023	0.024	0.03	0.037	0.037	0.0078	0.008	0.011	0.03	0.046	0.025	0.028	0.055	0.061	0.061	0.0016	0.0018	0.0042	0.02	0.027
Iron	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.046	0.19
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.00025	0.00025	0.00005	0.000051	0.000055	0.00006	0.00006	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.0088	0.0089	0.0093	0.0098	0.0098	0.0049	0.0062	0.0089	0.014	0.015	0.0048	0.0049	0.0055	0.0061	0.0062	0.0052	0.0054	0.006	0.007	0.0074
Magnesium	8.1	8.2	8.7	9.3	9.3	13	20	31	58	59	9	9.2	11	11	11	19	19	21	23	24
Manganese	0.014	0.014	0.014	0.014	0.014	0.0064	0.0078	0.022	0.64	1	0.028	0.029	0.032	0.036	0.036	0.081	0.082	0.1	0.12	0.12
Molybdenum	0.086	0.088	0.1	0.11	0.11	0.092	0.1	0.15	0.16	0.17	0.081	0.087	0.14	0.16	0.16	0.15	0.16	0.21	0.3	0.37
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0027	0.0034	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00085	0.0015
Potassium	1.4	1.4	1.4	1.4	1.4	0.95	1.5	2.3	2.8	2.8	0.75	0.75	0.78	0.87	0.88	0.85	0.85	0.98	1.1	1.2
Selenium	0.012	0.013	0.014	0.015	0.015	0.0065	0.0069	0.029	0.042	0.046	0.029	0.029	0.03	0.036	0.036	0.0092	0.011	0.014	0.035	0.039
Silicon	4.5	4.5	4.5	4.5	4.5	4	4.5	5.1	6.8	7.4	7.7	7.7	7.8	7.8	7.8	6.2	6.3	6.7	7.6	8.2
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	4.9	4.9	5.2	5.4	5.5	11	17	26	32	32	29	29	32	38	39	25	28	31	35	36
Strontium	2.7	2.7	2.9	3.1	3.2	3	4.5	7.5	14	15	0.83	0.85	0.99	1.2	1.2	0.7	0.76	0.88	0.95	0.98
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00011
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Boundary Pit					E10 - Effluent from Wight Pit					E11 - Springer Pit Sump					E11c - Springer Pit Dewatering Well				
Uranium	0.0034	0.0034	0.0036	0.0038	0.0038	0.0018	0.0024	0.0033	0.007	0.0073	0.0031	0.0031	0.0038	0.0044	0.0045	0.0041	0.0045	0.0051	0.0066	0.0068
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	0.00085	0.00099	0.0011	0.0025	0.0025	0.0031	0.0032	0.0036	0.0052	0.0054	0.001	0.0014	0.0017	0.0022	0.0022
Zinc	0.003	0.003	0.003	0.003	0.003	0.0052	0.0068	0.032	0.12	0.12	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0039	0.012

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	E13 - NW Sump					E14 - West Ditch Sump					E15 - Sump at Bootjack Culvert					E17 - 9Km Sump				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	11					6					5					5				
pH	7.4	7.4	7.7	8	8.1	7.7	7.7	7.9	8.1	8.1	7.6	7.6	7.7	7.9	8	7.4	7.4	7.6	7.7	7.7
Conductivity	1100	1200	1600	1700	1800	630	640	830	1100	1200	250	250	310	860	880	1000	1100	1400	1600	1600
Temprature	0.96	1	8	15	17	0.82	1.8	8.4	14	14	0.45	0.8	9	15	15	0.16	0.75	7.7	8.1	8.2
Turbidity	0.16	0.41	1.9	3.9	4.3	0.91	0.97	1.4	2.5	2.8	1.6	2	4	21	24	0.71	0.95	2.3	2.9	3
Physical Tests	4					5					4					4				
Conductivity	1300	1300	1500	1600	1600	690	710	780	1100	1200	170	180	490	890	910	1300	1300	1500	1600	1600
Hardness (as CaCO3)	680	700	860	930	930	270	300	420	580	620	64	70	250	460	470	710	720	830	920	920
pH	7.9	7.9	8	8.1	8.1	8	8	8.1	8.2	8.3	7.8	7.8	8	8.1	8.2	7.8	7.8	8	8.1	8.1
Total Suspended Solids	1	1.3	2.9	4.4	4.6	1	1.2	4.6	6.5	6.7	1	1.1	2.3	15	18	1.1	1.3	3.2	4.5	4.6
Total Dissolved Solids	1100	1100	1200	1400	1400	480	490	640	940	1000	150	150	360	730	760	1200	1200	1200	1400	1400
Turbidity	0.5	0.67	1.8	2.3	2.3	0.65	0.65	1.8	4.6	5.3	1.4	1.7	6.9	16	18	0.36	0.52	2	2.6	2.6
Anions and Nutrients	4					5					4					4				
Alkalinity, Total (as CaCO3)	79	83	110	120	130	81	82	110	130	140	48	51	110	160	160	85	88	110	130	130
Ammonia, Total (as N)	0.0063	0.0066	0.0092	0.011	0.011	0.005	0.0051	0.011	0.014	0.014	0.0059	0.0066	0.012	0.013	0.013	0.0081	0.0088	0.014	0.021	0.022
Chloride	2.5	2.6	3.9	5	5	2.3	2.7	4.8	7.8	8	0.5	0.55	1.7	2.5	2.5	2.5	2.6	4	5	5
Fluoride	0.1	0.1	0.15	0.2	0.2	0.1	0.11	0.17	0.21	0.21	0.074	0.077	0.13	0.18	0.19	0.1	0.1	0.15	0.2	0.2
Nitrate (as N)	7.3	7.4	10	14	14	1.6	2.1	5.4	9.5	10	0.23	0.3	0.85	1.1	1.2	7.2	7.7	12	16	17
Nitrite (as N)	0.005	0.0058	0.01	0.01	0.01	0.005	0.005	0.005	0.019	0.021	0.0015	0.0015	0.0033	0.0077	0.0082	0.0068	0.0073	0.01	0.016	0.017
Total Nitrogen	7.9	7.9	10	14	15	2.3	2.7	5.4	9.5	10	0.5	0.57	1	1.4	1.4	7.8	8.1	12	15	15
Orthophosphate-Dissolved (as P)	0.001	0.0012	0.0024	0.0057	0.0062	0.0011	0.0018	0.0052	0.012	0.013	0.001	0.001	0.0021	0.0033	0.0033	0.001	0.0013	0.0034	0.0066	0.0071
Phosphorus - Total Dissolved	0.0077	0.0078	0.0093	0.012	0.012	0.011	0.011	0.013	0.025	0.026	0.0052	0.0053	0.0097	0.016	0.016	0.0091	0.0091	0.01	0.014	0.014
Phosphorus - Total	0.014	0.014	0.016	0.02	0.02	0.012	0.014	0.022	0.037	0.039	0.012	0.012	0.022	0.045	0.048	0.015	0.015	0.02	0.021	0.022
Sulfate	660	660	740	830	830	250	250	300	490	530	19	24	160	350	370	660	660	710	790	800
Organic Carbon	4					5					4					4				
Dissolved Organic Carbon	5.6	5.6	5.9	6.3	6.3	3.4	3.9	6.5	8.1	8.5	8	8.2	11	18	19	5.7	5.8	6.5	7.4	7.5
Total Metals	4					5					4					4				
Aluminum	0.032	0.034	0.091	0.17	0.17	0.04	0.042	0.06	0.31	0.35	0.076	0.11	0.74	1.4	1.5	0.043	0.048	0.1	0.18	0.19
Antimony	0.00011	0.00012	0.00018	0.00018	0.00018	0.0002	0.00021	0.00026	0.00069	0.00074	0.0001	0.0001	0.00015	0.00021	0.00021	0.00012	0.00012	0.00016	0.00018	0.00018
Arsenic	0.00035	0.00035	0.00041	0.00044	0.00044	0.00091	0.00092	0.00097	0.0015	0.0016	0.00054	0.00054	0.00069	0.0011	0.0011	0.00039	0.00039	0.00043	0.00045	0.00045
Barium	0.05	0.052	0.069	0.079	0.08	0.032	0.032	0.034	0.09	0.1	0.016	0.017	0.047	0.083	0.085	0.061	0.063	0.08	0.087	0.087
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.064	0.064	0.075	0.083	0.083	0.078	0.082	0.13	0.21	0.21	0.013	0.017	0.058	0.087	0.088	0.054	0.054	0.065	0.075	0.076
Cadmium	0.000035	0.000037	0.000058	0.000065	0.000065	0.00004	0.000041	0.000045	0.000055	0.000055	0.000012	0.000015	0.000048	0.000069	0.00007	0.00005	0.00005	0.000054	0.000064	0.000065
Calcium	210	210	260	290	290	100	110	120	180	200	24	24	74	150	150	230	230	250	290	290
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00054	0.00089	0.0019	0.0021	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.00014	0.00018	0.00018	0.0001	0.0001	0.00015	0.00027	0.00029	0.00012	0.00012	0.00029	0.00086	0.00093	0.00013	0.00013	0.00017	0.0002	0.0002
Copper	0.0075	0.0077	0.01	0.013	0.014	0.0064	0.0078	0.015	0.023	0.024	0.033	0.035	0.058	0.083	0.085	0.0097	0.01	0.011	0.014	0.014
Iron	0.037	0.039	0.11	0.19	0.2	0.054	0.059	0.095	0.3	0.34	0.084	0.12	0.65	1.1	1.1	0.057	0.065	0.13	0.2	0.21
Lead	0.00005	0.00005	0.000057	0.000067	0.000068	0.00005	0.00005	0.000054	0.00011	0.00011	0.000054	0.000061	0.00019	0.00044	0.00046	0.00005	0.00005	0.000058	0.000094	0.000099
Lithium	0.001	0.0011	0.0017	0.0018	0.0018	0.002	0.002	0.0022	0.0035	0.0038	0.001	0.001	0.0017	0.003	0.0032	0.001	0.001	0.0014	0.0014	0.0014
Magnesium	39	39	47	54	54	20	21	25	37	39	4.3	4.4	14	27	28	43	43	48	53	53
Manganese	0.031	0.032	0.034	0.037	0.037	0.0058	0.008	0.017	0.027	0.027	0.0089	0.0099	0.037	0.086	0.091	0.024	0.026	0.037	0.055	0.058
Molybdenum	0.054	0.063	0.12	0.13	0.13	0.085	0.088	0.11	0.14	0.15	0.0025	0.0065	0.053	0.12	0.12	0.04	0.044	0.079	0.097	0.099
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00051	0.00056	0.0011	0.0015	0.0016	0.0005	0.00051	0.00058	0.00063	0.00064
Potassium	1.9	1.9	2.1	2.6	2.6	1.3	1.4	1.8	2.2	2.2	0.89	0.9	1.5	2.5	2.6	2	2.1	2.2	2.4	2.4
Selenium	0.038	0.04	0.054	0.06	0.061	0.016	0.018	0.027	0.042	0.044	0.0011	0.0021	0.014	0.037	0.04	0.038	0.041	0.061	0.068	0.069
Silicon	6.5	6.5	7	7.4	7.4	6.6	6.6	7.7	8.9	8.9	5	5.1	5.6	8.1	8.6	6.5	6.6	7	7.5	7.6
Silver	0.00001	0.00001	0.00001	0.000011	0.000011	0.00001	0.00001	0.00001	0.000012	0.000013	0.00001	0.000011	0.000023	0.000038	0.00004	0.00001	0.00001	0.00001	0.000013	0.000014
Sodium	18	18	21	23	23	13	13	14	23	24	2.4	3	8.8	13	13	16	16	18	20	20
Strontium	0.81	0.83	1.1	1.2	1.2	0.5	0.52	0.62	0.88	0.92	0.11	0.11	0.38	0.73	0.75	0.92	0.93	1.1	1.2	1.2
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.00012	0.00012	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00025	0.00028
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.014	0.015	0.01	0.01	0.024	0.062	0.066	0.01	0.01	0.01	0.01	0.01
Uranium	0.00048	0.0005	0.00081	0.0011	0.0011	0.00068	0.00069	0.00081	0.003	0.0035	0.00012	0.00012	0.00061	0.0011	0.0011	0.00049	0.00051	0.00082	0.0011	0.0012
Vanadium	0.00055	0.00056	0.00081	0.0011	0.0011	0.0012	0.0012	0.0015	0.0019	0.002	0.0011	0.0011	0.0021	0.0038	0.0039	0.00077	0.00078	0.00086	0.001	0.0011
Zinc	0.003	0.0032	0.0041	0.0074	0.008	0.003	0.003	0.0046	0.013	0.015	0.006	0.0063	0.0084	0.013	0.014	0.003	0.003	0.003	0.0047	0.005
Dissolved Metals	4					5					4					4				
Aluminum	0.0042	0.0043	0.0052	0.0095	0.01	0.003	0.0032	0.0085	0.016	0.018	0.0087	0.011	0.058	0.18	0.19	0.0039	0.0042	0.0076	0.019	0.02
Antimony	0.0001	0.00011	0.00016	0.00019	0.00019	0.0002	0.00021	0.00025	0.00053	0.00058	0.0001	0.0001	0.00013	0.00016	0.00016	0.0001	0.00011	0.00016	0.00017	0.00017
Arsenic	0.00032	0.00032	0.00035	0.00037	0.00037	0.00067	0.00069	0.00077	0.0012	0.0013	0.00043	0.00046	0.00061	0.0007	0.00072	0.0003	0.0003	0.00032	0.00038	0.00039
Barium	0.048	0.05	0.065	0.076	0.077	0.024	0.024	0.034	0.074	0.083	0.013	0.014	0.036	0.064	0.065	0.058	0.06	0.075	0.086	0.087
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.059	0.06	0.072	0.084	0.085	0.066	0.07	0.12	0.2	0.21	0.017	0.019	0.053	0.079	0.08	0.05	0.05	0.062	0.073	0.073
Cadmium	0.000025	0.00003	0.000058	0.00006	0.00006	0.000025	0.000028	0.00004	0.000049	0.00005	0.0000061	0.0000097	0.000038	0.000066	0.00007	0.000024	0.000028	0.00005	0.000054	0.000055
Calcium	210	210	270	290	290	83	89	130	170	190	19	21	76	140	140	220	220	250	280	290
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00012	0.00012	0.0001	0.0001	0.0001	0.00011	0.00011
Copper	0.0063	0.0064	0.0072	0.0083	0.0084	0.0057	0.0068	0.012	0.014	0.014	0.02	0.021	0.032	0.055	0.059	0.0062	0.0064	0.0076	0.0094	0.0096
Iron	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.095	0.16	0.17	0.03	0.03	0.03	0.03	0.03
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00012	0.00014	0.00005	0.00005	0.00005	0.000051	0.000051	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.001	0.001	0.0014	0.0017	0.0017	0.0017	0.0017	0.002	0.003	0.0032	0.001	0.001	0.0014	0.0018	0.0018	0.001	0.001	0.0012	0.0014	0.0014
Magnesium	38	39	49	52	52	16	18	26	35	37	4	4.2	14	26	27	41	41	48	51	51
Manganese	0.021	0.022	0.028	0.032	0.032	0.0059	0.0075	0.014	0.018	0.019	0.0057	0.0061	0.026	0.045	0.046	0.019	0.021	0.03	0.049	0.052
Molybdenum	0.053	0.062	0.11	0.12	0.13	0.085	0.086	0.1	0.12	0.13	0.0026	0.0073	0.057	0.11	0.12	0.039	0.044	0.081	0.095	0.095
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00053	0.00057	0.00057	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	2	2	2.1	2.4	2.5	1.4	1.4	1.7	2.2	2.2	0.81	0.82	1.5	2.2	2.2	2	2	2.1	2.2	2.3
Selenium	0.038	0.04	0.054	0.067	0.069	0.016	0.017	0.024	0.043	0.045	0.00092	0.0026	0.016	0.037	0.04	0.038	0.041	0.06	0.076	0.078
Silicon	6.6	6.6	7	7.5	7.5	6	6.2	7.4	9.2	9.4	3.7	3.9	4.8	5.3	5.4	6.4	6.4	7	7.5	7.5
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000016	0.000022	0.000022	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	19	19	21	23	23	10	11	14	22	22	3.3	3.6	8.5	12	12	15	16	18	19	19
Strontium	0.82	0.84	1	1.2	1.2	0.41	0.45	0.62	0.87	0.91	0.15	0.15	0.37	0.71	0.73	0.9	0.91	1.1	1.2	1.2
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.00013	0.00014	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	E13 - NW Sump					E14 - West Ditch Sump					E15 - Sump at Bootjack Culvert					E17 - 9Km Sump				
Uranium	0.00047	0.00049	0.00078	0.0011	0.0011	0.00068	0.00069	0.00075	0.0022	0.0026	0.00011	0.00011	0.00056	0.001	0.001	0.00045	0.00047	0.00078	0.0011	0.0011
Vanadium	0.0005	0.0005	0.00051	0.00054	0.00054	0.00082	0.00086	0.001	0.0011	0.0011	0.00065	0.00067	0.00086	0.00091	0.00091	0.0005	0.0005	0.00056	0.00059	0.00059
Zinc	0.003	0.0032	0.0043	0.0063	0.0066	0.003	0.003	0.003	0.013	0.015	0.0054	0.0054	0.0055	0.0064	0.0066	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	E18 - Central Collection Sump					E19 - Water Treatment Plant Feed					E19a - Perimeter Embankment Till Borrow Pit					E1a - TSF Supernatent					E4 - Main Embankment Seepage Pond			
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile
Field Parameters	5					52					11					47					6			
pH	7.8	7.8	8	8.1	8.1	7.2	7.5	7.8	8.1	8.2	0.001	0.0042	8	8.2	8.3	6.6	7.5	8.1	8.9	9.3	7.6	7.7	7.8	8.1
Conductivity	770	800	1100	2000	2100	95	790	1100	1700	1800	0.031	4.5	1200	1600	1600	640	850	1200	1700	1800	740	830	1300	1300
Temprature	2	2.5	10	17	18	1	1.5	11	18	20	0.0038	0.0096	1.3	15	19	1	1.8	4.3	21	23	3.9	4	7.3	16
Turbidity	1.4	1.4	2.8	4.4	4.8	0.18	0.62	2	12	35	0.2	0.46	3.4	4.9	4.9	0.46	1.7	4.6	8.7	16	0.52	0.55	0.75	1.8
Physical Tests	4					52					10					47					4			
Conductivity	760	810	1400	2000	2100	830	870	1200	1700	1800	0.065	57	1300	1600	1700	760	840	1200	1700	1800	720	800	1300	1400
Hardness (as CaCO3)	360	380	720	1300	1300	370	390	560	950	1100	2.8	180	670	1200	1400	250	260	350	670	720	320	340	490	550
pH	7.9	8	8.1	8.2	8.2	7.7	7.9	8.1	8.2	8.3	0.0052	2.1	8.1	8.2	8.3	7	7.3	7.6	7.9	7.9	8	8	8.2	8.2
Total Suspended Solids	1	1	1.3	6.3	7.2	1	1	2.2	15	48	0.28	0.6	3.9	550	990	1	1	4	21	35	1	1.2	2.5	5.7
Total Dissolved Solids	570	610	1200	1900	2000	590	630	910	1600	1700	0.0066	250	1000	1400	1500	560	610	860	1400	1400	540	600	990	1000
Turbidity	0.72	0.72	1.3	5	5.5	0.3	0.51	1.5	12	51	0.47	0.7	3.5	630	1200	0.36	0.77	4.4	15	29	0.34	0.35	0.42	0.52
Anions and Nutrients	4					52					8					47					4			
Alkalinity, Total (as CaCO3)	63	66	93	140	150	53	64	95	130	140	54	66	120	130	130	17	18	32	42	60	90	95	120	130
Ammonia, Total (as N)	0.007	0.0073	0.0093	0.13	0.15	0.005	0.0051	0.025	0.18	0.27	0.005	0.0065	0.014	0.16	0.22	0.012	0.028	0.26	0.45	0.51	0.005	0.0054	0.0078	0.01
Chloride	1.1	1.5	6.8	10	10	2.5	3.1	6.5	12	14	3	4.1	9.3	69	110	13	14	23	29	30	1.2	3.3	15	16
Fluoride	0.2	0.24	0.5	0.66	0.68	0.22	0.25	0.49	0.61	0.69	0.27	0.33	0.52	1400	1400	0.47	0.53	0.68	0.92	0.97	0.37	0.41	0.67	0.68
Nitrate (as N)	2.4	2.5	3.6	4.4	4.5	2.4	3.1	3.6	5.4	5.5	3.2	3.2	4.5	620	670	2.3	2.4	3.3	4.4	4.5	0.13	0.14	0.22	1.3
Nitrite (as N)	0.0097	0.01	0.017	0.069	0.077	0.005	0.0067	0.018	0.079	0.11	0.005	0.0058	0.013	390	700	0.059	0.069	0.14	0.25	0.28	0.001	0.0016	0.005	0.005
Total Nitrogen	2.4	2.6	3.8	8.7	9.5	2.6	3.2	3.8	5.6	5.8	0.59	1.8	4.5	370	670	2.2	3	4	5.1	51	0.22	0.23	0.31	1.4
Orthophosphate-Dissolved (as P)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0021	0.2	0.001	0.001	0.001	4.3	4.7	0.001	0.001	0.001	0.0025	0.014	0.001	0.001	0.001	0.0098
Phosphorus - Total Dissolved	0.0022	0.0023	0.0039	0.0052	0.0052	0.0022	0.0027	0.0038	0.005	0.013	0.001	0.0015	0.0051	4.5	8.1	0.002	0.0022	0.0033	0.0074	0.016	0.006	0.006	0.0071	0.018
Phosphorus - Total	0.0073	0.0073	0.0076	0.014	0.015	0.0053	0.0062	0.0099	0.032	0.087	0.0084	0.0084	0.025	8	8.1	0.0054	0.0074	0.014	0.038	0.061	0.0081	0.0085	0.013	0.017
Sulfate	310	340	690	1200	1300	330	360	530	920	1000	0.0038	3.6	600	860	870	310	350	510	860	870	290	330	570	590
Organic Carbon	4					52					10					47					4			
Dissolved Organic Carbon	2.2	2.3	3.3	6.6	7.1	2.2	2.3	3.1	5.9	6.8	2.6	2.6	3.8	690	1300	3.8	4.4	5.5	7.7	8.6	2	2	2.5	2.9
Total Metals	4					52					10					47					4			
Aluminum	0.044	0.052	0.11	0.4	0.45	0.0095	0.031	0.11	0.7	1.7	0.00058	0.0014	0.13	0.47	0.48	0.012	0.061	0.22	0.83	1.7	0.022	0.024	0.044	0.1
Antimony	0.00036	0.0004	0.00076	0.0012	0.0012	0.00038	0.00058	0.00073	0.0012	0.0012	0.00036	0.00036	0.00059	0.0023	0.0032	0.00075	0.0011	0.0017	0.0026	0.0026	0.00015	0.00015	0.00018	0.00051
Arsenic	0.00061	0.00063	0.00084	0.0016	0.0017	0.0005	0.00088	0.0011	0.0018	0.0025	0.00089	0.00092	0.0014	0.085	0.15	0.0012	0.0015	0.0026	0.0037	0.0038	0.00088	0.00097	0.0016	0.0018
Barium	0.03	0.031	0.042	0.053	0.054	0.031	0.035	0.044	0.057	0.087	0.00032	0.014	0.042	0.05	0.054	0.037	0.051	0.067	0.081	0.1	0.018	0.019	0.029	0.034
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.00076	0.0011	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.000075	0.0001	0.0001	0.00005	0.00005	0.00005	0.0001	0.0001	0.00005	0.00005	0.00005	0.023	0.04	0.00005	0.00005	0.00005	0.00005	0.0001	0.00005	0.00005	0.00005	0.00005
Boron	0.049	0.059	0.14	0.17	0.17	0.067	0.081	0.13	0.18	0.2	0.0001	0.019	0.12	0.16	0.17	0.065	0.087	0.14	0.19	0.2	0.045	0.059	0.14	0.15
Cadmium	0.00006	0.000063	0.00014	0.0006	0.00067	0.000045	0.00005	0.00008	0.00019	0.00027	0.00005	0.000057	0.0001	0.00016	0.00017	0.00001	0.000016	0.000045	0.000064	0.00009	0.00008	0.00008	0.00012	0.00085
Calcium	110	110	240	420	430	120	120	180	320	350	0.00005	0.052	190	300	300	74	86	110	210	230	120	120	170	180
Chromium	0.0005	0.0005	0.0005	0.00057	0.00058	0.0005	0.0005	0.0005	0.00077	0.001	0.00011	0.00028	0.0005	0.073	0.13	0.0005	0.0005	0.0005	0.0006	0.0012	0.0005	0.0005	0.0005	0.0005
Cobalt	0.00013	0.00014	0.00027	0.0012	0.0013	0.00015	0.00017	0.00022	0.00071	0.0022	0.00011	0.00015	0.00037	95	170	0.0001	0.0001	0.00024	0.00066	0.0013	0.0001	0.0001	0.0001	0.00014
Copper	0.0076	0.0078	0.0093	0.022	0.025	0.0021	0.0059	0.0084	0.023	0.031	0.0005	0.0034	0.011	120	210	0.0012	0.0019	0.0043	0.014	0.019	0.0061	0.0061	0.0065	0.01
Iron	0.055	0.061	0.11	0.35	0.4	0.03	0.03	0.081	0.62	1.2	0.0005	0.00052	0.12	0.26	0.34	0.03	0.037	0.14	0.52	1.2	0.03	0.032	0.051	0.13
Lead	0.00005	0.000058	0.0001	0.00012	0.00012	0.00005	0.00005	0.000055	0.00014	0.00025	0.000052	0.000055	0.000092	0.0076	0.013	0.00005	0.00005	0.00005	0.00013	0.00027	0.00005	0.00005	0.00005	0.000053
Lithium	0.0024	0.0031	0.0086	0.013	0.013	0.003	0.0039	0.0079	0.011	0.011	0.0039	0.0045	0.0077	0.12	0.21	0.0051	0.0084	0.012	0.026	0.028	0.0041	0.0049	0.0098	0.011
Magnesium	22	23	36	57	59	21	23	29	48	51	0.0001	0.014	36	44	45	9.5	10	15	32	34	19	20	26	29
Manganese	0.017	0.018	0.03	0.22	0.26	0.054	0.059	0.09	0.22	0.44	0.00005	0.0031	0.094	0.43	0.45	0.007	0.0096	0.019	0.095	0.29	0.022	0.026	0.049	0.068
Molybdenum	0.095	0.097	0.14	0.17	0.17	0.12	0.13	0.18	0.22	0.22	0.0076	0.078	0.18	17	30	0.096	0.14	0.21	0.24	0.25	0.28	0.29	0.32	0.39
Nickel	0.0005	0.00055	0.00091	0.002	0.0022	0.0005	0.0005	0.00051	0.0015	0.0019	0.00059	0.00059	0.00074	22	40	0.0005	0.0005	0.00055	0.0019	0.0043	0.0005	0.0005	0.0005	0.0005
Potassium	1.4	1.5	2.4	6.7	7.4	2	2.2	3.7	8.4	11	0.2	0.31	4.4	8.4	9.6	6	8.3	17	22	23	3.5	5	14	17
Selenium	0.02	0.022	0.034	0.048	0.049	0.021	0.026	0.041	0.047	0.051	0.00064	0.015	0.037	0.14	0.22	0.012	0.024	0.028	0.032	0.034	0.0058	0.0064	0.013	0.08
Silicon	5.6	5.6	6.2	6.9	7	4.7	4.8	5.9	7.4	10	0.00054	2.2	6.4	7.4	7.5	3.2	3.8	5.1	6.8	7.3	5.3	5.5	6.6	7.6
Silver	0.00001	0.00001	0.000015	0.00002	0.00002	0.00001	0.00001	0.00001	0.00002	0.00002	0.00001	0.00001	0.00001	4.1	7.4	0.00001	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001
Sodium	10	13	28	45	49	16	19	38	55	63	0.037	2.9	39	58	59	41	58	100	130	140	19	29	86	96
Strontium	1.1	1.3	5.8	9.5	9.6	1.1	1.2	3.3	7.6	8.2	0.00001	0.52	2.4	7.6	7.9	0.79	0.98	1.4	2.8	3.1	1.6	1.8	2.8	3
Thallium	0.00001	0.00001	0.000015	0.00002	0.00002	0.00001	0.00001	0.00001	0.00002	0.00002	0.00001	0.00001	0.00001	26	47	0.00001	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.00015	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0012	0.0001	0.0001	0.0001	33	58	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.018	0.019	0.01	0.01	0.01	0.037	0.1	0.00001	0.0045	0.01	1.4	2.5	0.01	0.01	0.01	0.061	0.097	0.01	0.01	0.01	0.01
Uranium	0.00088	0.001	0.003	0.0058	0.0061	0.0012	0.0014	0.0026	0.0043	0.0049	0.00001	0.000051	0.0022	0.0041	0.0046	0.00045	0.00047	0.00065	0.0017	0.0018	0.0013	0.0014	0.0021	0.0022
Vanadium	0.001	0.0011	0.0016	0.0021	0.0021	0.0005	0.00087	0.0013	0.0025	0.0049	0.0001	0.0005	0.0011	0.0065	0.01	0.00086	0.0012	0.003	0.0045	0.0064	0.0005	0.00052	0.00064	0.00084
Zinc	0.003	0.0031	0.011	0.055	0.061	0.003	0.003	0.0036	0.02	0.2	0.0023	0.0028	0.0045	0.011	0.012	0.003	0.003	0.003	0.0031	0.006	0.003	0.003	0.003	0.003
Dissolved Metals	4					52					10					47					4			
Aluminum	0.003	0.0035	0.0072	0.021	0.023	0.003	0.0045	0.012	0.052	0.13	0.0041	0.0049	0.011	2	2.6	0.012	0.015	0.022	0.046	0.2	0.003	0.003	0.0044	0.0072
Antimony	0.00031	0.00036	0.00076	0.0011	0.0012	0.00035	0.00054	0.00072	0.0011	0.0013	0.00028	0.00031	0.00063	3.8	6	0.00084	0.0012	0.0017	0.0026	0.0028	0.00014	0.00014	0.00018	0.00048
Arsenic	0.00052	0.00052	0.00069	0.0016	0.0017	0.00046	0.0007	0.00099	0.0016	0.0019	0.0006	0.00068	0.001	0.58	1.1	0.0013	0.0015	0.0024	0.0034	0.0038	0.00081	0.0009	0.0015	0.0016
Barium	0.025	0.027	0.04	0.053	0.055	0.027	0.029	0.042	0.05	0.055	0.0003	0.0022	0.039	0.046	0.05	0.036	0.046	0.062	0.072	0.081	0.015	0.017	0.028	0.033
Beryllium	0.0001	0.0001	0.0001	0.00019	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.00065	0.00091	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.000075	0.0001	0.0001	0.00005	0.00005	0.00005	0.0001	0.0001	0.00005	0.00005	0.00005	0.019	0.035	0.00005	0.00005	0.00005	0.00005	0.0001	0.00005	0.00005	0.00005	0.00005
Boron	0.045	0.053	0.13	0.16	0.17	0.066	0.076	0.12	0.17	0.19	0.0001	0.019	0.11	0.15	0.16	0.068	0.084	0.12	0.18	0.2	0.044	0.055	0.12	0.14
Cadmium	0.000014	0.000017	0.00011	0.00057	0.00064	0.00002	0.000044	0.00008	0.00021	0.0009	0.000045	0.000047	0.000088	0.00015	0.00016	0.000005	0.000013	0.00004	0.000074	0.00011	0.000015	0.000024	0.00008	0.000089
Calcium	110	120	230	420	440	110	120	180	310	350	0.00005	0.052	180	300	300	83	87	120	220	240	100	110	160	170
Chromium	0.0005	0.0005	0.0005	0.00093	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.00011	0.00028	0.0005	0.074	0.14	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.00015	0.0011	0.0012	0.0001	0.0001	0.00016	0.00046	0.00067	0.000095	0.000097	0.00026	95	170	0.0001	0.0001	0.0001	0.00019	0.00045	0.0001	0.0001	0.0001	0.0001
Copper	0.0049	0.005	0.0061	0.014	0.015	0.0017	0.0031	0.0057	0.012	0.014	0.0005	0.0016	0.0067	110	210	0.00086	0.00088	0.0014	0.0042	0.0048	0.0036	0.0037	0.0048	0.0053
Iron	0.03	0.03	0.03	0.056	0.06	0.03	0.03	0.03	0.06	1.6	0.00039	0.00044	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.16	0.03	0.03	0.03	0.03
Lead	0.00005	0.00005	0.000075	0.0001	0.0001	0.00005	0.00005	0.00005	0.0001	0.00011	0.00005	0.00005	0.00005	0.0039	0.0066	0.00005	0.00005	0.00005	0.00005	0.0001	0.00005	0.00005	0.00005	0.00005
Lithium	0.0021	0.0028	0.0082	0.012	0.012	0.0028	0.0036	0.0076	0.011	0.012	0.0037	0.0041	0.0074	0.021	0.03	0.0062	0.0082	0.012	0.026	0.027	0.0033	0.0041	0.0089	0.0097
Magnesium	21	21	35	58	60	21	21	30	44	51	0.00005	0.014	34	46	47	9.3	9.8	14	32	33	17	18	25	30
Manganese	0.013	0.014	0.018	0.21	0.24	0.046	0.05	0.082	0.2	0.42	0.00005	0.0032	0.088	0.4	0.44	0.0027	0.0059	0.011	0.088	0.26	0.0084	0.013	0.043	0.048
Molybdenum	0.088	0.093	0.14	0.17	0.17	0.12	0.13	0.17	0.21	0.23	0.0073	0.075	0.19	17	31	0.12	0.15	0.21	0.24	0.26	0.26	0.27	0.31	0.36
Nickel	0.0005	0.0005	0.00075	0.002	0.0022	0.0005	0.0005	0.0005	0.001	0.0016	0.0005	0.0005	0.00051	21	38	0.0005	0.0005	0.0005	0.0015	0.0037	0.0005	0.0005	0.0005	0.0005
Potassium	1.3	1.4	2.4	6.8	7.5	1.8	2.1	3.7	8.5	11	0.2	0.3	4.5	8.9	11	7.2	8.4	17	21	24	3	4.6	14	15
Selenium	0.021	0.022	0.033	0.047	0.049	0.021	0.025	0.039	0.047	0.051	0.0005	0.015	0.034	0.14	0.22	0.017	0.023	0.027	0.03	0.031	0.006	0.0066	0.014	0.088
Silicon	4.5	4.6	5.8	7.4	7.6	4.5	4.6	5.2	7	7.3	0.0005	2.2	6.1	7.1	7.1	3.3	3.4	4.4	5.7	5.9	4.5	4.8	6.6	7.2
Silver	0.00001	0.00001	0.000015	0.00002	0.00002	0.00001	0.00001	0.00001	0.00002	0.00002	0.00001	0.00001	0.00001	4	7.2	0.00001	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001
Sodium	9.7	13	29	44	47	15	18	35	54	62	0.035	2.7	40	58	63	53	61	96	130	140	14	25	87	91
Strontium	1.1	1.3	6	9.7	9.7	1.1	1.2	3.3	7.9	8.2	0.00001	0.54	2.3	7.5	7.9	0.91	0.99	1.4	2.8	2.9	1.3	1.6	2.8	3.2
Thallium	0.00001	0.00001	0.000015	0.00002	0.00002	0.00001	0.00001	0.00001	0.00002	0.00002	0.00001	0.00001	0.00001	27	49	0.00001	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.00015	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	31	54	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.019	0.02	0.01	0.01	0.01	0.02	0.02	0.00001	0.0045	0.01	1.3	2.3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	E18 - Central Collection Sump					E19 - Water Treatment Plant Feed					E19a - Perimeter Embankment Till Borrow Pit					E1a - TSF Supernatent					E4 - Main Embankment Seepage Pond			
Uranium	0.00093	0.0011	0.0028	0.0057	0.0061	0.0012	0.0014	0.0025	0.0043	0.0048	0.00001	0.000051	0.0023	0.0039	0.0044	0.00043	0.00044	0.00064	0.0016	0.0017	0.0011	0.0013	0.002	0.0021
Vanadium	0.00066	0.00071	0.001	0.0017	0.0018	0.0005	0.00066	0.001	0.0017	0.0019	0.0001	0.00033	0.00078	0.0063	0.01	0.00058	0.00085	0.0021	0.0034	0.0039	0.0005	0.0005	0.0005	0.0005
Zinc	0.003	0.003	0.01	0.052	0.058	0.003	0.003	0.003	0.019	0.25	0.0023	0.0026	0.0032	0.011	0.011	0.003	0.003	0.003	0.003	0.0045	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

		E8 - Effluent from Cariboo pit					East Dump Seep 1	East Dump Seep 1A
Parameter	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum		
Field Parameters		18					-	-
pH	8.1	7.1	7.5	7.7	8	8.2	-	-
Conductivity	1300	820	870	1000	1100	1300	-	-
Temprature	16	2.3	2.4	5.1	16	17	-	-
Turbidity	2.1	0.66	1.1	1.9	4.1	7	-	-
Physical Tests		18					-	-
Conductivity	1400	830	870	1000	1100	1100	-	-
Hardness (as CaCO3)	550	400	400	450	500	500	-	-
pH	8.2	7.5	7.7	8	8.1	8.1	-	-
Total Suspended Solids	6.3	1	1	1.8	6.5	12	-	-
Total Dissolved Solids	1100	650	650	740	810	840	-	-
Turbidity	0.54	0.4	0.46	1.1	4.1	8.2	-	-
Anions and Nutrients		18					-	-
Alkalinity, Total (as CaCO3)	130	23	65	75	92	96	-	-
Ammonia, Total (as N)	0.011	0.005	0.005	0.029	1.1	2.2	-	-
Chloride	16	3.7	3.7	4.6	7	7.9	-	-
Fluoride	0.68	0.33	0.33	0.39	0.5	0.51	-	-
Nitrate (as N)	1.5	4.7	4.8	5.9	17	21	-	-
Nitrite (as N)	0.005	0.0056	0.0064	0.016	0.42	0.7	-	-
Total Nitrogen	1.6	4.8	4.9	6	18	24	-	-
Orthophosphate-Dissolved (as P)	0.011	0.001	0.001	0.0011	0.003	0.0033	-	-
Phosphorus - Total Dissolved	0.019	0.002	0.002	0.0036	0.0046	0.0051	-	-
Phosphorus - Total	0.017	0.0045	0.0049	0.0083	0.016	0.031	-	-
Sulfate	590	360	370	410	450	460	-	-
Organic Carbon		18					-	-
Dissolved Organic Carbon	3	1.2	1.2	1.7	2.3	2.3	-	-
Total Metals		18					-	-
Aluminum	0.11	0.036	0.038	0.072	0.31	0.54	-	-
Antimony	0.00057	0.0012	0.0013	0.0021	0.0043	0.0047	-	-
Arsenic	0.0018	0.0014	0.0014	0.0015	0.0043	0.0048	-	-
Barium	0.035	0.038	0.041	0.046	0.056	0.056	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Boron	0.15	0.14	0.14	0.18	0.35	0.38	-	-
Cadmium	0.00097	0.00003	0.000037	0.00008	0.000096	0.0001	-	-
Calcium	180	120	120	140	150	150	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.00054	0.00077	-	-
Cobalt	0.00015	0.0002	0.0002	0.00024	0.00057	0.00082	-	-
Copper	0.011	0.012	0.016	0.02	0.028	0.034	-	-
Iron	0.15	0.032	0.033	0.061	0.26	0.48	-	-
Lead	0.000054	0.00005	0.00005	0.000073	0.00013	0.00015	-	-
Lithium	0.011	0.0058	0.0061	0.0069	0.0098	0.01	-	-
Magnesium	29	19	22	27	30	32	-	-
Manganese	0.071	0.051	0.052	0.067	0.15	0.18	-	-
Molybdenum	0.4	0.15	0.15	0.18	0.21	0.21	-	-
Nickel	0.0005	0.0005	0.0005	0.0006	0.0018	0.0023	-	-
Potassium	17	1.6	1.6	1.9	2.2	2.3	-	-
Selenium	0.091	0.046	0.047	0.054	0.062	0.065	-	-
Silicon	7.7	6.2	6.2	6.8	9.3	10	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.000017	0.000019	-	-
Sodium	97	19	19	28	43	49	-	-
Strontium	3.1	1	1	1.2	1.3	1.4	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium	0.01	0.01	0.01	0.01	0.015	0.029	-	-
Uranium	0.0022	0.0025	0.0026	0.0028	0.0058	0.006	-	-
Vanadium	0.00087	0.0019	0.0019	0.0023	0.0037	0.0041	-	-
Zinc	0.003	0.003	0.003	0.003	0.0056	0.011	-	-
Dissolved Metals		18					-	-
Aluminum	0.0075	0.003	0.003	0.0047	0.0077	0.014	-	-
Antimony	0.00053	0.0012	0.0012	0.002	0.0041	0.0042	-	-
Arsenic	0.0017	0.0013	0.0013	0.0014	0.0039	0.0048	-	-
Barium	0.034	0.036	0.037	0.042	0.052	0.053	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Boron	0.14	0.13	0.14	0.17	0.34	0.36	-	-
Cadmium	0.00009	0.000043	0.000053	0.00008	0.0001	0.00012	-	-
Calcium	170	120	120	140	150	150	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt	0.0001	0.00012	0.00012	0.00018	0.00038	0.00044	-	-
Copper	0.0053	0.0086	0.0089	0.016	0.021	0.023	-	-
Iron	0.03	0.03	0.03	0.03	0.03	0.03	-	-
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.000051	-	-
Lithium	0.0098	0.0056	0.006	0.0069	0.0093	0.0099	-	-
Magnesium	30	19	22	26	30	30	-	-
Manganese	0.049	0.036	0.044	0.062	0.14	0.16	-	-
Molybdenum	0.36	0.15	0.15	0.18	0.21	0.21	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.00083	0.0012	-	-
Potassium	15	1.5	1.6	1.9	2.2	2.2	-	-
Selenium	0.1	0.046	0.049	0.053	0.065	0.065	-	-
Silicon	7.3	5.9	6	6.5	8.7	9	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.000012	0.00002	-	-
Sodium	92	19	20	27	44	48	-	-
Strontium	3.2	0.96	0.98	1.2	1.3	1.3	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

		E8 - Effluent from Cariboo pit					East Dump Seep 1	East Dump Seep 1A
Uranium	0.0021	0.0024	0.0025	0.0027	0.0056	0.006	-	-
Vanadium	0.0005	0.0017	0.0017	0.0019	0.003	0.0033	-	-
Zinc	0.003	0.003	0.003	0.003	0.0044	0.0099	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	East Dump Seep 2					East Dump Seep 2A	East Dump Seep 3	East Dump Seep 3A					East Dump Seep 4				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum			Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	1					-	-	2					2				
pH	7.6	7.6	7.6	7.6	7.6	-	-	7.6	7.6	7.9	8.2	8.3	6.8	6.8	6.9	7.1	7.1
Conductivity	820	820	820	820	820	-	-	720	730	780	830	830	1300	1300	1400	1500	1500
Temprature	6.2	6.2	6.2	6.2	6.2	-	-	1.7	1.8	2.9	3.9	4	1	1.2	3.3	5.4	5.6
Turbidity	2.4	2.4	2.4	2.4	2.4	-	-	0.01	0.01	0.01	0.01	0.01	0.5	0.51	0.55	0.6	0.6
Physical Tests	1					-	-	2					2				
Conductivity	810	810	810	810	810	-	-	700	710	750	800	810	1300	1300	1400	1400	1400
Hardness (as CaCO3)	410	410	410	410	410	-	-	340	340	370	400	410	710	710	770	820	830
pH	7.8	7.8	7.8	7.8	7.8	-	-	7.9	7.9	7.9	7.9	8	7.3	7.3	7.4	7.5	7.5
Total Suspended Solids	1.9	1.9	1.9	1.9	1.9	-	-	1	1.9	9.8	18	19	1.1	1.1	1.3	1.5	1.5
Total Dissolved Solids	590	590	590	590	590	-	-	500	510	560	610	620	1100	1100	1100	1200	1200
Turbidity	0.1	0.1	0.1	0.1	0.1	-	-	0.1	0.11	0.24	0.36	0.37	0.14	0.15	0.25	0.35	0.36
Anions and Nutrients	1					-	-	2					2				
Alkalinity, Total (as CaCO3)	46	46	46	46	46	-	-	53	54	63	72	73	40	41	44	47	47
Ammonia, Total (as N)	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0054	0.0058	0.0058
Chloride	2.5	2.5	2.5	2.5	2.5	-	-	0.5	0.6	1.5	2.4	2.5	2.5	2.5	2.5	2.5	2.5
Fluoride	0.1	0.1	0.1	0.1	0.1	-	-	0.069	0.071	0.085	0.098	0.1	0.1	0.1	0.1	0.1	0.1
Nitrate (as N)	1.3	1.3	1.3	1.3	1.3	-	-	0.85	0.87	1.1	1.2	1.3	0.059	0.086	0.34	0.59	0.61
Nitrite (as N)	0.005	0.005	0.005	0.005	0.005	-	-	0.001	0.0012	0.003	0.0048	0.005	0.005	0.005	0.005	0.005	0.005
Total Nitrogen	0.72	0.72	0.72	0.72	0.72	-	-	0.96	0.98	1.2	1.3	1.4	0.21	0.24	0.51	0.77	0.8
Orthophosphate-Dissolved (as P)	0.001	0.001	0.001	0.001	0.001	-	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Phosphorus - Total Dissolved	0.019	0.019	0.019	0.019	0.019	-	-	0.0021	0.0021	0.0025	0.0029	0.0029	0.0037	0.0038	0.0048	0.0058	0.0059
Phosphorus - Total	0.02	0.02	0.02	0.02	0.02	-	-	0.0039	0.0039	0.0039	0.0039	0.0039	0.0073	0.0074	0.0085	0.0095	0.0096
Sulfate	380	380	380	380	380	-	-	300	300	330	350	350	710	710	750	780	780
Organic Carbon	1					-	-	2					2				
Dissolved Organic Carbon	5.6	5.6	5.6	5.6	5.6	-	-	3.4	3.5	4	4.6	4.6	4.9	5	5.2	5.5	5.5
Total Metals	1					-	-	2					2				
Aluminum	0.07	0.07	0.07	0.07	0.07	-	-	0.017	0.018	0.02	0.022	0.023	0.018	0.019	0.027	0.035	0.036
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	0.00019	0.00019	0.0002	0.00021	0.00021	0.00018	0.00018	0.0002	0.00022	0.00022
Barium	0.042	0.042	0.042	0.042	0.042	-	-	0.042	0.042	0.043	0.044	0.044	0.041	0.041	0.044	0.047	0.047
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.034	0.034	0.034	0.034	0.034	-	-	0.024	0.024	0.025	0.026	0.026	0.044	0.044	0.045	0.045	0.045
Cadmium	0.0014	0.0014	0.0014	0.0014	0.0014	-	-	0.00079	0.00079	0.00084	0.00088	0.00089	0.00026	0.00026	0.00027	0.00028	0.00028
Calcium	130	130	130	130	130	-	-	110	110	120	120	130	220	230	230	240	250
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00013	0.00016	0.00016
Copper	0.019	0.019	0.019	0.019	0.019	-	-	0.0056	0.0057	0.0066	0.0074	0.0075	0.005	0.005	0.005	0.005	0.005
Iron	0.086	0.086	0.086	0.086	0.086	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.032	0.045	0.059	0.06
Lead	0.00027	0.00027	0.00027	0.00027	0.00027	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.0015	0.0015	0.0015	0.0015	0.0015	-	-	0.001	0.001	0.0011	0.0012	0.0012	0.001	0.001	0.001	0.001	0.001
Magnesium	24	24	24	24	24	-	-	21	21	22	22	22	34	35	38	42	42
Manganese	0.004	0.004	0.004	0.004	0.004	-	-	0.00091	0.00093	0.0011	0.0013	0.0013	0.0026	0.0038	0.015	0.026	0.027
Molybdenum	0.06	0.06	0.06	0.06	0.06	-	-	0.05	0.052	0.066	0.08	0.081	0.034	0.035	0.045	0.056	0.057
Nickel	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.00058	0.00059	0.00067	0.00075	0.00076
Potassium	1.4	1.4	1.4	1.4	1.4	-	-	0.81	0.82	0.9	0.97	0.98	2.5	2.5	2.5	2.6	2.6
Selenium	0.033	0.033	0.033	0.033	0.033	-	-	0.018	0.019	0.024	0.029	0.03	0.0075	0.0094	0.027	0.044	0.046
Silicon	5.9	5.9	5.9	5.9	5.9	-	-	5.3	5.3	5.7	6	6.1	4.6	4.6	4.6	4.6	4.6
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	8.6	8.6	8.6	8.6	8.6	-	-	7.6	7.6	7.7	7.7	7.7	16	16	17	18	18
Strontium	2.2	2.2	2.2	2.2	2.2	-	-	1.6	1.6	1.7	1.7	1.7	4	4	4	4	4
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium	0.000051	0.000051	0.000051	0.000051	0.000051	-	-	0.00014	0.00015	0.00031	0.00046	0.00048	0.000012	0.000013	0.000018	0.000022	0.000023
Vanadium	0.00061	0.00061	0.00061	0.00061	0.00061	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc	0.19	0.19	0.19	0.19	0.19	-	-	0.078	0.079	0.085	0.091	0.091	0.022	0.022	0.024	0.026	0.026
Dissolved Metals	1					-	-	2					2				
Aluminum	0.004	0.004	0.004	0.004	0.004	-	-	0.003	0.0031	0.0037	0.0043	0.0044	0.011	0.011	0.013	0.015	0.015
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	0.00014	0.00014	0.00014	0.00014	0.00014	-	-	0.00013	0.00013	0.00016	0.00019	0.00019	0.00017	0.00017	0.00018	0.00018	0.00018
Barium	0.041	0.041	0.041	0.041	0.041	-	-	0.041	0.041	0.042	0.044	0.044	0.041	0.041	0.045	0.048	0.048
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.032	0.032	0.032	0.032	0.032	-	-	0.022	0.022	0.024	0.026	0.026	0.044	0.044	0.047	0.049	0.049
Cadmium	0.0014	0.0014	0.0014	0.0014	0.0014	-	-	0.00074	0.00074	0.00078	0.00082	0.00082	0.00023	0.00023	0.00024	0.00024	0.00024
Calcium	120	120	120	120	120	-	-	100	100	110	130	130	220	230	250	260	270
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00012	0.00014	0.00014
Copper	0.0084	0.0084	0.0084	0.0084	0.0084	-	-	0.0032	0.0033	0.0047	0.0061	0.0062	0.0037	0.0038	0.0045	0.0052	0.0052
Iron	0.03	0.03	0.03	0.03	0.03	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.031	0.038	0.044	0.045
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.0014	0.0014	0.0014	0.0014	0.0014	-	-	0.001	0.001	0.0011	0.0011	0.0011	0.001	0.001	0.001	0.001	0.001
Magnesium	24	24	24	24	24	-	-	21	21	21	22	22	36	36	38	40	41
Manganese	0.00017	0.00017	0.00017	0.00017	0.00017	-	-	0.00034	0.00034	0.00039	0.00043	0.00043	0.0021	0.0035	0.016	0.028	0.029
Molybdenum	0.058	0.058	0.058	0.058	0.058	-	-	0.047	0.049	0.061	0.074	0.075	0.034	0.035	0.045	0.056	0.057
Nickel	0.00075	0.00075	0.00075	0.00075	0.00075	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.00052	0.00053	0.00065	0.00077	0.00078
Potassium	1.4	1.4	1.4	1.4	1.4	-	-	0.83	0.84	0.91	0.98	0.99	2.5	2.5	2.6	2.7	2.7
Selenium	0.031	0.031	0.031	0.031	0.031	-	-	0.017	0.017	0.022	0.027	0.028	0.0073	0.0091	0.025	0.042	0.043
Silicon	5.3	5.3	5.3	5.3	5.3	-	-	4.9	4.9	5.4	6	6	4.1	4.2	4.4	4.7	4.7
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	8.4	8.4	8.4	8.4	8.4	-	-	7.5	7.5	7.6	7.7	7.7	16	16	17	18	18
Strontium	2.2	2.2	2.2	2.2	2.2	-	-	1.6	1.6	1.6	1.7	1.7	3.8	3.8	4	4.2	4.2
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	East Dump Seep 2					East Dump Seep 2A	East Dump Seep 3	East Dump Seep 3A					East Dump Seep 4				
Uranium	0.000029	0.000029	0.000029	0.000029	0.000029	-	-	0.00015	0.00017	0.00028	0.0004	0.00041	0.000014	0.000014	0.000017	0.000019	0.000019
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc	0.16	0.16	0.16	0.16	0.16	-	-	0.073	0.073	0.078	0.083	0.084	0.021	0.021	0.024	0.026	0.027

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	East Dump Seep 5	East Main Toe Drain					Gavin's Ditch	JCP - Joe's Creek Pipe					LD - Long Ditch at Pipe Outlet				
Parameter		Minimum	5th Percentile	Median	95th Percentile	Maximum		Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	-	19					-	13					12				
pH	-	7	7.4	7.7	7.8	7.8	-	7.1	7.4	7.8	8.1	8.3	7.8	7.8	8	8.2	8.3
Conductivity	-	13	1100	1300	1300	1400	-	26	650	1600	1900	1900	51	450	1600	2100	2200
Temprature	-	7.6	7.9	8.2	10	11	-	1.6	1.7	3.5	7.8	8.8	0.052	0.39	2.6	16	17
Turbidity	-	0.04	0.057	0.37	0.87	1.1	-	0.27	0.29	0.79	4.1	5.4	0.12	0.21	1	3.2	3.4
Physical Tests	-	4					-	4					11				
Conductivity	-	1300	1300	1300	1300	1400	-	1600	1600	1600	1800	1800	820	960	1600	2100	2200
Hardness (as CaCO3)	-	440	440	460	500	510	-	910	910	930	990	1000	420	500	920	1300	1400
pH	-	8	8	8.1	8.2	8.2	-	8	8	8.1	8.2	8.2	8	8.1	8.1	8.3	8.3
Total Suspended Solids	-	1	1	1	1.1	1.1	-	1	1	1	1.3	1.4	1	1	1.4	6.7	11
Total Dissolved Solids	-	850	870	980	1000	1000	-	1400	1400	1400	1600	1600	660	770	1400	1900	2000
Turbidity	-	0.14	0.14	0.17	0.22	0.23	-	0.1	0.11	0.19	0.39	0.42	0.2	0.22	0.58	3.3	5.5
Anions and Nutrients	-	4					-	4					11				
Alkalinity, Total (as CaCO3)	-	100	100	110	110	110	-	92	94	110	120	120	83	94	130	150	150
Ammonia, Total (as N)	-	0.1	0.1	0.11	0.11	0.11	-	0.005	0.005	0.005	0.0086	0.0092	0.005	0.005	0.006	0.0085	0.01
Chloride	-	18	18	18	19	19	-	2.2	2.6	5	5	5	2.5	2.5	4.3	7.5	10
Fluoride	-	0.74	0.74	0.76	0.78	0.79	-	0.21	0.21	0.22	0.28	0.28	0.19	0.21	0.27	0.7	0.75
Nitrate (as N)	-	0.025	0.025	0.025	0.025	0.025	-	5.3	5.3	5.5	9.1	9.8	1.4	1.8	10	16	16
Nitrite (as N)	-	0.005	0.005	0.005	0.005	0.005	-	0.001	0.0024	0.01	0.01	0.01	0.005	0.005	0.0058	0.022	0.023
Total Nitrogen	-	0.12	0.12	0.13	0.14	0.14	-	5.3	5.3	6	8.4	8.8	1.4	1.8	9.4	15	16
Orthophosphate-Dissolved (as P)	-	0.015	0.015	0.016	0.017	0.017	-	0.02	0.021	0.031	0.036	0.037	0.001	0.001	0.001	0.002	0.0021
Phosphorus - Total Dissolved	-	0.026	0.026	0.028	0.031	0.031	-	0.035	0.035	0.036	0.039	0.04	0.002	0.0027	0.0039	0.0056	0.0064
Phosphorus - Total	-	0.027	0.027	0.03	0.031	0.031	-	0.035	0.036	0.037	0.04	0.041	0.0041	0.0043	0.0052	0.016	0.016
Sulfate	-	560	560	570	610	610	-	820	820	850	970	980	360	430	820	1300	1300
Organic Carbon	-	4					-	4					11				
Dissolved Organic Carbon	-	2.9	3	3.2	3.3	3.3	-	6.3	6.4	6.7	7.9	8.1	2.2	2.2	5.4	6.6	7.3
Total Metals	-	4					-	4					11				
Aluminum	-	0.0031	0.0031	0.0035	0.0039	0.0039	-	0.0057	0.0057	0.007	0.034	0.039	0.0085	0.011	0.039	0.24	0.38
Antimony	-	0.0001	0.0001	0.0001	0.00011	0.00011	-	0.00044	0.00044	0.00047	0.00066	0.00069	0.00018	0.00021	0.00033	0.00079	0.00085
Arsenic	-	0.0022	0.0022	0.0023	0.0024	0.0024	-	0.0012	0.0012	0.0013	0.0015	0.0015	0.00043	0.00044	0.0005	0.00075	0.00082
Barium	-	0.051	0.052	0.056	0.056	0.056	-	0.037	0.038	0.044	0.047	0.047	0.027	0.028	0.035	0.047	0.05
Berylium	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00015	0.0002
Bismuth	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00018	0.00025
Boron	-	0.13	0.13	0.14	0.15	0.15	-	0.068	0.068	0.069	0.071	0.071	0.036	0.043	0.058	0.17	0.17
Cadmium	-	0.00007	0.000074	0.0001	0.00016	0.00017	-	0.00006	0.000061	0.00007	0.0001	0.00011	0.00005	0.000058	0.000076	0.00062	0.00088
Calcium	-	150	150	160	170	170	-	260	270	290	340	350	130	150	290	440	470
Chromium	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001
Cobalt	-	0.00052	0.00052	0.00056	0.0006	0.0006	-	0.0001	0.0001	0.0001	0.00015	0.00016	0.0001	0.0001	0.0001	0.0016	0.0027
Copper	-	0.0018	0.0018	0.0019	0.0025	0.0025	-	0.018	0.018	0.019	0.027	0.029	0.0052	0.0068	0.0093	0.014	0.015
Iron	-	0.04	0.041	0.051	0.054	0.054	-	0.03	0.03	0.03	0.046	0.049	0.03	0.03	0.052	0.24	0.37
Lead	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00018	0.00025
Lithium	-	0.0081	0.0081	0.0087	0.0095	0.0096	-	0.0031	0.0031	0.0037	0.0043	0.0043	0.0019	0.0022	0.0034	0.013	0.014
Magnesium	-	25	25	26	27	27	-	55	55	59	70	72	24	29	53	62	63
Manganese	-	0.78	0.79	0.83	0.89	0.9	-	0.0094	0.0096	0.013	0.036	0.04	0.0053	0.0061	0.011	0.26	0.49
Molybdenum	-	0.28	0.28	0.28	0.3	0.3	-	0.076	0.077	0.082	0.12	0.13	0.076	0.076	0.11	0.15	0.16
Nickel	-	0.0005	0.0005	0.0005	0.00051	0.00051	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0027	0.0029
Potassium	-	18	18	19	19	19	-	1.7	1.7	1.8	2	2.1	1.4	1.4	1.9	2.4	2.6
Selenium	-	0.00027	0.00027	0.00029	0.00037	0.00038	-	0.082	0.083	0.092	0.098	0.099	0.016	0.022	0.053	0.087	0.088
Silicon	-	7	7	7.1	7.2	7.3	-	5.7	5.7	6.4	6.7	6.7	4.8	4.9	5.8	7	7.3
Silver	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000037	0.00005
Sodium	-	94	94	97	100	100	-	15	15	16	17	17	8.1	11	17	30	30
Strontium	-	2.8	2.8	2.9	2.9	2.9	-	2.7	2.7	2.9	3.2	3.2	1.5	2	3.2	12	14
Thallium	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000035	0.00005
Tin	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00035	0.0005
Titanium	-	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.017	0.02
Uranium	-	0.002	0.002	0.0021	0.0024	0.0024	-	0.0012	0.0012	0.0013	0.0015	0.0015	0.00068	0.0011	0.0021	0.0057	0.0066
Vanadium	-	0.0007	0.0007	0.00074	0.00084	0.00085	-	0.00066	0.00066	0.0007	0.00085	0.00087	0.0005	0.0005	0.00093	0.002	0.0025
Zinc	-	0.003	0.003	0.003	0.003	0.003	-	0.0056	0.0056	0.006	0.0085	0.0089	0.0039	0.0039	0.0052	0.051	0.07
Dissolved Metals	-	4					-	4					11				
Aluminum	-	0.003	0.003	0.003	0.0034	0.0035	-	0.003	0.0033	0.0079	0.015	0.016	0.003	0.003	0.0036	0.015	0.022
Antimony	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.00045	0.00045	0.00046	0.00063	0.00066	0.00018	0.00021	0.00029	0.00075	0.0008
Arsenic	-	0.0021	0.0021	0.0022	0.0022	0.0023	-	0.0011	0.0011	0.0012	0.0014	0.0015	0.00034	0.00036	0.00044	0.00067	0.00076
Barium	-	0.05	0.05	0.054	0.056	0.056	-	0.037	0.038	0.043	0.045	0.046	0.023	0.027	0.034	0.046	0.051
Berylium	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00015	0.0002
Bismuth	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.000093	0.0001	0.00005	0.00005	0.00005	0.00018	0.00025
Boron	-	0.12	0.12	0.13	0.16	0.16	-	0.06	0.06	0.063	0.071	0.072	0.037	0.039	0.056	0.16	0.17
Cadmium	-	0.000005	0.000015	0.00007	0.000074	0.000075	-	0.00005	0.000052	0.000063	0.000095	0.0001	0.000053	0.000054	0.00006	0.00061	0.00088
Calcium	-	140	140	140	160	160	-	270	270	280	300	300	130	160	280	440	470
Chromium	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001
Cobalt	-	0.0005	0.0005	0.00056	0.0006	0.0006	-	0.0001	0.0001	0.00011	0.00019	0.0002	0.0001	0.0001	0.0001	0.0015	0.0025
Copper	-	0.0005	0.0005	0.0005	0.00071	0.00075	-	0.016	0.016	0.018	0.024	0.026	0.0041	0.0046	0.008	0.011	0.011
Iron	-	0.044	0.044	0.048	0.051	0.051	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.055	0.06
Lead	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.000093	0.0001	0.00005	0.00005	0.00005	0.00018	0.00025
Lithium	-	0.0075	0.0076	0.0081	0.0087	0.0088	-	0.0036	0.0036	0.0039	0.0041	0.0041	0.0016	0.0019	0.0033	0.013	0.013
Magnesium	-	23	23	25	27	28	-	53	53	55	59	60	24	27	52	62	64
Manganese	-	0.73	0.73	0.79	0.86	0.86	-	0.0062	0.0071	0.013	0.018	0.019	0.0043	0.0045	0.0096	0.25	0.47
Molybdenum	-	0.27	0.27	0.28	0.29	0.29	-	0.071	0.072	0.082	0.12	0.13	0.073	0.076	0.097	0.15	0.15
Nickel	-	0.0005	0.0005	0.0005	0.00054	0.00055	-	0.0005	0.0005	0.0005	0.00093	0.001	0.0005	0.0005	0.0005	0.0027	0.0028
Potassium	-	17	17	18	19	19	-	1.7	1.7	1.9	1.9	2	1.3	1.4	1.8	2.4	2.6
Selenium	-	0.00017	0.00018	0.00022	0.00024	0.00025	-	0.076	0.077	0.079	0.098	0.1	0.016	0.022	0.052	0.084	0.09
Silicon	-	6.2	6.3	6.8	7.4	7.4	-	5.6	5.6	5.8	6.2	6.2	4	4.4	5.7	6.9	7.6
Silver	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.000019	0.00002	0.00001	0.00001	0.00001	0.000035	0.00005
Sodium	-	90	90	97	100	100	-	15	15	15	16	16	7.9	11	16	31	31
Strontium	-	2.6	2.7	2.9	2.9	2.9	-	2.7	2.7	2.9	3.1	3.1	1.5	2	3	12	13
Thallium	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.000019	0.00002	0.00001	0.00001	0.00001	0.000035	0.00005
Tin	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.00019	0.0002	0.0001	0.0001	0.0001	0.00035	0.0005
Titanium	-	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.015	0.02

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	East Dump Seep 5	East Main Toe Drain					Gavin's Ditch	JCP - Joe's Creek Pipe					LD - Long Ditch at Pipe Outlet				
Uranium	-	0.002	0.002	0.0021	0.0023	0.0023	-	0.0011	0.0011	0.0013	0.0015	0.0015	0.00064	0.0011	0.0019	0.0055	0.0065
Vanadium	-	0.00062	0.00062	0.00063	0.00067	0.00068	-	0.00059	0.0006	0.00071	0.00097	0.001	0.0005	0.0005	0.00051	0.0018	0.0025
Zinc	-	0.003	0.003	0.003	0.003	0.003	-	0.0051	0.0052	0.0066	0.0084	0.0085	0.003	0.0033	0.0042	0.049	0.068

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Mine Drainage Creek					NEZ Dump Seep 10				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	6					2				
pH	7.6	7.7	8.1	8.4	8.5	7.9	7.9	7.9	7.9	7.9
Conductivity	530	580	810	970	970	1100	1100	1200	1400	1400
Temprature	3.3	3.8	6	8.7	9	2.1	2.2	3.1	3.9	4
Turbidity	0.08	0.15	1.2	2.3	2.5	0.43	0.54	1.6	2.6	2.7
Physical Tests	6					2				
Conductivity	530	570	800	930	930	1000	1100	1200	1300	1400
Hardness (as CaCO3)	230	260	390	470	480	580	590	670	750	760
pH	8.1	8.1	8.2	8.3	8.4	8.2	8.2	8.2	8.3	8.3
Total Suspended Solids	1	1.1	1.8	3.1	3.3	1	2.3	14	26	28
Total Dissolved Solids	390	420	590	730	730	910	920	1000	1100	1100
Turbidity	0.23	0.26	0.52	0.81	0.82	0.1	0.71	6.2	12	12
Anions and Nutrients	6					2				
Alkalinity, Total (as CaCO3)	79	85	150	150	160	170	170	180	190	200
Ammonia, Total (as N)	0.005	0.005	0.005	0.0092	0.01	0.005	0.005	0.0051	0.0051	0.0051
Chloride	4.2	4.8	8.8	16	17	2.5	2.5	2.5	2.5	2.5
Fluoride	0.14	0.14	0.17	0.23	0.24	0.15	0.15	0.18	0.2	0.2
Nitrate (as N)	0.72	1.5	6.5	8.8	9.3	0.025	0.039	0.16	0.28	0.3
Nitrite (as N)	0.001	0.0019	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Total Nitrogen	0.9	1.8	6.6	10	10	0.21	0.22	0.31	0.41	0.42
Orthophosphate-Dissolved (as P)	0.011	0.012	0.023	0.027	0.027	0.001	0.0013	0.0045	0.0076	0.0079
Phosphorus - Total Dissolved	0.016	0.016	0.028	0.032	0.033	0.0074	0.0076	0.0091	0.011	0.011
Phosphorus - Total	0.022	0.022	0.028	0.038	0.04	0.012	0.014	0.026	0.038	0.039
Sulfate	170	180	260	320	320	460	470	510	560	560
Organic Carbon	6					2				
Dissolved Organic Carbon	5.5	5.6	6.5	7.6	7.8	4.3	4.4	5.5	6.6	6.7
Total Metals	6					2				
Aluminum	0.016	0.017	0.03	0.036	0.037	0.0064	0.022	0.17	0.31	0.33
Antimony	0.00019	0.00021	0.00028	0.00038	0.00039	0.00012	0.00012	0.00014	0.00016	0.00016
Arsenic	0.00035	0.00037	0.00055	0.00083	0.00092	0.00037	0.00045	0.0012	0.002	0.0021
Barium	0.025	0.026	0.033	0.044	0.045	0.02	0.021	0.028	0.035	0.036
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.025	0.028	0.048	0.07	0.076	0.045	0.045	0.048	0.05	0.05
Cadmium	0.00003	0.000034	0.000048	0.000059	0.00006	0.00002	0.000021	0.000028	0.000034	0.000035
Calcium	64	72	110	140	150	190	190	210	220	220
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00051	0.00058	0.00065	0.00066
Cobalt	0.0001	0.0001	0.00011	0.00013	0.00014	0.0001	0.00013	0.00042	0.00071	0.00074
Copper	0.016	0.017	0.019	0.025	0.027	0.0038	0.0047	0.013	0.021	0.022
Iron	0.03	0.031	0.037	0.045	0.046	0.03	0.19	1.7	3.2	3.3
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000058	0.00013	0.0002	0.00021
Lithium	0.0016	0.0017	0.0023	0.0033	0.0035	0.0016	0.0016	0.002	0.0024	0.0024
Magnesium	13	15	25	32	34	36	36	41	47	47
Manganese	0.011	0.011	0.013	0.014	0.015	0.00088	0.0093	0.085	0.16	0.17
Molybdenum	0.079	0.085	0.13	0.15	0.15	0.03	0.032	0.045	0.058	0.059
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00051	0.00061	0.00071	0.00072
Potassium	1.3	1.4	2	2.2	2.3	1.6	1.7	1.9	2.2	2.2
Selenium	0.022	0.023	0.026	0.037	0.038	0.007	0.0077	0.013	0.019	0.02
Silicon	6.4	6.8	8.8	9.5	9.5	5.5	5.6	5.9	6.3	6.4
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.000012	0.000012
Sodium	7.8	8.7	13	17	17	12	12	12	13	13
Strontium	0.37	0.4	0.62	0.82	0.85	2.5	2.5	2.5	2.6	2.6
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.011	0.012	0.012
Uranium	0.00035	0.00038	0.00077	0.00095	0.00096	0.0014	0.0015	0.0016	0.0018	0.0018
Vanadium	0.00062	0.00062	0.00076	0.0013	0.0014	0.0005	0.00059	0.0014	0.0023	0.0024
Zinc	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Dissolved Metals	6					2				
Aluminum	0.0038	0.0039	0.0066	0.014	0.014	0.003	0.003	0.003	0.003	0.003
Antimony	0.00018	0.00019	0.00026	0.00037	0.00037	0.0001	0.0001	0.00013	0.00016	0.00016
Arsenic	0.00043	0.00044	0.00049	0.00089	0.001	0.00036	0.00036	0.00038	0.0004	0.0004
Barium	0.024	0.025	0.031	0.043	0.044	0.021	0.022	0.024	0.026	0.026
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.026	0.028	0.045	0.075	0.083	0.044	0.044	0.045	0.045	0.045
Cadmium	0.00002	0.000022	0.00004	0.000054	0.000055	0.000015	0.000015	0.000018	0.00002	0.00002
Calcium	69	76	110	140	140	170	180	200	230	230
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.00012	0.00013	0.0001	0.0001	0.00013	0.00016	0.00016
Copper	0.014	0.014	0.017	0.022	0.024	0.0027	0.0028	0.0031	0.0035	0.0035
Iron	0.03	0.03	0.03	0.03	0.03	0.03	0.036	0.086	0.14	0.14
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.0018	0.0019	0.0022	0.0031	0.0032	0.0014	0.0015	0.0019	0.0024	0.0024
Magnesium	15	16	25	30	30	35	35	40	44	45
Manganese	0.0032	0.0044	0.0087	0.02	0.024	0.0006	0.0026	0.021	0.038	0.04
Molybdenum	0.071	0.081	0.12	0.15	0.15	0.031	0.032	0.045	0.059	0.06
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	1.4	1.5	1.9	2.2	2.2	1.7	1.7	1.9	2.1	2.1
Selenium	0.023	0.023	0.026	0.033	0.033	0.0052	0.0059	0.012	0.018	0.019
Silicon	6.4	6.6	8.5	9.1	9.3	5.2	5.2	5.4	5.5	5.6
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	8.5	9.4	14	17	17	11	11	12	13	13
Strontium	0.37	0.41	0.59	0.78	0.79	2.3	2.3	2.5	2.6	2.6
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Mine Drainage Creek					NEZ Dump Seep 10				
Uranium	0.00035	0.00038	0.00071	0.00096	0.00097	0.0016	0.0016	0.0017	0.0019	0.0019
Vanadium	0.0005	0.00053	0.00064	0.0013	0.0015	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc	0.003	0.003	0.003	0.0048	0.0054	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 11					NEZ Dump Seep 12	NEZ Dump Seep 13				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum		Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	1					-	2				
pH	7.9	7.9	7.9	7.9	7.9	-	7.5	7.5	7.6	7.6	7.6
Conductivity	1100	1100	1100	1100	1100	-	1000	1100	1200	1400	1500
Temprature	4.3	4.3	4.3	4.3	4.3	-	1	1.1	2.5	3.8	3.9
Turbidity	2.3	2.3	2.3	2.3	2.3	-	2.3	2.5	4.5	6.4	6.6
Physical Tests	1					-	2				
Conductivity	980	980	980	980	980	-	970	990	1200	1400	1500
Hardness (as CaCO3)	520	520	520	520	520	-	520	530	670	820	830
pH	8.3	8.3	8.3	8.3	8.3	-	8.1	8.1	8.2	8.2	8.3
Total Suspended Solids	1	1	1	1	1	-	13	22	110	190	200
Total Dissolved Solids	770	770	770	770	770	-	780	800	1000	1200	1200
Turbidity	0.2	0.2	0.2	0.2	0.2	-	1.9	4.1	24	44	46
Anions and Nutrients	1					-	2				
Alkalinity, Total (as CaCO3)	210	210	210	210	210	-	200	210	240	280	290
Ammonia, Total (as N)	0.0061	0.0061	0.0061	0.0061	0.0061	-	0.008	0.0085	0.013	0.018	0.019
Chloride	2.5	2.5	2.5	2.5	2.5	-	2.5	2.5	2.5	2.5	2.5
Fluoride	0.27	0.27	0.27	0.27	0.27	-	0.21	0.21	0.23	0.24	0.25
Nitrate (as N)	0.22	0.22	0.22	0.22	0.22	-	0.27	0.28	0.33	0.39	0.39
Nitrite (as N)	0.005	0.005	0.005	0.005	0.005	-	0.005	0.005	0.005	0.005	0.005
Total Nitrogen	0.38	0.38	0.38	0.38	0.38	-	0.52	0.58	1.1	1.6	1.6
Orthophosphate-Dissolved (as P)	0.0067	0.0067	0.0067	0.0067	0.0067	-	0.001	0.0011	0.0017	0.0023	0.0024
Phosphorus - Total Dissolved	0.01	0.01	0.01	0.01	0.01	-	0.0053	0.0054	0.006	0.0066	0.0067
Phosphorus - Total	0.013	0.013	0.013	0.013	0.013	-	0.013	0.027	0.16	0.29	0.31
Sulfate	390	390	390	390	390	-	390	400	500	600	610
Organic Carbon	1					-	2				
Dissolved Organic Carbon	4.8	4.8	4.8	4.8	4.8	-	4.1	4.1	4.3	4.5	4.5
Total Metals	1					-	2				
Aluminum	0.015	0.015	0.015	0.015	0.015	-	0.17	0.2	0.55	0.9	0.94
Antimony	0.00013	0.00013	0.00013	0.00013	0.00013	-	0.00018	0.00018	0.00018	0.00018	0.00018
Arsenic	0.00043	0.00043	0.00043	0.00043	0.00043	-	0.00046	0.00049	0.00075	0.001	0.001
Barium	0.022	0.022	0.022	0.022	0.022	-	0.017	0.018	0.025	0.031	0.032
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.035	0.035	0.035	0.035	0.035	-	0.032	0.032	0.036	0.04	0.04
Cadmium	0.000025	0.000025	0.000025	0.000025	0.000025	-	0.00005	0.000053	0.000083	0.00011	0.00012
Calcium	190	190	190	190	190	-	180	180	220	260	270
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.00055	0.00097	0.0014	0.0014
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.00046	0.0005	0.0009	0.0013	0.0013
Copper	0.01	0.01	0.01	0.01	0.01	-	0.0084	0.0093	0.017	0.026	0.027
Iron	0.03	0.03	0.03	0.03	0.03	-	0.49	0.58	1.3	2.1	2.2
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00019	0.00021	0.00042	0.00062	0.00065
Lithium	0.002	0.002	0.002	0.002	0.002	-	0.0023	0.0024	0.0029	0.0033	0.0034
Magnesium	33	33	33	33	33	-	32	33	40	47	48
Manganese	0.023	0.023	0.023	0.023	0.023	-	0.21	0.23	0.42	0.61	0.63
Molybdenum	0.058	0.058	0.058	0.058	0.058	-	0.054	0.056	0.075	0.093	0.096
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.00053	0.00059	0.0011	0.0017	0.0018
Potassium	1.6	1.6	1.6	1.6	1.6	-	1.2	1.2	1.4	1.6	1.6
Selenium	0.0071	0.0071	0.0071	0.0071	0.0071	-	0.0053	0.0056	0.0088	0.012	0.012
Silicon	5.7	5.7	5.7	5.7	5.7	-	6.3	6.4	7.6	8.8	9
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.000011	0.000018	0.000025	0.000026
Sodium	9.7	9.7	9.7	9.7	9.7	-	9.9	10	11	12	12
Strontium	2	2	2	2	2	-	1.9	1.9	2.3	2.6	2.7
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	-	0.01	0.011	0.021	0.031	0.033
Uranium	0.0019	0.0019	0.0019	0.0019	0.0019	-	0.0027	0.0027	0.0027	0.0028	0.0028
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.00081	0.00095	0.0022	0.0034	0.0036
Zinc	0.003	0.003	0.003	0.003	0.003	-	0.003	0.0032	0.005	0.0068	0.007
Dissolved Metals	1					-	2				
Aluminum	0.0034	0.0034	0.0034	0.0034	0.0034	-	0.003	0.003	0.003	0.003	0.003
Antimony	0.00012	0.00012	0.00012	0.00012	0.00012	-	0.00014	0.00014	0.00016	0.00017	0.00017
Arsenic	0.00043	0.00043	0.00043	0.00043	0.00043	-	0.00019	0.00019	0.00021	0.00022	0.00022
Barium	0.022	0.022	0.022	0.022	0.022	-	0.014	0.014	0.015	0.015	0.015
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.031	0.031	0.031	0.031	0.031	-	0.027	0.028	0.032	0.037	0.037
Cadmium	0.000015	0.000015	0.000015	0.000015	0.000015	-	0.000016	0.000016	0.000018	0.00002	0.00002
Calcium	160	160	160	160	160	-	160	160	210	250	260
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001
Copper	0.0081	0.0081	0.0081	0.0081	0.0081	-	0.0014	0.0014	0.0017	0.0021	0.0021
Iron	0.03	0.03	0.03	0.03	0.03	-	0.03	0.03	0.03	0.03	0.03
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.0018	0.0018	0.0018	0.0018	0.0018	-	0.002	0.002	0.0024	0.0028	0.0028
Magnesium	29	29	29	29	29	-	29	29	37	44	45
Manganese	0.013	0.013	0.013	0.013	0.013	-	0.062	0.067	0.11	0.16	0.16
Molybdenum	0.055	0.055	0.055	0.055	0.055	-	0.041	0.044	0.064	0.085	0.087
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	1.6	1.6	1.6	1.6	1.6	-	1.2	1.2	1.3	1.5	1.5
Selenium	0.0071	0.0071	0.0071	0.0071	0.0071	-	0.0046	0.005	0.0084	0.012	0.012
Silicon	5.5	5.5	5.5	5.5	5.5	-	5.8	5.9	6.7	7.5	7.6
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	9	9	9	9	9	-	8.9	9.1	10	12	12
Strontium	1.8	1.8	1.8	1.8	1.8	-	1.8	1.8	2.1	2.5	2.5
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 11					NEZ Dump Seep 12	NEZ Dump Seep 13				
Uranium	0.002	0.002	0.002	0.002	0.002	-	0.0025	0.0026	0.0027	0.0028	0.0028
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc	0.003	0.003	0.003	0.003	0.003	-	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 14					NEZ Dump Seep 15					NEZ Dump Seep 2					NEZ Dump Seep 3				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	2					1					2					2				
pH	7.4	7.4	7.5	7.6	7.6	7.5	7.5	7.5	7.5	7.5	7.8	7.8	7.8	7.9	7.9	7.7	7.7	7.7	7.7	7.7
Conductivity	420	430	580	740	750	810	810	810	810	810	1600	1600	1600	1600	1600	1800	1900	1900	2000	2000
Temprature	3.7	3.7	4.1	4.4	4.4	11	11	11	11	11	1.3	1.3	1.7	2.1	2.1	2.7	2.8	3.3	3.8	3.9
Turbidity	0.75	0.83	1.6	2.3	2.4	2.3	2.3	2.3	2.3	2.3	0.04	0.15	1.1	2.1	2.2	0.19	0.3	1.3	2.4	2.5
Physical Tests	2					1					2					2				
Conductivity	380	400	550	700	720	700	700	700	700	700	1400	1400	1500	1600	1600	1800	1800	1900	2000	2000
Hardness (as CaCO3)	180	180	270	350	360	350	350	350	350	350	790	800	850	910	910	1100	1100	1100	1200	1200
pH	7.9	7.9	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8	8
Total Suspended Solids	1	1	1	1	1	1	1	1	1	1	1.8	2.1	4.5	6.9	7.2	1	1	1.1	1.1	1.1
Total Dissolved Solids	270	280	380	480	490	560	560	560	560	560	1300	1300	1300	1300	1400	1700	1700	1800	1800	1800
Turbidity	0.1	0.11	0.18	0.24	0.25	0.1	0.1	0.1	0.1	0.1	0.55	0.67	1.8	2.9	3	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients	2					1					2					2				
Alkalinity, Total (as CaCO3)	66	68	95	120	120	130	130	130	130	130	60	61	65	68	69	76	77	82	86	87
Ammonia, Total (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Chloride	0.5	0.6	1.5	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	3.8	4.9	5	5	5	5	5	5
Fluoride	0.069	0.071	0.085	0.098	0.1	0.13	0.13	0.13	0.13	0.13	0.32	0.33	0.39	0.45	0.45	0.2	0.2	0.2	0.2	0.2
Nitrate (as N)	0.025	0.03	0.077	0.12	0.13	0.025	0.025	0.025	0.025	0.025	0.77	0.78	0.87	0.95	0.96	0.64	0.65	0.73	0.81	0.82
Nitrite (as N)	0.001	0.0012	0.003	0.0048	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0053	0.0075	0.0098	0.01	0.01	0.01	0.01	0.01	0.01
Total Nitrogen	0.064	0.073	0.15	0.23	0.24	0.16	0.16	0.16	0.16	0.16	0.83	0.84	0.93	1	1	0.75	0.76	0.84	0.92	0.93
Orthophosphate-Dissolved (as P)	0.001	0.001	0.001	0.001	0.001	0.0017	0.0017	0.0017	0.0017	0.0017	0.001	0.001	0.001	0.001	0.001	0.0051	0.0052	0.0066	0.0079	0.008
Phosphorus - Total Dissolved	0.002	0.0021	0.0028	0.0035	0.0036	0.003	0.003	0.003	0.003	0.003	0.0037	0.0037	0.0041	0.0045	0.0045	0.0084	0.0085	0.0094	0.01	0.01
Phosphorus - Total	0.0028	0.0028	0.0029	0.003	0.003	0.0041	0.0041	0.0041	0.0041	0.0041	0.0036	0.0041	0.0084	0.013	0.013	0.009	0.0091	0.01	0.011	0.012
Sulfate	130	140	190	250	250	270	270	270	270	270	820	820	840	860	860	1100	1100	1100	1200	1200
Organic Carbon	2					1					2					2				
Dissolved Organic Carbon	3	3.1	3.5	4	4.1	6.7	6.7	6.7	6.7	6.7	2.9	2.9	3.1	3.2	3.2	3.9	3.9	4.1	4.3	4.3
Total Metals	2					1					2					2				
Aluminum	0.0056	0.0056	0.0058	0.006	0.006	0.048	0.048	0.048	0.048	0.048	0.0095	0.018	0.096	0.17	0.18	0.006	0.0061	0.0067	0.0073	0.0074
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00029	0.00029	0.00032	0.00034	0.00034	0.0002	0.0002	0.0002	0.0002	0.0002
Arsenic	0.00014	0.00014	0.00017	0.00019	0.00019	0.00026	0.00026	0.00026	0.00026	0.00026	0.0002	0.0002	0.00022	0.00024	0.00024	0.00022	0.00022	0.00023	0.00023	0.00023
Barium	0.0087	0.0092	0.013	0.017	0.018	0.015	0.015	0.015	0.015	0.015	0.028	0.028	0.029	0.029	0.029	0.048	0.048	0.048	0.048	0.048
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00011	0.00015	0.0002	0.0002
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000053	0.000075	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron	0.012	0.013	0.017	0.022	0.022	0.028	0.028	0.028	0.028	0.028	0.061	0.061	0.064	0.066	0.066	0.065	0.065	0.07	0.074	0.074
Cadmium	0.000026	0.000027	0.000033	0.000038	0.000039	0.000025	0.000025	0.000025	0.000025	0.000025	0.00017	0.00017	0.00018	0.00018	0.00018	0.000068	0.000068	0.000069	0.00007	0.00007
Calcium	60	62	84	110	110	130	130	130	130	130	260	260	260	270	270	340	340	340	340	350
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00053	0.00075	0.00098	0.001
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.00023	0.00054	0.00085	0.00088	0.0002	0.0002	0.0002	0.0002	0.0002
Copper	0.0041	0.0042	0.0053	0.0064	0.0066	0.0088	0.0088	0.0088	0.0088	0.0088	0.087	0.091	0.13	0.16	0.17	0.0034	0.0034	0.0036	0.0038	0.0038
Iron	0.03	0.03	0.032	0.033	0.033	0.074	0.074	0.074	0.074	0.074	0.03	0.036	0.086	0.14	0.14	0.03	0.032	0.045	0.059	0.06
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000065	0.000067	0.000083	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Lithium	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0027	0.0028	0.0035	0.0041	0.0042	0.002	0.002	0.002	0.002	0.002
Magnesium	11	12	16	21	21	20	20	20	20	20	51	51	53	55	56	87	87	88	90	90
Manganese	0.0071	0.0073	0.0095	0.012	0.012	0.0074	0.0074	0.0074	0.0074	0.0074	0.023	0.027	0.064	0.1	0.11	0.0002	0.00021	0.00034	0.00046	0.00047
Molybdenum	0.016	0.016	0.017	0.017	0.017	0.039	0.039	0.039	0.039	0.039	0.15	0.16	0.2	0.24	0.24	0.078	0.078	0.079	0.079	0.08
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0013	0.0013	0.0015	0.0016	0.0016	0.001	0.001	0.001	0.001	0.001
Potassium	0.68	0.7	0.89	1.1	1.1	1.4	1.4	1.4	1.4	1.4	1.8	1.9	1.9	2	2	3.1	3.1	3.2	3.4	3.4
Selenium	0.0052	0.0057	0.0096	0.014	0.014	0.004	0.004	0.004	0.004	0.004	0.089	0.09	0.1	0.11	0.11	0.011	0.011	0.018	0.025	0.025
Silicon	5.3	5.3	5.7	6	6	5.7	5.7	5.7	5.7	5.7	4	4	4.2	4.4	4.4	5.5	5.5	5.6	5.6	5.6
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.000015	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Sodium	4.1	4.3	5.4	6.6	6.8	7.4	7.4	7.4	7.4	7.4	19	19	19	19	19	25	25	25	25	25
Strontium	0.33	0.36	0.58	0.79	0.82	0.79	0.79	0.79	0.79	0.79	3.6	3.6	3.8	4	4	5.8	5.8	5.8	5.8	5.8
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.000015	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00011	0.00015	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium	0.00014	0.00015	0.00028	0.00042	0.00043	0.001	0.001	0.001	0.001	0.001	0.0012	0.0012	0.0012	0.0013	0.0013	0.00042	0.00042	0.00046	0.00049	0.00049
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00054	0.00056	0.00077	0.00098	0.001	0.001	0.001	0.001	0.001	0.001
Zinc	0.003	0.003	0.0031	0.0032	0.0032	0.003	0.003	0.003	0.003	0.003	0.0066	0.0067	0.0078	0.0089	0.009	0.006	0.006	0.006	0.006	0.006
Dissolved Metals	2					1					2					2				
Aluminum	0.003	0.0032	0.0049	0.0065	0.0067	0.018	0.018	0.018	0.018	0.018	0.0088	0.0088	0.0091	0.0093	0.0093	0.0045	0.0045	0.0048	0.005	0.005
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00028	0.00028	0.00031	0.00034	0.00034	0.0002	0.0002	0.0002	0.0002	0.0002
Arsenic	0.00012	0.00012	0.00013	0.00013	0.00013	0.00021	0.00021	0.00021	0.00021	0.00021	0.00014	0.00014	0.00017	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium	0.009	0.0095	0.014	0.018	0.018	0.014	0.014	0.014	0.014	0.014	0.026	0.026	0.028	0.03	0.031	0.048	0.048	0.049	0.05	0.05
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000053	0.000075	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron	0.012	0.013	0.018	0.022	0.023	0.024	0.024	0.024	0.024	0.024	0.059	0.059	0.06	0.06	0.06	0.064	0.064	0.065	0.065	0.065
Cadmium	0.000019	0.000019	0.000025	0.000031	0.000032	0.000014	0.000014	0.000014	0.000014	0.000014	0.00013	0.00013	0.00015	0.00017	0.00018	0.000042	0.000044	0.000056	0.000069	0.00007
Calcium	53	56	82	110	110	110	110	110	110	110	240	240	260	270	280	300	300	320	340	340
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.00023	0.00047	0.0007	0.00073	0.0002	0.0002	0.0002	0.0002	0.0002
Copper	0.0035	0.0036	0.0048	0.0059	0.0061	0.007	0.007	0.007	0.007	0.007	0.086	0.086	0.086	0.087	0.087	0.0035	0.0035	0.0036	0.0036	0.0036
Iron	0.03	0.03	0.03	0.03	0.03	0.032	0.032	0.032	0.032	0.032	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000053	0.000075	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Lithium	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0028	0.0029	0.0034	0.0038	0.0039	0.002	0.002	0.002	0.002	0.002
Magnesium	10	11	15	20	20	19	19	19	19	19	48	48	51	54	55	78	78	84	89	89
Manganese	0.0046	0.0049	0.0071	0.0094	0.0097	0.0055	0.0055	0.0055	0.0055	0.0055	0.024	0.028	0.062	0.096	0.099	0.0002	0.00021	0.00026	0.00031	0.00032
Molybdenum	0.015	0.015	0.015	0.016	0.016	0.038	0.038	0.038	0.038	0.038	0.15	0.15	0.19	0.23	0.24	0.074	0.074	0.076	0.077	0.077
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0013	0.0013	0.0013	0.0014	0.0014	0.001	0.001	0.001	0.001	0.001
Potassium	0.7	0.71	0.89	1.1	1.1	1.4	1.4	1.4	1.4	1.4	1.9	1.9	2	2.1	2.1	3.1	3.1	3.3	3.4	3.5
Selenium	0.0046	0.005	0.0087	0.012	0.013	0.0038	0.0038	0.0038	0.0038	0.0038	0.087	0.087	0.093	0.099	0.1	0.01	0.011	0.016	0.022	0.022
Silicon	5.1	5.1	5.5	5.9	5.9	5.5	5.5	5.5	5.5	5.5	4	4	4	4.1	4.1	5.3	5.3	5.4	5.5	5.5
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.000015	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Sodium	3.6	3.7	5.1	6.5	6.6	6.9	6.9	6.9	6.9	6.9	18	18	18	19	19	22	22	24	26	26
Strontium	0.3	0.32	0.54	0.76	0.79	0.73	0.73	0.73	0.73	0.73	3.6	3.6	3.7	3.7	3.7	5.3	5.3	5.5	5.7	5.7
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.000015	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00011	0.00015	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 14					NEZ Dump Seep 15					NEZ Dump Seep 2					NEZ Dump Seep 3				
Uranium	0.00015	0.00016	0.00026	0.00037	0.00038	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.00042	0.00043	0.00047	0.0005	0.00051
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00053	0.00075	0.00098	0.001	0.001	0.001	0.001	0.001	0.001
Zinc	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0074	0.0074	0.0077	0.008	0.008	0.003	0.003	0.0032	0.0033	0.0033

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 4					NEZ Dump Seep 5	NEZ Dump Seep 6	NEZ Dump Seep 7					NEZ Dump Seep 8
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum			Minimum	5th Percentile	Median	95th Percentile	Maximum	
Field Parameters	2					-	-	1					-
pH	7.4	7.4	7.6	7.7	7.7	-	-	8.2	8.2	8.2	8.2	8.2	-
Conductivity	1500	1500	1700	1800	1800	-	-	540	540	540	540	540	-
Temprature	0.9	1	2.3	3.6	3.7	-	-	3.8	3.8	3.8	3.8	3.8	-
Turbidity	0.02	0.13	1.1	2	2.1	-	-	2.2	2.2	2.2	2.2	2.2	-
Physical Tests	2					-	-	1					-
Conductivity	1400	1400	1600	1800	1800	-	-	490	490	490	490	490	-
Hardness (as CaCO3)	810	820	940	1100	1100	-	-	240	240	240	240	240	-
pH	7.9	7.9	8	8	8	-	-	8.2	8.2	8.2	8.2	8.2	-
Total Suspended Solids	1.2	1.2	1.4	1.6	1.6	-	-	2.7	2.7	2.7	2.7	2.7	-
Total Dissolved Solids	1300	1300	1400	1500	1500	-	-	370	370	370	370	370	-
Turbidity	0.1	0.1	0.11	0.12	0.12	-	-	0.3	0.3	0.3	0.3	0.3	-
Anions and Nutrients	2					-	-	1					-
Alkalinity, Total (as CaCO3)	80	82	98	110	120	-	-	120	120	120	120	120	-
Ammonia, Total (as N)	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005	0.005	0.005	-
Chloride	2.5	2.6	3.8	4.9	5	-	-	0.5	0.5	0.5	0.5	0.5	-
Fluoride	0.25	0.25	0.28	0.31	0.31	-	-	0.21	0.21	0.21	0.21	0.21	-
Nitrate (as N)	0.39	0.4	0.57	0.73	0.75	-	-	0.44	0.44	0.44	0.44	0.44	-
Nitrite (as N)	0.005	0.0053	0.0075	0.0098	0.01	-	-	0.001	0.001	0.001	0.001	0.001	-
Total Nitrogen	0.52	0.54	0.69	0.84	0.86	-	-	0.53	0.53	0.53	0.53	0.53	-
Orthophosphate-Dissolved (as P)	0.0052	0.0055	0.0083	0.011	0.011	-	-	0.0047	0.0047	0.0047	0.0047	0.0047	-
Phosphorus - Total Dissolved	0.011	0.011	0.013	0.014	0.015	-	-	0.007	0.007	0.007	0.007	0.007	-
Phosphorus - Total	0.016	0.016	0.016	0.016	0.016	-	-	0.061	0.061	0.061	0.061	0.061	-
Sulfate	820	830	910	990	1000	-	-	150	150	150	150	150	-
Organic Carbon	2					-	-	1					-
Dissolved Organic Carbon	3.9	3.9	4.4	4.9	5	-	-	2.3	2.3	2.3	2.3	2.3	-
Total Metals	2					-	-	1					-
Aluminum	0.025	0.027	0.04	0.053	0.055	-	-	0.022	0.022	0.022	0.022	0.022	-
Antimony	0.0002	0.0002	0.00022	0.00024	0.00024	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	-
Arsenic	0.00029	0.00029	0.00031	0.00032	0.00032	-	-	0.00048	0.00048	0.00048	0.00048	0.00048	-
Barium	0.03	0.031	0.033	0.036	0.036	-	-	0.019	0.019	0.019	0.019	0.019	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-
Bismuth	0.00005	0.000053	0.000075	0.000098	0.0001	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-
Boron	0.049	0.049	0.051	0.053	0.053	-	-	0.037	0.037	0.037	0.037	0.037	-
Cadmium	0.00007	0.000071	0.000078	0.000084	0.000085	-	-	0.000015	0.000015	0.000015	0.000015	0.000015	-
Calcium	260	260	290	310	310	-	-	86	86	86	86	86	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-
Cobalt	0.00014	0.00014	0.00017	0.0002	0.0002	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-
Copper	0.016	0.016	0.02	0.023	0.023	-	-	0.0057	0.0057	0.0057	0.0057	0.0057	-
Iron	0.03	0.031	0.041	0.051	0.052	-	-	0.03	0.03	0.03	0.03	0.03	-
Lead	0.00005	0.000053	0.000075	0.000098	0.0001	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-
Lithium	0.0024	0.0024	0.0027	0.003	0.003	-	-	0.0017	0.0017	0.0017	0.0017	0.0017	-
Magnesium	56	57	65	74	75	-	-	12	12	12	12	12	-
Manganese	0.01	0.01	0.012	0.013	0.013	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	-
Molybdenum	0.096	0.1	0.14	0.17	0.17	-	-	0.032	0.032	0.032	0.032	0.032	-
Nickel	0.0005	0.00053	0.00075	0.00098	0.001	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-
Potassium	1.8	1.8	2.1	2.3	2.3	-	-	0.57	0.57	0.57	0.57	0.57	-
Selenium	0.0087	0.011	0.036	0.061	0.064	-	-	0.012	0.012	0.012	0.012	0.012	-
Silicon	4.5	4.5	4.7	4.9	4.9	-	-	6.5	6.5	6.5	6.5	6.5	-
Silver	0.00001	0.000011	0.000015	0.00002	0.00002	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-
Sodium	18	18	20	21	21	-	-	5.7	5.7	5.7	5.7	5.7	-
Strontium	4.8	4.9	5.4	5.9	6	-	-	0.62	0.62	0.62	0.62	0.62	-
Thallium	0.00001	0.000011	0.000015	0.00002	0.00002	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-
Tin	0.0001	0.00011	0.00015	0.0002	0.0002	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	-
Uranium	0.001	0.0011	0.0015	0.0018	0.0019	-	-	0.00052	0.00052	0.00052	0.00052	0.00052	-
Vanadium	0.00054	0.00056	0.00077	0.00098	0.001	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	-
Zinc	0.003	0.0032	0.0045	0.0059	0.006	-	-	0.003	0.003	0.003	0.003	0.003	-
Dissolved Metals	2					-	-	1					-
Aluminum	0.0061	0.0063	0.0078	0.0092	0.0094	-	-	0.005	0.005	0.005	0.005	0.005	-
Antimony	0.0002	0.0002	0.00023	0.00025	0.00025	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	-
Arsenic	0.00024	0.00024	0.00025	0.00025	0.00025	-	-	0.00045	0.00045	0.00045	0.00045	0.00045	-
Barium	0.03	0.031	0.033	0.035	0.035	-	-	0.021	0.021	0.021	0.021	0.021	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-
Bismuth	0.00005	0.000053	0.000075	0.000098	0.0001	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-
Boron	0.047	0.047	0.049	0.051	0.051	-	-	0.031	0.031	0.031	0.031	0.031	-
Cadmium	0.000029	0.000031	0.000047	0.000063	0.000065	-	-	0.000011	0.000011	0.000011	0.000011	0.000011	-
Calcium	240	240	280	310	310	-	-	80	80	80	80	80	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-
Cobalt	0.0001	0.00011	0.00015	0.0002	0.0002	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-
Copper	0.011	0.011	0.012	0.012	0.012	-	-	0.005	0.005	0.005	0.005	0.005	-
Iron	0.03	0.03	0.03	0.03	0.03	-	-	0.03	0.03	0.03	0.03	0.03	-
Lead	0.00005	0.000053	0.000075	0.000098	0.0001	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-
Lithium	0.0024	0.0024	0.0027	0.003	0.003	-	-	0.0017	0.0017	0.0017	0.0017	0.0017	-
Magnesium	51	52	62	71	72	-	-	11	11	11	11	11	-
Manganese	0.00055	0.00057	0.00075	0.00092	0.00094	-	-	0.00048	0.00048	0.00048	0.00048	0.00048	-
Molybdenum	0.088	0.093	0.13	0.17	0.18	-	-	0.031	0.031	0.031	0.031	0.031	-
Nickel	0.0005	0.00053	0.00075	0.00098	0.001	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-
Potassium	1.9	1.9	2.1	2.3	2.3	-	-	0.61	0.61	0.61	0.61	0.61	-
Selenium	0.0083	0.011	0.032	0.054	0.056	-	-	0.011	0.011	0.011	0.011	0.011	-
Silicon	4.5	4.5	4.6	4.7	4.7	-	-	6.3	6.3	6.3	6.3	6.3	-
Silver	0.00001	0.000011	0.000015	0.00002	0.00002	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-
Sodium	17	17	19	20	20	-	-	5.1	5.1	5.1	5.1	5.1	-
Strontium	4.5	4.6	5	5.4	5.4	-	-	0.59	0.59	0.59	0.59	0.59	-
Thallium	0.00001	0.000011	0.000015	0.00002	0.00002	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-
Tin	0.0001	0.00011	0.00015	0.0002	0.0002	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 4					NEZ Dump Seep 5	NEZ Dump Seep 6	NEZ Dump Seep 7					NEZ Dump Seep 8
Uranium	0.0011	0.0011	0.0014	0.0016	0.0016	-	-	0.00055	0.00055	0.00055	0.00055	0.00055	-
Vanadium	0.0005	0.00053	0.00075	0.00098	0.001	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	-
Zinc	0.003	0.003	0.003	0.003	0.003	-	-	0.003	0.003	0.003	0.003	0.003	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 9					NEZ Seep 1					NEZ Seep 2a	PAG Ditch	PAG Dump Seep 1	PAG Dump Seep 10				
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum				Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	2					5					-	-	-	1				
pH	7.6	7.6	7.8	8	8	7.5	7.5	7.6	7.9	7.9	-	-	-	7.6	7.6	7.6	7.6	7.6
Conductivity	1300	1300	1400	1500	1500	1100	1100	1400	1700	1700	-	-	-	1300	1300	1300	1300	1300
Temprature	3.6	3.6	3.9	4.2	4.2	0.42	0.59	1.6	4.7	5.1	-	-	-	2.7	2.7	2.7	2.7	2.7
Turbidity	0.81	0.87	1.4	2	2	0.15	0.25	1.2	2.5	2.6	-	-	-	0.26	0.26	0.26	0.26	0.26
Physical Tests	2					5					-	-	-	1				
Conductivity	1200	1200	1400	1500	1500	1100	1100	1500	1600	1700	-	-	-	1300	1300	1300	1300	1300
Hardness (as CaCO3)	670	680	750	820	830	550	580	780	870	880	-	-	-	670	670	670	670	670
pH	7.9	7.9	8	8.1	8.1	7.9	7.9	7.9	8.1	8.1	-	-	-	7.8	7.8	7.8	7.8	7.8
Total Suspended Solids	1	1	1	1	1	1	1	1.8	7.1	8.4	-	-	-	10	10	10	10	10
Total Dissolved Solids	1100	1100	1200	1300	1300	850	890	1200	1400	1500	-	-	-	1100	1100	1100	1100	1100
Turbidity	0.15	0.16	0.22	0.28	0.29	0.2	0.22	0.33	1.8	2.2	-	-	-	1.7	1.7	1.7	1.7	1.7
Anions and Nutrients	2					5					-	-	-	1				
Alkalinity, Total (as CaCO3)	66	67	76	86	87	61	62	66	70	71	-	-	-	140	140	140	140	140
Ammonia, Total (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0061	0.0064	-	-	-	0.18	0.18	0.18	0.18	0.18
Chloride	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4.7	5	-	-	-	4.5	4.5	4.5	4.5	4.5
Fluoride	0.16	0.16	0.17	0.19	0.19	0.28	0.3	0.38	0.41	0.42	-	-	-	0.1	0.1	0.1	0.1	0.1
Nitrate (as N)	0.75	0.76	0.87	0.98	0.99	0.88	0.89	1.1	1.1	1.1	-	-	-	38	38	38	38	38
Nitrite (as N)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.009	0.01	-	-	-	0.23	0.23	0.23	0.23	0.23
Total Nitrogen	0.81	0.83	0.96	1.1	1.1	0.97	0.97	1.1	1.2	1.2	-	-	-	41	41	41	41	41
Orthophosphate-Dissolved (as P)	0.0044	0.0044	0.0046	0.0048	0.0048	0.001	0.001	0.001	0.001	0.001	-	-	-	0.0023	0.0023	0.0023	0.0023	0.0023
Phosphorus - Total Dissolved	0.007	0.007	0.0073	0.0075	0.0075	0.002	0.0021	0.0031	0.0039	0.004	-	-	-	0.0063	0.0063	0.0063	0.0063	0.0063
Phosphorus - Total	0.0086	0.0086	0.0091	0.0095	0.0095	0.0038	0.0039	0.0042	0.0094	0.01	-	-	-	0.022	0.022	0.022	0.022	0.022
Sulfate	690	690	720	750	760	520	550	750	910	950	-	-	-	460	460	460	460	460
Organic Carbon	2					5					-	-	-	1				
Dissolved Organic Carbon	3.8	3.8	4.4	4.9	5	2.6	2.6	3	3.9	3.9	-	-	-	12	12	12	12	12
Total Metals	2					5					-	-	-	1				
Aluminum	0.0088	0.0094	0.015	0.02	0.021	0.013	0.017	0.059	0.29	0.35	-	-	-	0.24	0.24	0.24	0.24	0.24
Antimony	0.00012	0.00012	0.00014	0.00015	0.00015	0.00026	0.00027	0.00036	0.0004	0.0004	-	-	-	0.00034	0.00034	0.00034	0.00034	0.00034
Arsenic	0.00023	0.00023	0.00024	0.00025	0.00025	0.00019	0.00019	0.00021	0.00037	0.0004	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054
Barium	0.022	0.022	0.023	0.025	0.025	0.024	0.025	0.034	0.037	0.037	-	-	-	0.083	0.083	0.083	0.083	0.083
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.052	0.052	0.053	0.054	0.054	0.06	0.06	0.062	0.067	0.067	-	-	-	0.062	0.062	0.062	0.062	0.062
Cadmium	0.00007	0.000071	0.00008	0.000089	0.00009	0.00018	0.00018	0.0002	0.00033	0.00036	-	-	-	0.000093	0.000093	0.000093	0.000093	0.000093
Calcium	220	220	240	250	260	170	180	240	300	320	-	-	-	210	210	210	210	210
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.00025	0.00028	0.0012	0.0019	0.002	-	-	-	0.0017	0.0017	0.0017	0.0017	0.0017
Copper	0.018	0.018	0.018	0.018	0.018	0.1	0.1	0.12	0.4	0.46	-	-	-	0.02	0.02	0.02	0.02	0.02
Iron	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.21	0.26	-	-	-	0.25	0.25	0.25	0.25	0.25
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00017	0.0002	-	-	-	0.000092	0.000092	0.000092	0.000092	0.000092
Lithium	0.0017	0.0017	0.0019	0.0021	0.0021	0.0025	0.0027	0.0035	0.0035	0.0035	-	-	-	0.001	0.001	0.001	0.001	0.001
Magnesium	44	45	48	51	52	32	34	47	60	62	-	-	-	48	48	48	48	48
Manganese	0.006	0.0061	0.0074	0.0087	0.0089	0.066	0.069	0.15	0.31	0.34	-	-	-	1.3	1.3	1.3	1.3	1.3
Molybdenum	0.095	0.097	0.12	0.14	0.14	0.16	0.17	0.22	0.24	0.24	-	-	-	0.048	0.048	0.048	0.048	0.048
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0015	0.0016	0.0017	0.003	0.0033	-	-	-	0.00053	0.00053	0.00053	0.00053	0.00053
Potassium	1.9	1.9	2.1	2.3	2.3	1.5	1.6	1.8	2.1	2.1	-	-	-	3	3	3	3	3
Selenium	0.032	0.033	0.04	0.046	0.047	0.078	0.079	0.1	0.11	0.11	-	-	-	0.048	0.048	0.048	0.048	0.048
Silicon	4.8	4.8	4.9	5	5	4.1	4.1	4.3	4.4	4.5	-	-	-	5.6	5.6	5.6	5.6	5.6
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.000011	-	-	-	0.000027	0.000027	0.000027	0.000027	0.000027
Sodium	15	15	15	15	16	13	13	17	20	21	-	-	-	20	20	20	20	20
Strontium	2.9	2.9	2.9	2.9	2.9	2.8	2.8	3.4	3.7	3.8	-	-	-	1.3	1.3	1.3	1.3	1.3
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	0.012	0.012	0.012	0.012	0.012
Uranium	0.00099	0.001	0.0011	0.0012	0.0012	0.00093	0.00096	0.0011	0.0013	0.0013	-	-	-	0.0014	0.0014	0.0014	0.0014	0.0014
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00093	0.001	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011
Zinc	0.003	0.003	0.0034	0.0037	0.0037	0.0082	0.0082	0.0085	0.013	0.014	-	-	-	0.003	0.003	0.003	0.003	0.003
Dissolved Metals	2					5					-	-	-	1				
Aluminum	0.0079	0.0082	0.011	0.014	0.015	0.0068	0.0071	0.0087	0.063	0.076	-	-	-	0.021	0.021	0.021	0.021	0.021
Antimony	0.0001	0.0001	0.00013	0.00015	0.00015	0.00024	0.00025	0.0003	0.00036	0.00036	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036
Arsenic	0.00019	0.00019	0.00021	0.00023	0.00023	0.00016	0.00017	0.0002	0.00023	0.00023	-	-	-	0.00044	0.00044	0.00044	0.00044	0.00044
Barium	0.023	0.023	0.024	0.025	0.025	0.023	0.025	0.033	0.036	0.037	-	-	-	0.079	0.079	0.079	0.079	0.079
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	0.046	0.046	0.049	0.052	0.052	0.052	0.052	0.061	0.062	0.062	-	-	-	0.057	0.057	0.057	0.057	0.057
Cadmium	0.00004	0.00004	0.000047	0.000054	0.000055	0.00013	0.00014	0.00019	0.00024	0.00025	-	-	-	0.000083	0.000083	0.000083	0.000083	0.000083
Calcium	200	200	230	250	250	170	180	240	270	270	-	-	-	190	190	190	190	190
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.00023	0.00026	0.00093	0.0017	0.0018	-	-	-	0.0016	0.0016	0.0016	0.0016	0.0016
Copper	0.013	0.013	0.016	0.019	0.019	0.096	0.096	0.1	0.12	0.12	-	-	-	0.013	0.013	0.013	0.013	0.013
Iron	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.063	0.071	-	-	-	0.052	0.052	0.052	0.052	0.052
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000099	0.0001	0.0001	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	0.0016	0.0016	0.0019	0.0021	0.0021	0.0026	0.0027	0.003	0.0035	0.0036	-	-	-	0.001	0.001	0.001	0.001	0.001
Magnesium	40	40	45	50	50	31	33	46	49	50	-	-	-	46	46	46	46	46
Manganese	0.0045	0.0047	0.007	0.0092	0.0095	0.072	0.074	0.15	0.25	0.27	-	-	-	1.2	1.2	1.2	1.2	1.2
Molybdenum	0.093	0.095	0.12	0.14	0.14	0.16	0.16	0.22	0.23	0.23	-	-	-	0.051	0.051	0.051	0.051	0.051
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.0015	0.0015	0.0017	0.0021	0.0022	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	1.9	1.9	2.1	2.3	2.3	1.5	1.5	1.8	1.9	1.9	-	-	-	3.2	3.2	3.2	3.2	3.2
Selenium	0.031	0.032	0.036	0.041	0.042	0.073	0.076	0.088	0.11	0.11	-	-	-	0.046	0.046	0.046	0.046	0.046
Silicon	4.5	4.5	4.7	4.9	5	3.2	3.4	4	4.5	4.5	-	-	-	5.5	5.5	5.5	5.5	5.5
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002
Sodium	13	13	14	15	15	12	13	17	18	18	-	-	-	20	20	20	20	20
Strontium	2.7	2.7	2.8	2.8	2.8	2.8	2.8	3.4	3.7	3.8	-	-	-	1.3	1.3	1.3	1.3	1.3
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	NEZ Dump Seep 9					NEZ Seep 1					NEZ Seep 2a	PAG Ditch	PAG Dump Seep 1	PAG Dump Seep 10				
Uranium	0.0011	0.0011	0.0011	0.0011	0.0011	0.00091	0.00093	0.0011	0.0012	0.0012	-	-	-	0.0014	0.0014	0.0014	0.0014	0.0014
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	-	-	-	0.00055	0.00055	0.00055	0.00055	0.00055
Zinc	0.003	0.003	0.0035	0.0039	0.0039	0.0079	0.008	0.0086	0.011	0.011	-	-	-	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	PAG Dump Seep 12	PAG Dump Seep 13	PAG Dump Seep 14					PAG Dump Seep 15					PAG Dump Seep 16	PAG Dump Seep 17					PAG Dump Seep 18				
Parameter			Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum		Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	-	-	2					3					-	2					1				
pH	-	-	7.7	7.7	7.7	7.7	7.7	7.4	7.5	7.8	8	8.1	-	7.6	7.6	7.8	8	8	7.2	7.2	7.2	7.2	7.2
Conductivity	-	-	1400	1400	1600	1800	1800	1900	1900	2000	2100	2100	-	1400	1400	1500	1700	1700	810	810	810	810	810
Temprature	-	-	3.3	3.4	3.8	4.3	4.3	3.3	3.5	6.1	6.3	6.3	-	3.3	3.3	3.6	3.9	3.9	0.8	0.8	0.8	0.8	0.8
Turbidity	-	-	0.1	0.11	0.17	0.22	0.23	0.45	0.46	0.51	2.3	2.5	-	0.67	0.73	1.3	1.8	1.9	1.4	1.4	1.4	1.4	1.4
Physical Tests	-	-	2					3					-	2					1				
Conductivity	-	-	1400	1400	1600	1800	1800	1800	1900	2000	2000	2100	-	1400	1400	1500	1600	1600	790	790	790	790	790
Hardness (as CaCO3)	-	-	780	800	940	1100	1100	1100	1100	1200	1200	1200	-	730	740	830	910	920	400	400	400	400	400
pH	-	-	7.9	7.9	7.9	8	8	8	8.1	8.1	8.1	8.2	-	7.8	7.8	7.8	7.8	7.8	7	7	7	7	7
Total Suspended Solids	-	-	1	1.7	8.5	15	16	1.8	1.8	2.1	5.2	5.5	-	1	1.8	8.9	16	17	43	43	43	43	43
Total Dissolved Solids	-	-	1200	1200	1400	1600	1700	1600	1700	1800	1900	2000	-	1200	1200	1300	1400	1400	600	600	600	600	600
Turbidity	-	-	0.19	0.2	0.26	0.32	0.33	0.18	0.22	0.54	1.2	1.3	-	0.36	0.55	2.2	3.9	4.1	19	19	19	19	19
Anions and Nutrients	-	-	2					3					-	2					1				
Alkalinity, Total (as CaCO3)	-	-	120	120	130	130	130	84	87	110	130	130	-	61	63	80	97	99	160	160	160	160	160
Ammonia, Total (as N)	-	-	0.005	0.0054	0.0089	0.012	0.013	0.005	0.0054	0.0094	0.015	0.015	-	0.005	0.0052	0.0065	0.0079	0.008	0.099	0.099	0.099	0.099	0.099
Chloride	-	-	2.6	2.7	3.8	4.9	5	5	5	5	9.5	10	-	5	5	5	5	5	2.5	2.5	2.5	2.5	2.5
Fluoride	-	-	0.12	0.13	0.16	0.2	0.2	0.25	0.25	0.28	0.39	0.4	-	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Nitrate (as N)	-	-	10	10	13	15	15	7.3	7.6	11	14	14	-	16	16	16	17	17	0.048	0.048	0.048	0.048	0.048
Nitrite (as N)	-	-	0.01	0.011	0.024	0.036	0.037	0.01	0.01	0.01	0.027	0.028	-	0.01	0.01	0.012	0.013	0.014	0.0058	0.0058	0.0058	0.0058	0.0058
Total Nitrogen	-	-	12	12	16	20	20	9.2	9.3	10	14	14	-	17	17	18	18	18	1.4	1.4	1.4	1.4	1.4
Orthophosphate-Dissolved (as P)	-	-	0.0092	0.01	0.017	0.024	0.025	0.0034	0.0034	0.0037	0.005	0.0051	-	0.012	0.012	0.014	0.016	0.016	0.001	0.001	0.001	0.001	0.001
Phosphorus - Total Dissolved	-	-	0.02	0.02	0.022	0.024	0.024	0.0053	0.0065	0.018	0.018	0.018	-	0.016	0.016	0.018	0.019	0.02	0.033	0.033	0.033	0.033	0.033
Phosphorus - Total	-	-	0.025	0.025	0.025	0.025	0.025	0.02	0.02	0.021	0.022	0.022	-	0.022	0.023	0.034	0.045	0.047	0.27	0.27	0.27	0.27	0.27
Sulfate	-	-	680	690	800	910	930	1000	1000	1100	1200	1200	-	690	690	740	790	800	260	260	260	260	260
Organic Carbon	-	-	2					3					-	2					1				
Dissolved Organic Carbon	-	-	4.7	4.8	5.5	6.2	6.2	4.3	4.3	4.5	5.1	5.1	-	5.2	5.2	5.4	5.5	5.6	6.1	6.1	6.1	6.1	6.1
Total Metals	-	-	2					3					-	2					1				
Aluminum	-	-	0.035	0.035	0.039	0.042	0.042	0.029	0.03	0.04	0.064	0.067	-	0.033	0.064	0.34	0.62	0.65	0.65	0.65	0.65	0.65	0.65
Antimony	-	-	0.00023	0.00023	0.00024	0.00024	0.00024	0.00034	0.00035	0.00043	0.00044	0.00044	-	0.0002	0.0002	0.00022	0.00023	0.00023	0.0002	0.0002	0.0002	0.0002	0.0002
Arsenic	-	-	0.00051	0.00051	0.00052	0.00052	0.00052	0.00041	0.00042	0.00046	0.00052	0.00053	-	0.00051	0.00052	0.00058	0.00063	0.00064	0.0021	0.0021	0.0021	0.0021	0.0021
Barium	-	-	0.058	0.058	0.064	0.07	0.071	0.033	0.033	0.034	0.035	0.035	-	0.066	0.066	0.069	0.072	0.072	0.16	0.16	0.16	0.16	0.16
Beryllium	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000095	0.0001	-	0.00005	0.000053	0.000075	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron	-	-	0.05	0.051	0.058	0.065	0.066	0.11	0.11	0.14	0.14	0.14	-	0.058	0.06	0.074	0.087	0.089	0.024	0.024	0.024	0.024	0.024
Cadmium	-	-	0.00006	0.000061	0.000068	0.000074	0.000075	0.000055	0.000057	0.000075	0.000075	0.000075	-	0.00003	0.000032	0.00005	0.000068	0.00007	0.000085	0.000085	0.000085	0.000085	0.000085
Calcium	-	-	250	260	300	340	340	360	360	360	360	360	-	240	250	260	280	280	120	120	120	120	120
Chromium	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.00088	0.00088	0.00088	0.00088	0.00088
Cobalt	-	-	0.0001	0.00011	0.00018	0.00024	0.00025	0.0001	0.0001	0.00012	0.00019	0.0002	-	0.0002	0.00021	0.00029	0.00037	0.00038	0.0067	0.0067	0.0067	0.0067	0.0067
Copper	-	-	0.011	0.011	0.012	0.014	0.014	0.0073	0.0073	0.0074	0.0082	0.0082	-	0.014	0.015	0.018	0.021	0.022	0.026	0.026	0.026	0.026	0.026
Iron	-	-	0.03	0.032	0.045	0.059	0.06	0.039	0.041	0.054	0.067	0.068	-	0.03	0.051	0.24	0.42	0.44	7.6	7.6	7.6	7.6	7.6
Lead	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000095	0.0001	-	0.0001	0.0001	0.00012	0.00014	0.00015	0.00041	0.00041	0.00041	0.00041	0.00041
Lithium	-	-	0.0016	0.0016	0.0019	0.0021	0.0021	0.0048	0.0048	0.0052	0.0064	0.0065	-	0.002	0.002	0.0022	0.0023	0.0023	0.002	0.002	0.002	0.002	0.002
Magnesium	-	-	45	45	51	56	57	62	62	63	64	64	-	47	47	50	53	54	23	23	23	23	23
Manganese	-	-	0.021	0.025	0.057	0.089	0.093	0.035	0.036	0.05	0.053	0.054	-	0.0033	0.005	0.02	0.035	0.037	5.7	5.7	5.7	5.7	5.7
Molybdenum	-	-	0.17	0.17	0.17	0.17	0.17	0.27	0.28	0.3	0.31	0.32	-	0.07	0.071	0.073	0.075	0.075	0.0017	0.0017	0.0017	0.0017	0.0017
Nickel	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00095	0.001	-	0.00096	0.00096	0.00098	0.001	0.001	0.0016	0.0016	0.0016	0.0016	0.0016
Potassium	-	-	2	2.1	2.3	2.6	2.6	2.4	2.4	2.5	2.5	2.5	-	2.2	2.2	2.3	2.4	2.5	2.9	2.9	2.9	2.9	2.9
Selenium	-	-	0.056	0.057	0.065	0.074	0.075	0.081	0.082	0.091	0.099	0.1	-	0.08	0.08	0.081	0.082	0.082	0.00068	0.00068	0.00068	0.00068	0.00068
Silicon	-	-	7.5	7.6	7.8	8.1	8.2	7	7.1	7.5	7.6	7.6	-	9.4	9.4	9.4	9.4	9.4	9.6	9.6	9.6	9.6	9.6
Silver	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000019	0.00002	-	0.00001	0.000011	0.000015	0.00002	0.00002	0.000037	0.000037	0.000037	0.000037	0.000037
Sodium	-	-	17	17	20	22	22	31	31	32	33	34	-	13	13	14	15	15	7.6	7.6	7.6	7.6	7.6
Strontium	-	-	1.1	1.1	1.2	1.4	1.4	1.3	1.3	1.4	1.4	1.4	-	0.95	0.96	1	1.1	1.1	0.43	0.43	0.43	0.43	0.43
Thallium	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000019	0.00002	-	0.00001	0.000011	0.000015	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Tin	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00019	0.0002	-	0.0001	0.00011	0.00015	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Titanium	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	0.011	0.024	0.037	0.039	0.022	0.022	0.022	0.022	0.022
Uranium	-	-	0.0012	0.0013	0.0015	0.0018	0.0018	0.001	0.0011	0.0019	0.0021	0.0022	-	0.00041	0.00044	0.0007	0.00095	0.00098	0.000095	0.000095	0.000095	0.000095	0.000095
Vanadium	-	-	0.00092	0.00092	0.00092	0.00092	0.00092	0.00059	0.0006	0.00064	0.00096	0.001	-	0.001	0.001	0.0014	0.0018	0.0018	0.0034	0.0034	0.0034	0.0034	0.0034
Zinc	-	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0057	0.006	-	0.003	0.0032	0.0045	0.0059	0.006	0.011	0.011	0.011	0.011	0.011
Dissolved Metals	-	-	2					3					-	2					1				
Aluminum	-	-	0.006	0.006	0.0064	0.0067	0.0067	0.0033	0.0035	0.0051	0.0053	0.0053	-	0.0065	0.0075	0.016	0.025	0.026	0.0076	0.0076	0.0076	0.0076	0.0076
Antimony	-	-	0.00023	0.00023	0.00025	0.00027	0.00027	0.00033	0.00034	0.00041	0.00046	0.00046	-	0.0002	0.0002	0.00022	0.00024	0.00024	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	-	-	0.00041	0.00041	0.00044	0.00047	0.00047	0.00038	0.00038	0.00038	0.00042	0.00042	-	0.00041	0.00041	0.00045	0.00048	0.00048	0.00048	0.00048	0.00048	0.00048	0.00048
Barium	-	-	0.057	0.058	0.063	0.068	0.069	0.031	0.031	0.033	0.034	0.034	-	0.055	0.056	0.063	0.069	0.07	0.033	0.033	0.033	0.033	0.033
Beryllium	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	0.00005	0.000053	0.000075	0.000098	0.0001	0.00005	0.00005	0.00005	0.000095	0.0001	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	-	-	0.047	0.048	0.054	0.059	0.06	0.11	0.11	0.12	0.13	0.13	-	0.053	0.054	0.068	0.081	0.082	0.024	0.024	0.024	0.024	0.024
Cadmium	-	-	0.000055	0.000056	0.00006	0.000065	0.000065	0.000075	0.000075	0.000075	0.00008	0.00008	-	0.00003	0.000032	0.000048	0.000063	0.000065	0.0000065	0.0000065	0.0000065	0.0000065	0.0000065
Calcium	-	-	240	250	290	340	350	340	340	360	360	360	-	220	230	250	280	280	130	130	130	130	130
Chromium	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	0.0002	0.0002	0.00021	0.00022	0.00022	0.0001	0.0001	0.00014	0.00019	0.0002	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0029	0.0029	0.0029	0.0029	0.0029
Copper	-	-	0.0098	0.0098	0.01	0.011	0.011	0.006	0.0061	0.0068	0.0069	0.0069	-	0.012	0.012	0.013	0.014	0.014	0.00082	0.00082	0.00082	0.00082	0.00082
Iron	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	0.03	0.03	0.03	0.03	1.5	1.5	1.5	1.5	1.5
Lead	-	-	0.00005	0.000053	0.000075	0.000098	0.0001	0.00005	0.00005	0.00005	0.000095	0.0001	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	-	-	0.0017	0.0017	0.0019	0.002	0.002	0.0049	0.0049	0.0052	0.0058	0.0059	-	0.0019	0.0019	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001
Magnesium	-	-	43	44	51	58	59	57	57	62	62	62	-	43	44	48	53	53	22	22	22	22	22
Manganese	-	-	0.021	0.024	0.055	0.086	0.089	0.024	0.027	0.051	0.17	0.18	-	0.0026	0.0034	0.011	0.019	0.02	3.3	3.3	3.3	3.3	3.3
Molybdenum	-	-	0.14	0.14	0.16	0.17	0.17	0.26	0.26	0.27	0.3	0.3	-	0.067	0.068	0.074	0.08	0.081	0.0003	0.0003	0.0003	0.0003	0.0003
Nickel	-	-	0.0005	0.00053	0.00075	0.00098	0.001	0.0005	0.0005	0.0005	0.00095	0.001	-	0.0005	0.00051	0.00058	0.00064	0.00065	0.00052	0.00052	0.00052	0.00052	0.00052
Potassium	-	-	2.2	2.2	2.3	2.5	2.5	2.3	2.3	2.5	2.6	2.6	-	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6
Selenium	-	-	0.052	0.053	0.062	0.071	0.072	0.066	0.068	0.089	0.11	0.11	-	0.082	0.082	0.082	0.082	0.082	0.00019	0.00019	0.00019	0.00019	0.00019
Silicon	-	-	7.4	7.4	7.5	7.6	7.6	6.5	6.5	6.7	6.8	6.8	-	8.4	8.4	8.5	8.7	8.7	7.9	7.9	7.9	7.9	7.9
Silver	-	-	0.00001	0.000011	0.000015	0.00002	0.00002	0.00001	0.00001	0.00001	0.000019	0.00002	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	-	-	17	17	20	22	23	31	31	32	32	32	-	12	13	14	15	16	7.6	7.6	7.6	7.6	7.6
Strontium	-	-	0.97	0.99	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.5	-	0.94	0.94	0.98	1	1	0.4	0.4	0.4	0.4	0.4
Thallium	-	-	0.00001	0.000011	0.000015	0.00002	0.00002	0.00001	0.00001	0.00001	0.000019	0.00002	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	-	-	0.0001	0.00011	0.00015	0.0002	0.0002	0.0001	0.0001	0.0001	0.00019	0.0002	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	PAG Dump Seep 12	PAG Dump Seep 13	PAG Dump Seep 14					PAG Dump Seep 15					PAG Dump Seep 16	PAG Dump Seep 17					PAG Dump Seep 18				
Uranium	-	-	0.0012	0.0012	0.0015	0.0018	0.0018	0.001	0.0011	0.0019	0.002	0.0021	-	0.0004	0.00043	0.0007	0.00097	0.001	0.000062	0.000062	0.000062	0.000062	0.000062
Vanadium	-	-	0.00085	0.00086	0.00093	0.00099	0.001	0.0005	0.0005	0.0005	0.00095	0.001	-	0.00066	0.00067	0.00071	0.00076	0.00076	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc	-	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	PAG Dump Seep 19						PAG Dump Seep 2	PAG Dump Seep 20					PAG Dump Seep 22						PAG Dump Seep 3	PAG Dump Seep		
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum			Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum			Minimum	5th Percentile	Median
Field Parameters	2					-		2					1					-		1		
pH	6.9	6.9	7.3	7.7	7.8	-		7.9	7.9	8	8.1	8.1	8	8	8	8	8	-		7.3	7.3	7.3
Conductivity	1300	1300	1400	1400	1500	-		1500	1500	1700	1900	1900	1100	1100	1100	1100	1100	-		750	750	750
Temprature	2.8	2.9	3.3	3.8	3.8	-		1.3	1.5	3.5	5.4	5.6	0.8	0.8	0.8	0.8	0.8	-		3.5	3.5	3.5
Turbidity	1.1	1.1	1.5	1.8	1.8	-		0.05	0.08	0.35	0.61	0.64	9.4	9.4	9.4	9.4	9.4	-		4	4	4
Physical Tests	2					-		2					1					-		1		
Conductivity	1400	1400	1500	1600	1600	-		1900	1900	1900	2000	2000	1100	1100	1100	1100	1100	-		1300	1300	1300
Hardness (as CaCO3)	770	770	820	860	870	-		1100	1100	1100	1200	1200	530	530	530	530	530	-		740	740	740
pH	7.7	7.7	7.8	7.9	7.9	-		8	8	8	8	8	8	8	8	8	8	-		7.9	7.9	7.9
Total Suspended Solids	3.8	4.5	11	17	18	-		2.2	2.2	2.3	2.4	2.4	98	98	98	98	98	-		6	6	6
Total Dissolved Solids	1200	1200	1300	1400	1400	-		1700	1700	1700	1800	1800	830	830	830	830	830	-		1000	1000	1000
Turbidity	2.6	2.7	3.4	4.1	4.1	-		0.19	0.2	0.25	0.29	0.3	20	20	20	20	20	-		0.58	0.58	0.58
Anions and Nutrients	2					-		2					1					-		1		
Alkalinity, Total (as CaCO3)	100	110	120	130	130	-		110	110	120	130	130	140	140	140	140	140	-		77	77	77
Ammonia, Total (as N)	0.0052	0.028	0.24	0.45	0.47	-		0.005	0.0052	0.0067	0.0081	0.0083	0.013	0.013	0.013	0.013	0.013	-		0.005	0.005	0.005
Chloride	5	5.1	6.2	7.2	7.3	-		5	5	5	5	5	2.5	2.5	2.5	2.5	2.5	-		2.5	2.5	2.5
Fluoride	0.1	0.11	0.15	0.2	0.2	-		0.21	0.21	0.22	0.22	0.22	0.27	0.27	0.27	0.27	0.27	-		0.1	0.1	0.1
Nitrate (as N)	18	18	20	23	23	-		8.7	8.7	9.2	9.7	9.8	20	20	20	20	20	-		6.8	6.8	6.8
Nitrite (as N)	0.01	0.023	0.14	0.26	0.27	-		0.01	0.01	0.013	0.015	0.016	0.005	0.005	0.005	0.005	0.005	-		0.005	0.005	0.005
Total Nitrogen	20	20	22	24	25	-		9	9.1	9.9	11	11	24	24	24	24	24	-		7	7	7
Orthophosphate-Dissolved (as P)	0.0044	0.0047	0.007	0.0093	0.0096	-		0.0045	0.0051	0.01	0.016	0.016	0.024	0.024	0.024	0.024	0.024	-		0.001	0.001	0.001
Phosphorus - Total Dissolved	0.007	0.0073	0.01	0.014	0.014	-		0.016	0.016	0.018	0.021	0.021	0.03	0.03	0.03	0.03	0.03	-		0.0079	0.0079	0.0079
Phosphorus - Total	0.018	0.02	0.039	0.057	0.059	-		0.019	0.02	0.022	0.024	0.024	0.23	0.23	0.23	0.23	0.23	-		0.031	0.031	0.031
Sulfate	600	610	680	750	760	-		980	990	1100	1100	1100	360	360	360	360	360	-		640	640	640
Organic Carbon	2					-		2					1					-		1		
Dissolved Organic Carbon	4.8	5.1	7.7	10	11	-		4.6	4.6	4.7	4.8	4.8	4.4	4.4	4.4	4.4	4.4	-		3.6	3.6	3.6
Total Metals	2					-		2					1					-		1		
Aluminum	0.097	0.16	0.71	1.3	1.3	-		0.022	0.024	0.036	0.048	0.05	3.1	3.1	3.1	3.1	3.1	-		0.34	0.34	0.34
Antimony	0.00021	0.00021	0.00022	0.00023	0.00023	-		0.00038	0.00038	0.0004	0.00041	0.00041	0.00049	0.00049	0.00049	0.00049	0.00049	-		0.0002	0.0002	0.0002
Arsenic	0.00048	0.00052	0.0009	0.0013	0.0013	-		0.00043	0.00044	0.00049	0.00053	0.00054	0.0034	0.0034	0.0034	0.0034	0.0034	-		0.00054	0.00054	0.00054
Barium	0.081	0.084	0.11	0.14	0.15	-		0.029	0.029	0.033	0.037	0.037	0.086	0.086	0.086	0.086	0.086	-		0.028	0.028	0.028
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0001	0.00011	0.00015	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-		0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-		0.00005	0.00005	0.00005
Boron	0.082	0.082	0.083	0.083	0.083	-		0.1	0.11	0.12	0.13	0.14	0.061	0.061	0.061	0.061	0.061	-		0.047	0.047	0.047
Cadmium	0.000044	0.000047	0.000074	0.0001	0.0001	-		0.00005	0.000053	0.000083	0.00011	0.00012	0.00016	0.00016	0.00016	0.00016	0.00016	-		0.00024	0.00024	0.00024
Calcium	260	260	270	280	280	-		340	350	370	390	400	160	160	160	160	160	-		210	210	210
Chromium	0.0005	0.00053	0.00079	0.0011	0.0011	-		0.001	0.0016	0.0066	0.012	0.012	0.0033	0.0033	0.0033	0.0033	0.0033	-		0.0005	0.0005	0.0005
Cobalt	0.00012	0.00021	0.00099	0.0018	0.0019	-		0.0002	0.0002	0.0002	0.0002	0.0002	0.0026	0.0026	0.0026	0.0026	0.0026	-		0.00034	0.00034	0.00034
Copper	0.013	0.017	0.054	0.091	0.095	-		0.0076	0.0076	0.0077	0.0078	0.0078	0.074	0.074	0.074	0.074	0.074	-		0.018	0.018	0.018
Iron	0.12	0.17	0.67	1.2	1.2	-		0.06	0.062	0.081	0.1	0.1	3.7	3.7	3.7	3.7	3.7	-		0.32	0.32	0.32
Lead	0.00005	0.000068	0.00023	0.00039	0.00041	-		0.0001	0.0001	0.0001	0.0001	0.0001	0.003	0.003	0.003	0.003	0.003	-		0.00015	0.00015	0.00015
Lithium	0.002	0.002	0.0022	0.0024	0.0024	-		0.0054	0.0054	0.0056	0.0058	0.0058	0.0053	0.0053	0.0053	0.0053	0.0053	-		0.0018	0.0018	0.0018
Magnesium	51	51	51	51	52	-		57	57	62	66	66	32	32	32	32	32	-		34	34	34
Manganese	0.015	0.077	0.64	1.2	1.3	-		0.034	0.035	0.043	0.052	0.053	0.19	0.19	0.19	0.19	0.19	-		0.025	0.025	0.025
Molybdenum	0.022	0.024	0.039	0.054	0.056	-		0.28	0.28	0.28	0.28	0.28	0.17	0.17	0.17	0.17	0.17	-		0.17	0.17	0.17
Nickel	0.00058	0.00062	0.001	0.0014	0.0014	-		0.001	0.001	0.0011	0.0012	0.0012	0.0032	0.0032	0.0032	0.0032	0.0032	-		0.0005	0.0005	0.0005
Potassium	2.1	2.1	2.2	2.3	2.3	-		2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	-		1	1	1
Selenium	0.067	0.068	0.073	0.078	0.079	-		0.067	0.068	0.085	0.1	0.1	0.029	0.029	0.029	0.029	0.029	-		0.083	0.083	0.083
Silicon	9.5	9.5	9.8	10	10	-		7.1	7.1	7.4	7.7	7.7	13	13	13	13	13	-		5.3	5.3	5.3
Silver	0.00001	0.000015	0.000057	0.000098	0.0001	-		0.00002	0.00002	0.00002	0.00002	0.00002	0.000026	0.000026	0.000026	0.000026	0.000026	-		0.00001	0.00001	0.00001
Sodium	16	16	16	17	17	-		30	30	30	30	30	15	15	15	15	15	-		20	20	20
Strontium	1.1	1.1	1.1	1.2	1.2	-		1.2	1.2	1.3	1.4	1.4	0.64	0.64	0.64	0.64	0.64	-		0.74	0.74	0.74
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-		0.00002	0.00002	0.00002	0.00002	0.00002	0.000018	0.000018	0.000018	0.000018	0.000018	-		0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0001	0.0001	0.0001
Titanium	0.01	0.012	0.034	0.055	0.057	-		0.01	0.011	0.015	0.02	0.02	0.13	0.13	0.13	0.13	0.13	-		0.55	0.55	0.55
Uranium	0.0009	0.00091	0.00093	0.00095	0.00095	-		0.0017	0.0017	0.0017	0.0017	0.0017	0.0014	0.0014	0.0014	0.0014	0.0014	-		0.0004	0.0004	0.0004
Vanadium	0.00095	0.0011	0.0025	0.0039	0.0041	-		0.001	0.001	0.001	0.001	0.001	0.012	0.012	0.012	0.012	0.012	-		0.0012	0.0012	0.0012
Zinc	0.003	0.0031	0.0044	0.0057	0.0058	-		0.006	0.006	0.006	0.006	0.006	0.022	0.022	0.022	0.022	0.022	-		0.009	0.009	0.009
Dissolved Metals	2					-		2					1					-		1		
Aluminum	0.0063	0.0069	0.012	0.018	0.018	-		0.0062	0.0072	0.016	0.025	0.026	0.003	0.003	0.003	0.003	0.003	-		0.014	0.014	0.014
Antimony	0.0002	0.0002	0.00022	0.00023	0.00023	-		0.0004	0.0004	0.00041	0.00042	0.00042	0.00042	0.00042	0.00042	0.00042	0.00042	-		0.00019	0.00019	0.00019
Arsenic	0.00037	0.00038	0.00049	0.0006	0.00061	-		0.00037	0.00037	0.00039	0.00041	0.00041	0.0013	0.0013	0.0013	0.0013	0.0013	-		0.00034	0.00034	0.00034
Barium	0.073	0.075	0.093	0.11	0.11	-		0.029	0.029	0.032	0.035	0.036	0.049	0.049	0.049	0.049	0.049	-		0.021	0.021	0.021
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0001	0.0001	0.0001
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-		0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-		0.00005	0.00005	0.00005
Boron	0.075	0.075	0.075	0.075	0.075	-		0.095	0.096	0.11	0.12	0.12	0.055	0.055	0.055	0.055	0.055	-		0.05	0.05	0.05
Cadmium	0.000035	0.000038	0.000063	0.000088	0.000091	-		0.00004	0.000042	0.000058	0.000073	0.000075	0.000065	0.000065	0.000065	0.000065	0.000065	-		0.00023	0.00023	0.00023
Calcium	230	230	250	270	270	-		340	340	350	360	370	160	160	160	160	160	-		230	230	230
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-		0.0005	0.0005	0.0005
Cobalt	0.0001	0.00015	0.00065	0.0011	0.0012	-		0.0002	0.0002	0.0002	0.0002	0.0002	0.00013	0.00013	0.00013	0.00013	0.00013	-		0.0001	0.0001	0.0001
Copper	0.01	0.012	0.03	0.048	0.05	-		0.006	0.0061	0.0066	0.0072	0.0072	0.0094	0.0094	0.0094	0.0094	0.0094	-		0.006	0.006	0.006
Iron	0.03	0.034	0.065	0.097	0.1	-		0.03	0.03	0.034	0.038	0.038	0.03	0.03	0.03	0.03	0.03	-		0.03	0.03	0.03
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-		0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-		0.00005	0.00005	0.00005
Lithium	0.0011	0.0011	0.0015	0.0018	0.0018	-		0.0053	0.0053	0.0054	0.0054	0.0054	0.0022	0.0022	0.0022	0.0022	0.0022	-		0.0017	0.0017	0.0017
Magnesium	47	47	47	48	48	-		56	56	58	61	61	30	30	30	30	30	-		40	40	40
Manganese	0.01	0.067	0.58	1.1	1.1	-		0.034	0.035	0.04	0.045	0.046	0.013	0.013	0.013	0.013	0.013	-		0.0079	0.0079	0.0079
Molybdenum	0.024	0.025	0.037	0.049	0.05	-		0.25	0.25	0.26	0.27	0.28	0.16	0.16	0.16	0.16	0.16	-		0.21	0.21	0.21
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-		0.001	0.001	0.001	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	-		0.0005	0.0005	0.0005
Potassium	2	2	2.1	2.3	2.3	-		2.4	2.4	2.4	2.4	2.4	1.8	1.8	1.8	1.8	1.8	-		1.2	1.2	1.2
Selenium	0.069	0.069	0.071	0.072	0.073	-		0.065	0.066	0.082	0.097	0.099	0.03	0.03	0.03	0.03	0.03	-		0.083	0.083	0.083
Silicon	8.1	8.1	8.2	8.3	8.3	-		7	7	7.2	7.4	7.5	6.3	6.3	6.3	6.3	6.3	-		4.4	4.4	4.4
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-		0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	-		0.00001	0.00001	0.00001
Sodium	15	15	16	16	16	-		29	29	30	30	31	14	14	14	14	14	-		24	24	24
Strontium	1	1	1.1	1.1	1.1	-		1.2	1.2	1.3	1.3	1.3	0.62	0.62	0.62	0.62	0.62	-		0.77	0.77	0.77
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-		0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	-		0.00001	0.00001	0.00001
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	-		0.0001	0.0001	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	-		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-		0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	PAG Dump Seep 19					PAG Dump Seep 2	PAG Dump Seep 20					PAG Dump Seep 22					PAG Dump Seep 3	PAG Dump Seep		
Uranium	0.0009	0.0009	0.0009	0.00091	0.00091	-	0.0017	0.0017	0.0017	0.0017	0.0017	0.0013	0.0013	0.0013	0.0013	0.0013	-	0.00055	0.00055	0.00055
Vanadium	0.00059	0.0006	0.0007	0.00079	0.0008	-	0.001	0.001	0.001	0.001	0.001	0.0015	0.0015	0.0015	0.0015	0.0015	-	0.0005	0.0005	0.0005
Zinc	0.003	0.003	0.003	0.003	0.003	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	-	0.0064	0.0064	0.0064

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	4		PAG Dump Seep 5					PAG Dump Seep 7
Parameter	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	
Field Parameters			2					-
pH	7.3	7.3	7.5	7.5	7.8	8	8.1	-
Conductivity	750	750	220	310	1100	1900	2000	-
Temprature	3.5	3.5	1.1	1.1	1.6	2	2	-
Turbidity	4	4	0.14	150	1500	2800	3000	-
Physical Tests			2					-
Conductivity	1300	1300	1900	1900	2000	2200	2200	-
Hardness (as CaCO3)	740	740	1000	1000	1100	1200	1200	-
pH	7.9	7.9	7.7	7.7	7.9	8	8	-
Total Suspended Solids	6	6	1.9	77	750	1400	1500	-
Total Dissolved Solids	1000	1000	1800	1800	1900	1900	1900	-
Turbidity	0.58	0.58	0.4	180	1800	3500	3600	-
Anions and Nutrients			2					-
Alkalinity, Total (as CaCO3)	77	77	110	110	120	130	130	-
Ammonia, Total (as N)	0.005	0.005	0.013	0.015	0.032	0.048	0.05	-
Chloride	2.5	2.5	5	5.3	7.5	9.8	10	-
Fluoride	0.1	0.1	0.22	0.23	0.31	0.39	0.4	-
Nitrate (as N)	6.8	6.8	9.5	9.6	11	11	12	-
Nitrite (as N)	0.005	0.005	0.02	0.025	0.073	0.12	0.13	-
Total Nitrogen	7	7	11	11	11	12	12	-
Orthophosphate-Dissolved (as P)	0.001	0.001	0.0012	0.0012	0.0015	0.0017	0.0017	-
Phosphorus - Total Dissolved	0.0079	0.0079	0.0027	0.0027	0.0032	0.0036	0.0036	-
Phosphorus - Total	0.031	0.031	0.0058	0.11	1	2	2.1	-
Sulfate	640	640	1000	1000	1100	1100	1100	-
Organic Carbon			2					-
Dissolved Organic Carbon	3.6	3.6	3.6	3.6	4.2	4.7	4.8	-
Total Metals			2					-
Aluminum	0.34	0.34	0.04	3.3	32	62	65	-
Antimony	0.0002	0.0002	0.0002	0.00022	0.0004	0.00058	0.0006	-
Arsenic	0.00054	0.00054	0.00025	0.0018	0.016	0.03	0.032	-
Barium	0.028	0.028	0.027	0.1	0.79	1.5	1.6	-
Berylium	0.0001	0.0001	0.0001	0.00019	0.001	0.0019	0.002	-
Bismuth	0.00005	0.00005	0.0001	0.00011	0.00018	0.00024	0.00025	-
Boron	0.047	0.047	0.083	0.085	0.1	0.12	0.12	-
Cadmium	0.00024	0.00024	0.00023	0.00026	0.00053	0.00079	0.00082	-
Calcium	210	210	400	400	410	410	410	-
Chromium	0.0005	0.0005	0.0005	0.0035	0.03	0.057	0.06	-
Cobalt	0.00034	0.00034	0.002	0.0045	0.028	0.051	0.054	-
Copper	0.018	0.018	0.0095	0.13	1.2	2.3	2.4	-
Iron	0.32	0.32	0.054	3.4	34	65	68	-
Lead	0.00015	0.00015	0.0001	0.0013	0.013	0.024	0.025	-
Lithium	0.0018	0.0018	0.005	0.0083	0.038	0.068	0.071	-
Magnesium	34	34	64	66	85	100	110	-
Manganese	0.025	0.025	0.65	0.79	2	3.2	3.3	-
Molybdenum	0.17	0.17	0.34	0.35	0.46	0.58	0.59	-
Nickel	0.0005	0.0005	0.001	0.0056	0.047	0.088	0.092	-
Potassium	1	1	3.4	3.6	5.9	8.2	8.5	-
Selenium	0.083	0.083	0.043	0.043	0.048	0.053	0.054	-
Silicon	5.3	5.3	7	11	51	90	95	-
Silver	0.00001	0.00001	0.00002	0.000072	0.00054	0.001	0.0011	-
Sodium	20	20	45	45	46	46	46	-
Strontium	0.74	0.74	1.3	1.3	1.5	1.7	1.8	-
Thallium	0.00001	0.00001	0.00002	0.000023	0.000049	0.000075	0.000078	-
Tin	0.0001	0.0001	0.0002	0.00024	0.00062	0.001	0.001	-
Titanium	0.55	0.55	0.01	0.17	1.6	3.1	3.3	-
Uranium	0.0004	0.0004	0.0018	0.0019	0.0027	0.0035	0.0035	-
Vanadium	0.0012	0.0012	0.001	0.011	0.098	0.19	0.2	-
Zinc	0.009	0.009	0.006	0.02	0.14	0.27	0.28	-
Dissolved Metals			2					-
Aluminum	0.014	0.014	0.006	0.0092	0.038	0.067	0.07	-
Antimony	0.00019	0.00019	0.0002	0.00021	0.00029	0.00037	0.00038	-
Arsenic	0.00034	0.00034	0.0002	0.00022	0.00038	0.00054	0.00056	-
Barium	0.021	0.021	0.026	0.028	0.045	0.061	0.063	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-
Bismuth	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	-
Boron	0.05	0.05	0.072	0.072	0.074	0.076	0.076	-
Cadmium	0.00023	0.00023	0.0002	0.0002	0.00021	0.00022	0.00023	-
Calcium	230	230	330	330	360	400	400	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-
Cobalt	0.0001	0.0001	0.0018	0.0018	0.0019	0.0019	0.0019	-
Copper	0.006	0.006	0.0081	0.0082	0.0089	0.0096	0.0097	-
Iron	0.03	0.03	0.03	0.032	0.051	0.069	0.071	-
Lead	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	-
Lithium	0.0017	0.0017	0.0047	0.0049	0.0065	0.008	0.0082	-
Magnesium	40	40	52	53	56	60	60	-
Manganese	0.0079	0.0079	0.64	0.65	0.71	0.77	0.78	-
Molybdenum	0.21	0.21	0.3	0.31	0.41	0.52	0.53	-
Nickel	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	-
Potassium	1.2	1.2	2.9	2.9	3.1	3.2	3.3	-
Selenium	0.083	0.083	0.04	0.041	0.045	0.05	0.051	-
Silicon	4.4	4.4	5.8	5.8	6.1	6.4	6.4	-
Silver	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	-
Sodium	24	24	41	41	43	44	44	-
Strontium	0.77	0.77	1.2	1.2	1.2	1.3	1.3	-
Thallium	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	-
Tin	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	-
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	4		PAG Dump Seep 5					PAG Dump Seep 7
Uranium	0.00055	0.00055	0.0017	0.0017	0.002	0.0022	0.0022	-
Vanadium	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	-
Zinc	0.0064	0.0064	0.003	0.0032	0.0046	0.0059	0.0061	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	PAG Dump Seep 8					PAG Dump Seep 9					SERDS Ditch					SERDS Seep 1	SERDS Seep 10	SERDS Seep 11					SERDS Seep 12	
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum			Minimum	5th Percentile	Median	95th Percentile	Maximum		Minimum
Field Parameters	2					2					11					-	-	5					-	5
pH	7.5	7.5	7.8	8.1	8.1	7.4	7.4	7.8	8.1	8.2	7.9	7.9	8	8.4	8.7	-	-	7.6	7.4	7.4	7.4	7.4	-	7.6
Conductivity	1800	1800	1900	1900	1900	1600	1600	1600	1600	1700	550	610	1100	1300	1300	-	-	1500	1900	1900	1900	1900	-	1500
Temprature	0.1	0.3	2.1	3.9	4.1	0.1	0.12	0.25	0.39	0.4	0.073	0.16	0.7	15	15	-	-	2.2	2.9	2.9	2.9	2.9	-	2.2
Turbidity	0.19	0.28	1.1	2	2.1	0.24	0.24	0.26	0.27	0.27	0.21	0.42	1.9	4.8	5.1	-	-	0.05	15	15	15	15	-	0.05
Physical Tests	2					2					10					-	-	5					-	5
Conductivity	1800	1800	1800	1800	1800	1600	1600	1600	1600	1600	540	730	1100	1300	1300	-	-	1500	1900	1900	1900	1900	-	1500
Hardness (as CaCO3)	1000	1000	1000	1000	1000	890	890	910	930	930	270	340	590	670	700	-	-	820	1100	1100	1100	1100	-	820
pH	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.9	8	8	8.1	8.1	8.1	8.3	8.3	-	-	8.1	7.9	7.9	7.9	7.9	-	8.1
Total Suspended Solids	3.9	5.6	21	37	39	3.4	3.6	5.8	8	8.2	1	1	2	6.6	7.5	-	-	1	9.4	9.4	9.4	9.4	-	1
Total Dissolved Solids	1500	1500	1600	1600	1600	1400	1400	1400	1400	1400	420	570	910	1000	1000	-	-	1300	1600	1600	1600	1600	-	1300
Turbidity	0.98	1.5	5.9	10	11	0.6	1.1	5.3	9.5	10	0.45	0.51	0.94	4.8	5.6	-	-	0.1	4.1	4.1	4.1	4.1	-	0.1
Anions and Nutrients	2					2					10					-	-	5					-	5
Alkalinity, Total (as CaCO3)	130	130	140	150	150	140	140	190	230	230	72	74	120	130	130	-	-	120	95	95	95	95	-	120
Ammonia, Total (as N)	0.088	0.088	0.094	0.1	0.1	0.025	0.027	0.044	0.061	0.063	0.005	0.0051	0.0067	0.47	0.84	-	-	0.005	0.0066	0.0066	0.0066	0.0066	-	0.005
Chloride	5	5	5	5	5	4.7	4.7	4.9	5	5	1.3	1.8	3.2	5.6	6.1	-	-	2.6	5	5	5	5	-	2.6
Fluoride	0.2	0.2	0.2	0.2	0.2	0.1	0.11	0.15	0.2	0.2	0.13	0.14	0.18	0.38	0.39	-	-	0.23	0.37	0.37	0.37	0.37	-	0.23
Nitrate (as N)	6.6	6.7	7.6	8.4	8.5	10	10	11	12	13	3	3.9	7.9	15	19	-	-	5.4	1	1	1	1	-	5.4
Nitrite (as N)	0.071	0.075	0.12	0.15	0.16	0.014	0.015	0.02	0.026	0.027	0.005	0.005	0.005	0.24	0.43	-	-	0.005	0.016	0.016	0.016	0.016	-	0.005
Total Nitrogen	7	7.1	8.3	9.5	9.7	11	11	12	13	13	3.4	3.9	8.2	14	18	-	-	5.4	1.4	1.4	1.4	1.4	-	5.4
Orthophosphate-Dissolved (as P)	0.0042	0.0046	0.0086	0.012	0.013	0.0016	0.0019	0.005	0.0081	0.0084	0.001	0.001	0.001	0.0011	0.0012	-	-	0.0065	0.0048	0.0048	0.0048	0.0048	-	0.0065
Phosphorus - Total Dissolved	0.017	0.017	0.018	0.018	0.019	0.012	0.012	0.016	0.02	0.02	0.0026	0.0029	0.0039	0.006	0.0062	-	-	0.011	0.016	0.016	0.016	0.016	-	0.011
Phosphorus - Total	0.03	0.032	0.055	0.077	0.079	0.017	0.018	0.024	0.03	0.031	0.0044	0.0047	0.0078	0.02	0.024	-	-	0.011	0.034	0.034	0.034	0.034	-	0.011
Sulfate	900	900	940	980	980	690	700	740	790	790	190	290	500	570	580	-	-	720	1100	1100	1100	1100	-	720
Organic Carbon	2					2					10					-	-	5					-	5
Dissolved Organic Carbon	6.8	6.8	7.2	7.6	7.7	12	12	13	15	15	2.4	2.5	4.1	7.6	9	-	-	3.6	10	10	10	10	-	3.6
Total Metals	2					2					10					-	-	5					-	5
Aluminum	0.063	0.083	0.26	0.45	0.47	0.04	0.048	0.12	0.2	0.21	0.018	0.018	0.064	0.36	0.49	-	-	0.007	0.66	0.66	0.66	0.66	-	0.007
Antimony	0.00024	0.00024	0.00028	0.00032	0.00032	0.00026	0.00029	0.00055	0.0008	0.00083	0.00024	0.0003	0.00047	0.0018	0.0023	-	-	0.00022	0.00062	0.00062	0.00062	0.00062	-	0.00022
Arsenic	0.00065	0.00066	0.00078	0.0009	0.00091	0.00064	0.00065	0.00077	0.00089	0.0009	0.00061	0.00062	0.00076	0.0022	0.003	-	-	0.0005	0.00097	0.00097	0.00097	0.00097	-	0.0005
Barium	0.053	0.053	0.059	0.064	0.064	0.092	0.093	0.11	0.12	0.12	0.031	0.036	0.046	0.055	0.058	-	-	0.035	0.1	0.1	0.1	0.1	-	0.035
Beryllium	0.0001	0.00011	0.00015	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001
Bismuth	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00025	0.00025	0.00025	0.00025	-	0.00005
Boron	0.12	0.12	0.12	0.13	0.13	0.086	0.087	0.094	0.1	0.1	0.047	0.048	0.072	0.21	0.27	-	-	0.071	0.11	0.11	0.11	0.11	-	0.071
Cadmium	0.000085	0.000085	0.000085	0.000085	0.000085	0.000092	0.000093	0.00011	0.00012	0.00012	0.000035	0.000035	0.000043	0.000093	0.0001	-	-	0.00005	0.00024	0.00024	0.00024	0.00024	-	0.00005
Calcium	310	310	330	340	350	300	300	300	300	300	81	110	180	210	220	-	-	260	340	340	340	340	-	260
Chromium	0.00061	0.00063	0.00081	0.00098	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00055	0.00057	-	-	0.0005	0.001	0.001	0.001	0.001	-	0.0005
Cobalt	0.0017	0.0017	0.0017	0.0018	0.0018	0.00069	0.0007	0.00079	0.00088	0.00089	0.0001	0.0001	0.00016	0.00041	0.00047	-	-	0.00016	0.0026	0.0026	0.0026	0.0026	-	0.00016
Copper	0.0084	0.0089	0.014	0.018	0.019	0.036	0.037	0.043	0.049	0.049	0.009	0.0094	0.016	0.032	0.037	-	-	0.0091	0.017	0.017	0.017	0.017	-	0.0091
Iron	0.18	0.22	0.58	0.94	0.98	0.19	0.2	0.27	0.35	0.36	0.03	0.03	0.072	0.36	0.45	-	-	0.03	0.94	0.94	0.94	0.94	-	0.03
Lead	0.0001	0.00011	0.00019	0.00028	0.00029	0.00005	0.000052	0.000069	0.000085	0.000087	0.00005	0.00005	0.00005	0.00012	0.00014	-	-	0.00005	0.00025	0.00025	0.00025	0.00025	-	0.00005
Lithium	0.0026	0.0026	0.0029	0.0032	0.0032	0.0011	0.0011	0.0014	0.0016	0.0016	0.0023	0.0023	0.0038	0.0074	0.0087	-	-	0.0036	0.009	0.009	0.009	0.009	-	0.0036
Magnesium	55	55	58	61	61	57	57	58	59	59	15	22	39	45	46	-	-	48	67	67	67	67	-	48
Manganese	1.2	1.2	1.4	1.5	1.5	0.93	0.95	1.1	1.3	1.3	0.0078	0.0086	0.022	0.12	0.19	-	-	0.0093	1.7	1.7	1.7	1.7	-	0.0093
Molybdenum	0.18	0.18	0.22	0.26	0.27	0.06	0.064	0.097	0.13	0.13	0.052	0.054	0.071	0.17	0.18	-	-	0.12	0.45	0.45	0.45	0.45	-	0.12
Nickel	0.001	0.001	0.001	0.001	0.001	0.00072	0.00074	0.00092	0.0011	0.0011	0.0005	0.0005	0.0005	0.00074	0.00076	-	-	0.0005	0.0025	0.0025	0.0025	0.0025	-	0.0005
Potassium	2.9	2.9	2.9	2.9	2.9	3.3	3.3	3.4	3.5	3.5	1.3	1.5	2	3.1	3.6	-	-	1.6	3.1	3.1	3.1	3.1	-	1.6
Selenium	0.053	0.055	0.072	0.089	0.09	0.034	0.036	0.054	0.071	0.073	0.026	0.035	0.061	0.076	0.081	-	-	0.054	0.06	0.06	0.06	0.06	-	0.054
Silicon	6.7	6.8	7.3	7.9	7.9	8	8	8.7	9.3	9.4	6	6.3	8.4	9.1	9.2	-	-	6.8	5	5	5	5	-	6.8
Silver	0.00002	0.00002	0.00002	0.00002	0.00002	0.000019	0.000019	0.000019	0.000019	0.000019	0.00001	0.00001	0.00001	0.000013	0.000013	-	-	0.00001	0.00005	0.00005	0.00005	0.00005	-	0.00001
Sodium	28	28	29	29	29	19	19	19	19	19	9.2	11	16	34	39	-	-	17	24	24	24	24	-	17
Strontium	1.2	1.2	1.3	1.4	1.5	1.4	1.4	1.4	1.4	1.4	0.36	0.51	0.84	1.1	1.1	-	-	2.4	14	14	14	14	-	2.4
Thallium	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00005	0.00005	0.00005	0.00005	-	0.00001
Tin	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0005	0.0005	0.0005	0.0005	-	0.0001
Titanium	0.02	0.02	0.02	0.021	0.021	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.017	0.022	-	-	0.01	0.027	0.027	0.027	0.027	-	0.01
Uranium	0.0013	0.0013	0.0013	0.0014	0.0014	0.001	0.0011	0.0016	0.0022	0.0022	0.00079	0.00085	0.0016	0.0033	0.0038	-	-	0.0019	0.0012	0.0012	0.0012	0.0012	-	0.0019
Vanadium	0.001	0.0011	0.0017	0.0024	0.0025	0.00092	0.00095	0.0012	0.0015	0.0015	0.00069	0.00069	0.0012	0.0022	0.0022	-	-	0.00071	0.0027	0.0027	0.0027	0.0027	-	0.00071
Zinc	0.006	0.006	0.006	0.006	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0043	0.0045	-	-	0.003	0.015	0.015	0.015	0.015	-	0.003
Dissolved Metals	2					2					10					-	-	5					-	5
Aluminum	0.01	0.012	0.029	0.046	0.048	0.011	0.011	0.012	0.013	0.014	0.003	0.003	0.0042	0.024	0.038	-	-	0.003	0.025	0.025	0.025	0.025	-	0.003
Antimony	0.00024	0.00024	0.00028	0.00032	0.00032	0.0002	0.0002	0.00022	0.00024	0.00024	0.00024	0.00029	0.00042	0.0017	0.0023	-	-	0.0002	0.00056	0.00056	0.00056	0.00056	-	0.0002
Arsenic	0.00036	0.00037	0.00047	0.00056	0.00057	0.00061	0.00061	0.00065	0.00068	0.00068	0.00056	0.00056	0.00065	0.0021	0.0028	-	-	0.00037	0.00058	0.00058	0.00058	0.00058	-	0.00037
Barium	0.051	0.051	0.052	0.052	0.052	0.092	0.093	0.1	0.11	0.11	0.024	0.031	0.043	0.051	0.054	-	-	0.034	0.09	0.09	0.09	0.09	-	0.034
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	0.0001
Bismuth	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00025	0.00025	0.00025	0.00025	-	0.00005
Boron	0.11	0.11	0.11	0.12	0.12	0.07	0.071	0.083	0.094	0.095	0.043	0.046	0.071	0.2	0.26	-	-	0.065	0.12	0.12	0.12	0.12	-	0.065
Cadmium	0.000065	0.000066	0.000078	0.000089	0.00009	0.00009	0.000091	0.0001	0.00011	0.00011	0.000011	0.000017	0.00004	0.000072	0.00009	-	-	0.000045	0.00017	0.00017	0.00017	0.00017	-	0.000045
Calcium	320	320	320	330	330	270	270	280	280	280	80	100	170	200	210	-	-	250	350	350	350	350	-	250
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	0.0005
Cobalt	0.00064	0.00069	0.0012	0.0016	0.0017	0.00049	0.00051	0.00067	0.00082	0.00084	0.0001	0.0001	0.0001	0.00018	0.00025	-	-	0.0001	0.0022	0.0022	0.0022	0.0022	-	0.0001
Copper	0.0056	0.0057	0.0066	0.0075	0.0076	0.032	0.032	0.033	0.034	0.034	0.0072	0.0078	0.0095	0.02	0.021	-	-	0.0084	0.012	0.012	0.012	0.012	-	0.0084
Iron	0.052	0.057	0.11	0.15	0.16	0.07	0.073	0.1	0.13	0.14	0.03	0.03	0.03	0.036	0.04	-	-	0.03	0.18	0.18	0.18	0.18	-	0.03
Lead	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00025	0.00025	0.00025	0.00025	-	0.00005
Lithium	0.0024	0.0024	0.0028	0.0031	0.0031	0.001	0.001	0.0011	0.0011	0.0011	0.0017	0.0019	0.0035	0.0069	0.008	-	-	0.0036	0.0083	0.0083	0.0083	0.0083	-	0.0036
Magnesium	55	55	55	56	56	52	52	53	55	55	16	21	38	43	43	-	-	46	64	64	64	64	-	46
Manganese	0.92	0.94	1.1	1.3	1.3	0.87	0.88	1	1.2	1.2	0.0059	0.006	0.014	0.031	0.032	-	-	0.0092	1.6	1.6	1.6	1.6	-	0.0092
Molybdenum	0.16	0.17	0.22	0.26	0.27	0.05	0.054	0.091	0.13	0.13	0.052	0.052	0.066	0.16	0.18	-	-	0.11	0.46	0.46	0.46	0.46	-	0.11
Nickel	0.001	0.001	0.001	0.001	0.001	0.00062	0.00063	0.00072	0.0008	0.00081	0.0005	0.0005	0.0005	0.00056	0.00061	-	-	0.0005	0.0025	0.0025	0.0025	0.0025	-	0.0005
Potassium	2.9	2.9	2.9	3	3	3.5	3.5	3.5	3.5	3.5	1.3	1.4	2	3	3.5	-	-	1.6	2.8	2.8	2.8	2.8	-	1.6
Selenium	0.054	0.056	0.07	0.085	0.087	0.036	0.037	0.052	0.066	0.068	0.029	0.034	0.06	0.07	0.075	-	-	0.053	0.053	0.053	0.053	0.053	-	0.053
Silicon	6.8	6.8	6.9	7	7	8.1	8.1	8.2	8.3	8.3	5.3	5.5	8.2	8.6	8.8	-	-	6.3	3.6	3.6	3.6	3.6	-	6.3
Silver	0.00002	0.00002	0.00002	0.00002	0.00002	0.000011	0.000011	0.000012	0.000013	0.000013	0.00001	0.00001	0.00001	0.000011	0.000011	-	-	0.00001	0.00005	0.00005	0.00005	0.00005	-	0.00001
Sodium	28	28	28	29	29	18	18	18	19	19	9.8	11	15	33	39	-	-	17	24	24	24	24	-	17
Strontium	1.2	1.2	1.3	1.4	1.4	1.2	1.2	1.3	1.3	1.3	0.39	0.52	0.78	1.1	1.2	-	-	2.2	14	14	14	14	-	2.2
Thallium	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00005	0.00005	0.00005	0.00005	-	0.00001
Tin	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0005	0.0005	0.0005	0.0005	-	0.0001
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	-	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	PAG Dump Seep 8					PAG Dump Seep 9					SERDS Ditch					SERDS Seep 1	SERDS Seep 10	SERDS Seep 11					SERDS Seep 12	
Uranium	0.0013	0.0013	0.0013	0.0013	0.0014	0.00099	0.001	0.0015	0.002	0.0021	0.00087	0.00093	0.0015	0.0031	0.0035	-	-	0.0019	0.0011	0.0011	0.0011	0.0011	-	0.0019
Vanadium	0.001	0.001	0.001	0.001	0.001	0.00076	0.00076	0.00077	0.00078	0.00078	0.00055	0.00055	0.0006	0.0016	0.0018	-	-	0.0005	0.0025	0.0025	0.0025	0.0025	-	0.0005
Zinc	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	-	-	0.003	0.0051	0.0051	0.0051	0.0051	-	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 13			
Parameter	5th Percentile	Median	95th Percentile	Maximum
Field Parameters				
pH	7.6	7.7	7.9	7.9
Conductivity	1500	1800	1900	1900
Temprature	2.2	3.9	8.1	9
Turbidity	0.25	1.2	3.5	3.6
Physical Tests				
Conductivity	1600	1800	1900	1900
Hardness (as CaCO3)	850	1000	1100	1100
pH	8.1	8.2	8.3	8.3
Total Suspended Solids	1.1	2.2	25	31
Total Dissolved Solids	1300	1600	1600	1600
Turbidity	0.13	0.93	3.8	4.2
Anions and Nutrients				
Alkalinity, Total (as CaCO3)	120	120	170	180
Ammonia, Total (as N)	0.005	0.0055	0.012	0.013
Chloride	3.1	5	5	5
Fluoride	0.27	0.49	0.51	0.51
Nitrate (as N)	7.8	21	24	25
Nitrite (as N)	0.006	0.01	0.019	0.02
Total Nitrogen	7.8	24	25	25
Orthophosphate-Dissolved (as P)	0.0068	0.0093	0.017	0.019
Phosphorus - Total Dissolved	0.011	0.012	0.027	0.03
Phosphorus - Total	0.012	0.017	0.084	0.1
Sulfate	750	880	890	890
Organic Carbon				
Dissolved Organic Carbon	3.7	4.4	7.7	8
Total Metals				
Aluminum	0.0096	0.062	0.29	0.34
Antimony	0.00026	0.00054	0.00065	0.00068
Arsenic	0.00051	0.00061	0.001	0.0011
Barium	0.035	0.036	0.053	0.056
Berylium	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00006	0.0001	0.0001	0.0001
Boron	0.071	0.073	0.081	0.082
Cadmium	0.000054	0.000075	0.000096	0.0001
Calcium	260	310	330	330
Chromium	0.0005	0.0005	0.0005	0.0005
Cobalt	0.00017	0.0002	0.00038	0.00042
Copper	0.0092	0.011	0.059	0.07
Iron	0.03	0.08	0.26	0.3
Lead	0.00006	0.0001	0.0001	0.0001
Lithium	0.0038	0.0051	0.0061	0.0063
Magnesium	49	57	61	61
Manganese	0.01	0.035	0.31	0.36
Molybdenum	0.12	0.13	0.18	0.18
Nickel	0.0006	0.001	0.001	0.001
Potassium	1.6	1.8	2.2	2.2
Selenium	0.058	0.086	0.095	0.096
Silicon	6.8	7.5	7.7	7.7
Silver	0.000012	0.00002	0.00002	0.00002
Sodium	17	18	19	19
Strontium	2.4	3	4.4	4.6
Thallium	0.000012	0.00002	0.00002	0.00002
Tin	0.00012	0.0002	0.0002	0.0002
Titanium	0.01	0.01	0.015	0.016
Uranium	0.002	0.0027	0.0034	0.0036
Vanadium	0.00077	0.001	0.0018	0.0021
Zinc	0.0036	0.006	0.006	0.006
Dissolved Metals				
Aluminum	0.0032	0.0046	0.0069	0.0072
Antimony	0.00024	0.0005	0.00062	0.00064
Arsenic	0.00039	0.00051	0.00078	0.00085
Barium	0.034	0.035	0.049	0.052
Berylium	0.0001	0.0001	0.0001	0.0001
Bismuth	0.00006	0.0001	0.0001	0.0001
Boron	0.066	0.071	0.078	0.08
Cadmium	0.000047	0.00007	0.000086	0.00009
Calcium	260	310	320	330
Chromium	0.0005	0.0005	0.0005	0.0005
Cobalt	0.00012	0.0002	0.00024	0.00025
Copper	0.0084	0.0087	0.047	0.056
Iron	0.03	0.03	0.03	0.03
Lead	0.00006	0.0001	0.0001	0.0001
Lithium	0.0037	0.0046	0.0059	0.0059
Magnesium	48	56	58	59
Manganese	0.0094	0.027	0.3	0.35
Molybdenum	0.11	0.13	0.17	0.18
Nickel	0.0006	0.001	0.001	0.001
Potassium	1.6	1.7	2.1	2.1
Selenium	0.058	0.079	0.091	0.092
Silicon	6.4	7	7.4	7.4
Silver	0.000012	0.00002	0.00002	0.00002
Sodium	17	17	19	19
Strontium	2.3	3	4.3	4.5
Thallium	0.000012	0.00002	0.00002	0.00002
Tin	0.00012	0.0002	0.0002	0.0002
Titanium	0.01	0.01	0.01	0.01

	SERDS Seep 13			
Uranium	0.002	0.0027	0.0033	0.0035
Vanadium	0.0006	0.001	0.001	0.001
Zinc	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 14					SERDS Seep 15	SERDS Seep 16
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum		
Field Parameters	2					-	-
pH	7.9	7.9	8.2	8.4	8.4	-	-
Conductivity	1500	1500	1500	1600	1600	-	-
Temprature	3.2	3.2	3.3	3.4	3.4	-	-
Turbidity	0.08	0.19	1.2	2.2	2.3	-	-
Physical Tests	2					-	-
Conductivity	1400	1400	1600	1700	1700	-	-
Hardness (as CaCO3)	740	750	880	1000	1000	-	-
pH	8.1	8.1	8.1	8.1	8.1	-	-
Total Suspended Solids	1	1.2	2.5	3.9	4	-	-
Total Dissolved Solids	1100	1100	1300	1500	1500	-	-
Turbidity	0.26	0.27	0.38	0.49	0.5	-	-
Anions and Nutrients	2					-	-
Alkalinity, Total (as CaCO3)	110	110	120	130	130	-	-
Ammonia, Total (as N)	0.005	0.005	0.005	0.005	0.005	-	-
Chloride	2.5	2.6	3.8	4.9	5	-	-
Fluoride	0.22	0.23	0.32	0.4	0.41	-	-
Nitrate (as N)	5.6	6.2	12	17	18	-	-
Nitrite (as N)	0.005	0.0053	0.0075	0.0098	0.01	-	-
Total Nitrogen	6.4	6.9	12	17	18	-	-
Orthophosphate-Dissolved (as P)	0.0095	0.0095	0.0097	0.0098	0.0098	-	-
Phosphorus - Total Dissolved	0.013	0.013	0.013	0.014	0.014	-	-
Phosphorus - Total	0.014	0.014	0.015	0.015	0.015	-	-
Sulfate	690	700	760	820	830	-	-
Organic Carbon	2					-	-
Dissolved Organic Carbon	3.9	4	4.7	5.3	5.4	-	-
Total Metals	2					-	-
Aluminum	0.012	0.013	0.028	0.044	0.045	-	-
Antimony	0.00025	0.00026	0.00034	0.00042	0.00043	-	-
Arsenic	0.00041	0.00042	0.00049	0.00055	0.00056	-	-
Barium	0.03	0.03	0.032	0.033	0.033	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.000053	0.000075	0.000098	0.0001	-	-
Boron	0.07	0.07	0.072	0.073	0.073	-	-
Cadmium	0.000055	0.000056	0.000063	0.000069	0.00007	-	-
Calcium	250	250	270	300	300	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt	0.00013	0.00013	0.00017	0.0002	0.0002	-	-
Copper	0.0087	0.0088	0.01	0.012	0.012	-	-
Iron	0.03	0.032	0.049	0.066	0.068	-	-
Lead	0.000051	0.000053	0.000076	0.000098	0.0001	-	-
Lithium	0.0042	0.0042	0.0044	0.0046	0.0046	-	-
Magnesium	46	46	51	55	56	-	-
Manganese	0.0096	0.0096	0.0099	0.01	0.01	-	-
Molybdenum	0.13	0.13	0.13	0.14	0.14	-	-
Nickel	0.0005	0.00053	0.00075	0.00098	0.001	-	-
Potassium	1.7	1.7	1.8	1.8	1.8	-	-
Selenium	0.073	0.073	0.073	0.074	0.074	-	-
Silicon	5.9	6	6.6	7.2	7.3	-	-
Silver	0.00001	0.000011	0.000015	0.00002	0.00002	-	-
Sodium	17	17	18	18	18	-	-
Strontium	2.6	2.7	3.5	4.3	4.4	-	-
Thallium	0.00001	0.000011	0.000015	0.00002	0.00002	-	-
Tin	0.0001	0.00011	0.00015	0.0002	0.0002	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-
Uranium	0.0019	0.0019	0.0023	0.0026	0.0027	-	-
Vanadium	0.00062	0.00064	0.00081	0.00098	0.001	-	-
Zinc	0.003	0.0032	0.0045	0.0059	0.006	-	-
Dissolved Metals	2					-	-
Aluminum	0.0072	0.0074	0.0093	0.011	0.011	-	-
Antimony	0.00024	0.00025	0.00033	0.0004	0.00041	-	-
Arsenic	0.00038	0.00039	0.00047	0.00054	0.00055	-	-
Barium	0.029	0.029	0.032	0.036	0.036	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.000053	0.000075	0.000098	0.0001	-	-
Boron	0.065	0.065	0.07	0.074	0.074	-	-
Cadmium	0.00005	0.000051	0.00006	0.000069	0.00007	-	-
Calcium	230	240	270	310	310	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt	0.0001	0.00011	0.00015	0.0002	0.0002	-	-
Copper	0.0089	0.009	0.0092	0.0095	0.0096	-	-
Iron	0.03	0.03	0.03	0.03	0.03	-	-
Lead	0.00005	0.000053	0.000075	0.000098	0.0001	-	-
Lithium	0.0041	0.0041	0.0042	0.0043	0.0043	-	-
Magnesium	40	40	48	56	57	-	-
Manganese	0.0019	0.0023	0.0059	0.0095	0.0099	-	-
Molybdenum	0.12	0.12	0.13	0.13	0.13	-	-
Nickel	0.0005	0.00053	0.00075	0.00098	0.001	-	-
Potassium	1.6	1.6	1.8	1.9	1.9	-	-
Selenium	0.072	0.072	0.073	0.074	0.075	-	-
Silicon	5.5	5.6	6.6	7.6	7.7	-	-
Silver	0.00001	0.000011	0.000015	0.00002	0.00002	-	-
Sodium	17	17	17	18	18	-	-
Strontium	2.6	2.6	3.4	4.2	4.2	-	-
Thallium	0.00001	0.000011	0.000015	0.00002	0.00002	-	-
Tin	0.0001	0.00011	0.00015	0.0002	0.0002	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 14					SERDS Seep 15	SERDS Seep 16
Uranium	0.0018	0.0018	0.0022	0.0026	0.0026	-	-
Vanadium	0.0005	0.00053	0.00075	0.00098	0.001	-	-
Zinc	0.003	0.003	0.003	0.003	0.003	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 17					SERDS Seep 18					SERDS Seep 18	SERDS Seep 19	SERDS Seep 2	SERDS Seep 20	SERDS Seep 21
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum					
Field Parameters	2					2					-	-	-	-	-
pH	7.3	7.3	7.4	7.5	7.6	7.9	7.9	8.3	8.6	8.7	-	-	-	-	-
Conductivity	1100	1100	1100	1100	1100	1.8	140	1400	2600	2700	-	-	-	-	-
Temprature	3.3	3.3	3.8	4.2	4.2	0.3	0.46	1.9	3.4	3.6	-	-	-	-	-
Turbidity	0.52	0.65	1.8	3	3.1	2.6	2.9	5.5	8.1	8.4	-	-	-	-	-
Physical Tests	2					2					-	-	-	-	-
Conductivity	1000	1000	1100	1100	1100	2500	2500	2600	2700	2700	-	-	-	-	-
Hardness (as CaCO3)	550	550	560	570	570	1500	1500	1600	1600	1600	-	-	-	-	-
pH	7.8	7.8	7.9	8	8	8	8	8	8	8	-	-	-	-	-
Total Suspended Solids	5.2	5.8	12	17	18	14	14	18	22	23	-	-	-	-	-
Total Dissolved Solids	870	870	880	900	900	2300	2300	2400	2500	2600	-	-	-	-	-
Turbidity	3.9	4.3	7.3	10	11	1.3	2.2	10	18	19	-	-	-	-	-
Anions and Nutrients	2					2					-	-	-	-	-
Alkalinity, Total (as CaCO3)	99	100	110	110	110	80	81	89	97	97	-	-	-	-	-
Ammonia, Total (as N)	0.0089	0.0091	0.01	0.012	0.012	0.0059	0.0066	0.013	0.019	0.019	-	-	-	-	-
Chloride	2.8	3	4.2	5.4	5.6	10	10	10	10	10	-	-	-	-	-
Fluoride	0.1	0.1	0.12	0.13	0.13	0.4	0.4	0.4	0.4	0.4	-	-	-	-	-
Nitrate (as N)	0.43	0.44	0.58	0.72	0.74	42	42	46	50	50	-	-	-	-	-
Nitrite (as N)	0.005	0.005	0.005	0.005	0.005	0.02	0.02	0.021	0.022	0.022	-	-	-	-	-
Total Nitrogen	0.62	0.64	0.78	0.93	0.94	43	44	49	54	54	-	-	-	-	-
Orthophosphate-Dissolved (as P)	0.0061	0.0067	0.012	0.018	0.019	0.017	0.017	0.017	0.017	0.017	-	-	-	-	-
Phosphorus - Total Dissolved	0.013	0.014	0.019	0.024	0.024	0.018	0.018	0.021	0.024	0.024	-	-	-	-	-
Phosphorus - Total	0.021	0.022	0.029	0.037	0.038	0.022	0.022	0.027	0.032	0.033	-	-	-	-	-
Sulfate	500	500	500	500	500	1400	1400	1400	1400	1400	-	-	-	-	-
Organic Carbon	2					2					-	-	-	-	-
Dissolved Organic Carbon	7.6	7.6	7.7	7.7	7.7	3.7	3.7	3.9	4.2	4.2	-	-	-	-	-
Total Metals	2					2					-	-	-	-	-
Aluminum	0.21	0.22	0.35	0.48	0.5	0.2	0.2	0.27	0.33	0.34	-	-	-	-	-
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	0.00061	0.00061	0.00062	0.00062	0.00062	-	-	-	-	-
Arsenic	0.0005	0.00051	0.00061	0.00071	0.00072	0.00093	0.00094	0.00099	0.001	0.0011	-	-	-	-	-
Barium	0.04	0.041	0.047	0.053	0.054	0.044	0.044	0.044	0.044	0.044	-	-	-	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-
Boron	0.054	0.054	0.055	0.055	0.055	0.13	0.13	0.14	0.14	0.15	-	-	-	-	-
Cadmium	0.00003	0.000031	0.000043	0.000054	0.000055	0.00016	0.00016	0.0002	0.00024	0.00025	-	-	-	-	-
Calcium	180	180	180	180	180	480	480	480	490	490	-	-	-	-	-
Chromium	0.0005	0.00051	0.00056	0.0006	0.00061	0.0005	0.00051	0.00055	0.0006	0.0006	-	-	-	-	-
Cobalt	0.00028	0.0003	0.00051	0.00071	0.00073	0.0003	0.0003	0.00032	0.00033	0.00033	-	-	-	-	-
Copper	0.019	0.02	0.026	0.031	0.032	0.0092	0.0094	0.012	0.015	0.015	-	-	-	-	-
Iron	0.26	0.28	0.48	0.67	0.69	0.21	0.22	0.3	0.38	0.39	-	-	-	-	-
Lead	0.00014	0.00015	0.00022	0.00028	0.00029	0.00011	0.00012	0.00017	0.00023	0.00023	-	-	-	-	-
Lithium	0.0011	0.0011	0.0012	0.0012	0.0012	0.0078	0.0078	0.0082	0.0085	0.0085	-	-	-	-	-
Magnesium	35	35	35	35	36	100	100	100	110	110	-	-	-	-	-
Manganese	0.053	0.063	0.16	0.25	0.26	0.034	0.035	0.049	0.062	0.064	-	-	-	-	-
Molybdenum	0.04	0.041	0.049	0.057	0.058	0.58	0.58	0.58	0.59	0.59	-	-	-	-	-
Nickel	0.0005	0.00051	0.00063	0.00075	0.00076	0.001	0.001	0.001	0.001	0.001	-	-	-	-	-
Potassium	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.6	2.6	-	-	-	-	-
Selenium	0.02	0.021	0.026	0.032	0.032	0.32	0.32	0.33	0.33	0.33	-	-	-	-	-
Silicon	6.2	6.3	6.5	6.7	6.7	6.5	6.5	6.5	6.6	6.6	-	-	-	-	-
Silver	0.00001	0.00001	0.000014	0.000018	0.000018	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-	-
Sodium	14	14	15	15	15	29	29	29	29	29	-	-	-	-	-
Strontium	2.5	2.5	2.7	2.8	2.8	5	5	5.5	5.9	6	-	-	-	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-	-
Titanium	0.011	0.011	0.018	0.025	0.025	0.012	0.012	0.014	0.016	0.017	-	-	-	-	-
Uranium	0.00031	0.00031	0.00033	0.00034	0.00035	0.0038	0.0039	0.0044	0.0049	0.0049	-	-	-	-	-
Vanadium	0.00098	0.001	0.0016	0.0022	0.0023	0.0012	0.0012	0.0015	0.0018	0.0019	-	-	-	-	-
Zinc	0.003	0.0031	0.0036	0.004	0.0041	0.006	0.006	0.006	0.006	0.006	-	-	-	-	-
Dissolved Metals	2					2					-	-	-	-	-
Aluminum	0.0079	0.0088	0.017	0.025	0.026	0.0059	0.0059	0.0063	0.0067	0.0067	-	-	-	-	-
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006	0.0006	0.00062	0.00064	0.00064	-	-	-	-	-
Arsenic	0.00032	0.00032	0.00034	0.00035	0.00035	0.00081	0.00081	0.00083	0.00084	0.00084	-	-	-	-	-
Barium	0.042	0.043	0.046	0.049	0.05	0.037	0.037	0.038	0.039	0.039	-	-	-	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-
Boron	0.048	0.048	0.049	0.05	0.05	0.12	0.12	0.13	0.14	0.14	-	-	-	-	-
Cadmium	0.000027	0.000027	0.000029	0.00003	0.00003	0.00015	0.00015	0.0002	0.00024	0.00025	-	-	-	-	-
Calcium	170	170	170	170	170	460	460	470	480	480	-	-	-	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	-
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-	-
Copper	0.0082	0.0083	0.0089	0.0095	0.0096	0.0054	0.0055	0.007	0.0084	0.0086	-	-	-	-	-
Iron	0.03	0.03	0.032	0.034	0.034	0.03	0.03	0.03	0.03	0.03	-	-	-	-	-
Lead	0.00005	0.00005	0.000053	0.000056	0.000056	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-
Lithium	0.001	0.001	0.0011	0.0011	0.0011	0.0069	0.007	0.0076	0.0081	0.0082	-	-	-	-	-
Magnesium	31	31	33	34	34	87	88	95	100	100	-	-	-	-	-
Manganese	0.035	0.035	0.038	0.041	0.041	0.018	0.02	0.037	0.054	0.056	-	-	-	-	-
Molybdenum	0.037	0.038	0.047	0.056	0.057	0.55	0.55	0.56	0.58	0.58	-	-	-	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	-	-	-	-	-
Potassium	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.3	2.6	2.6	-	-	-	-	-
Selenium	0.018	0.019	0.025	0.03	0.031	0.31	0.31	0.32	0.33	0.33	-	-	-	-	-
Silicon	5.8	5.8	5.8	5.9	5.9	5.7	5.7	5.9	6	6	-	-	-	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-	-
Sodium	13	13	14	14	14	26	26	27	28	28	-	-	-	-	-
Strontium	2.5	2.5	2.6	2.6	2.7	4.8	4.9	5.3	5.8	5.9	-	-	-	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 17					SERDS Seep 18					SERDS Seep 18	SERDS Seep 19	SERDS Seep 2	SERDS Seep 20	SERDS Seep 21
Uranium	0.00026	0.00027	0.00031	0.00036	0.00036	0.0038	0.0039	0.0043	0.0048	0.0049	-	-	-	-	-
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	-	-	-	-	-
Zinc	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	-	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 22					SERDS Seep 23					SERDS Seep 24					SERDS Seep 25					SERDS Seep 26	SERDS Seep 3	SERDS Seep 4	SERDS Seep 5
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum				
Field Parameters	1					1					1					1					-	-	-	-
pH	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	7	7	7	7	7	-	-	-	-
Conductivity	850	850	850	850	850	2900	2900	2900	2900	2900	1700	1700	1700	1700	1700	910	910	910	910	910	-	-	-	-
Temprature	13	13	13	13	13	0.8	0.8	0.8	0.8	0.8	2.4	2.4	2.4	2.4	2.4	0.7	0.7	0.7	0.7	0.7	-	-	-	-
Turbidity	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	1	1	1	1	1	3.6	3.6	3.6	3.6	3.6	-	-	-	-
Physical Tests	1					1					1					1					-	-	-	-
Conductivity	820	820	820	820	820	2900	2900	2900	2900	2900	1900	1900	1900	1900	1900	850	850	850	850	850	-	-	-	-
Hardness (as CaCO3)	390	390	390	390	390	1700	1700	1700	1700	1700	1100	1100	1100	1100	1100	420	420	420	420	420	-	-	-	-
pH	8.2	8.2	8.2	8.2	8.2	8	8	8	8	8	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	-	-	-	-
Total Suspended Solids	2.9	2.9	2.9	2.9	2.9	34	34	34	34	34	2.3	2.3	2.3	2.3	2.3	3.8	3.8	3.8	3.8	3.8	-	-	-	-
Total Dissolved Solids	550	550	550	550	550	2800	2800	2800	2800	2800	1600	1600	1600	1600	1600	580	580	580	580	580	-	-	-	-
Turbidity	1.1	1.1	1.1	1.1	1.1	9.9	9.9	9.9	9.9	9.9	0.68	0.68	0.68	0.68	0.68	1.8	1.8	1.8	1.8	1.8	-	-	-	-
Anions and Nutrients	1					1					1					1					-	-	-	-
Alkalinity, Total (as CaCO3)	120	120	120	120	120	98	98	98	98	98	140	140	140	140	140	170	170	170	170	170	-	-	-	-
Ammonia, Total (as N)	0.052	0.052	0.052	0.052	0.052	0.0079	0.0079	0.0079	0.0079	0.0079	0.006	0.006	0.006	0.006	0.006	0.017	0.017	0.017	0.017	0.017	-	-	-	-
Chloride	2.5	2.5	2.5	2.5	2.5	10	10	10	10	10	5	5	5	5	5	2.5	2.5	2.5	2.5	2.5	-	-	-	-
Fluoride	0.22	0.22	0.22	0.22	0.22	0.4	0.4	0.4	0.4	0.4	0.58	0.58	0.58	0.58	0.58	0.1	0.1	0.1	0.1	0.1	-	-	-	-
Nitrate (as N)	8.8	8.8	8.8	8.8	8.8	64	64	64	64	64	20	20	20	20	20	0.61	0.61	0.61	0.61	0.61	-	-	-	-
Nitrite (as N)	0.035	0.035	0.035	0.035	0.035	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.084	0.084	0.084	0.084	0.084	-	-	-	-
Total Nitrogen	9.6	9.6	9.6	9.6	9.6	66	66	66	66	66	20	20	20	20	20	1.5	1.5	1.5	1.5	1.5	-	-	-	-
Orthophosphate-Dissolved (as P)	0.028	0.028	0.028	0.028	0.028	0.034	0.034	0.034	0.034	0.034	0.017	0.017	0.017	0.017	0.017	0.022	0.022	0.022	0.022	0.022	-	-	-	-
Phosphorus - Total Dissolved	0.04	0.04	0.04	0.04	0.04	0.048	0.048	0.048	0.048	0.048	0.023	0.023	0.023	0.023	0.023	0.038	0.038	0.038	0.038	0.038	-	-	-	-
Phosphorus - Total	0.049	0.049	0.049	0.049	0.049	0.18	0.18	0.18	0.18	0.18	0.026	0.026	0.026	0.026	0.026	0.088	0.088	0.088	0.088	0.088	-	-	-	-
Sulfate	290	290	290	290	290	1500	1500	1500	1500	1500	930	930	930	930	930	290	290	290	290	290	-	-	-	-
Organic Carbon	1					1					1					1					-	-	-	-
Dissolved Organic Carbon	4.3	4.3	4.3	4.3	4.3	7.4	7.4	7.4	7.4	7.4	4.4	4.4	4.4	4.4	4.4	17	17	17	17	17	-	-	-	-
Total Metals	1					1					1					1					-	-	-	-
Aluminum	0.24	0.24	0.24	0.24	0.24	0.47	0.47	0.47	0.47	0.47	0.18	0.18	0.18	0.18	0.18	0.12	0.12	0.12	0.12	0.12	-	-	-	-
Antimony	0.00051	0.00051	0.00051	0.00051	0.00051	0.00051	0.00051	0.00051	0.00051	0.00051	0.00074	0.00074	0.00074	0.00074	0.00074	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	-
Arsenic	0.0012	0.0012	0.0012	0.0012	0.0012	0.0011	0.0011	0.0011	0.0011	0.0011	0.001	0.001	0.001	0.001	0.001	0.00066	0.00066	0.00066	0.00066	0.00066	-	-	-	-
Barium	0.048	0.048	0.048	0.048	0.048	0.058	0.058	0.058	0.058	0.058	0.037	0.037	0.037	0.037	0.037	0.067	0.067	0.067	0.067	0.067	-	-	-	-
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-
Boron	0.053	0.053	0.053	0.053	0.053	0.1	0.1	0.1	0.1	0.1	0.075	0.075	0.075	0.075	0.075	0.026	0.026	0.026	0.026	0.026	-	-	-	-
Cadmium	0.000055	0.000055	0.000055	0.000055	0.000055	0.0002	0.0002	0.0002	0.0002	0.0002	0.000085	0.000085	0.000085	0.000085	0.000085	0.000049	0.000049	0.000049	0.000049	0.000049	-	-	-	-
Calcium	130	130	130	130	130	540	540	540	540	540	340	340	340	340	340	140	140	140	140	140	-	-	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00052	0.00052	0.00052	0.00052	0.00052	-	-	-	-
Cobalt	0.00019	0.00019	0.00019	0.00019	0.00019	0.00043	0.00043	0.00043	0.00043	0.00043	0.0002	0.0002	0.0002	0.0002	0.0002	0.002	0.002	0.002	0.002	0.002	-	-	-	-
Copper	0.014	0.014	0.014	0.014	0.014	0.021	0.021	0.021	0.021	0.021	0.017	0.017	0.017	0.017	0.017	0.0073	0.0073	0.0073	0.0073	0.0073	-	-	-	-
Iron	0.23	0.23	0.23	0.23	0.23	0.51	0.51	0.51	0.51	0.51	0.17	0.17	0.17	0.17	0.17	0.39	0.39	0.39	0.39	0.39	-	-	-	-
Lead	0.00012	0.00012	0.00012	0.00012	0.00012	0.00028	0.00028	0.00028	0.00028	0.00028	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-
Lithium	0.0023	0.0023	0.0023	0.0023	0.0023	0.0083	0.0083	0.0083	0.0083	0.0083	0.0072	0.0072	0.0072	0.0072	0.0072	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Magnesium	25	25	25	25	25	110	110	110	110	110	64	64	64	64	64	28	28	28	28	28	-	-	-	-
Manganese	0.018	0.018	0.018	0.018	0.018	0.04	0.04	0.04	0.04	0.04	0.058	0.058	0.058	0.058	0.058	1.4	1.4	1.4	1.4	1.4	-	-	-	-
Molybdenum	0.2	0.2	0.2	0.2	0.2	0.36	0.36	0.36	0.36	0.36	0.19	0.19	0.19	0.19	0.19	0.019	0.019	0.019	0.019	0.019	-	-	-	-
Nickel	0.00067	0.00067	0.00067	0.00067	0.00067	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0011	0.0011	0.0011	0.0011	0.0011	-	-	-	-
Potassium	1.5	1.5	1.5	1.5	1.5	2.9	2.9	2.9	2.9	2.9	2	2	2	2	2	5.6	5.6	5.6	5.6	5.6	-	-	-	-
Selenium	0.065	0.065	0.065	0.065	0.065	0.34	0.34	0.34	0.34	0.34	0.093	0.093	0.093	0.093	0.093	0.036	0.036	0.036	0.036	0.036	-	-	-	-
Silicon	6.9	6.9	6.9	6.9	6.9	6.4	6.4	6.4	6.4	6.4	7.7	7.7	7.7	7.7	7.7	6.7	6.7	6.7	6.7	6.7	-	-	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-
Sodium	13	13	13	13	13	32	32	32	32	32	20	20	20	20	20	9.6	9.6	9.6	9.6	9.6	-	-	-	-
Strontium	1.3	1.3	1.3	1.3	1.3	6.9	6.9	6.9	6.9	6.9	3.5	3.5	3.5	3.5	3.5	0.76	0.76	0.76	0.76	0.76	-	-	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	0.028	0.028	0.028	0.028	0.028	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-
Uranium	0.0017	0.0017	0.0017	0.0017	0.0017	0.003	0.003	0.003	0.003	0.003	0.0034	0.0034	0.0034	0.0034	0.0034	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	-
Vanadium	0.0018	0.0018	0.0018	0.0018	0.0018	0.0023	0.0023	0.0023	0.0023	0.0023	0.0012	0.0012	0.0012	0.0012	0.0012	0.00093	0.00093	0.00093	0.00093	0.00093	-	-	-	-
Zinc	0.0061	0.0061	0.0061	0.0061	0.0061	0.007	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.006	0.0033	0.0033	0.0033	0.0033	0.0033	-	-	-	-
Dissolved Metals	1					1					1					1					-	-	-	-
Aluminum	0.023	0.023	0.023	0.023	0.023	0.012	0.012	0.012	0.012	0.012	0.005	0.005	0.005	0.005	0.005	0.056	0.056	0.056	0.056	0.056	-	-	-	-
Antimony	0.0005	0.0005	0.0005	0.0005	0.0005	0.00048	0.00048	0.00048	0.00048	0.00048	0.00071	0.00071	0.00071	0.00071	0.00071	0.00025	0.00025	0.00025	0.00025	0.00025	-	-	-	-
Arsenic	0.001	0.001	0.001	0.001	0.001	0.00071	0.00071	0.00071	0.00071	0.00071	0.00086	0.00086	0.00086	0.00086	0.00086	0.00059	0.00059	0.00059	0.00059	0.00059	-	-	-	-
Barium	0.044	0.044	0.044	0.044	0.044	0.037	0.037	0.037	0.037	0.037	0.034	0.034	0.034	0.034	0.034	0.066	0.066	0.066	0.066	0.066	-	-	-	-
Beryllium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-
Boron	0.047	0.047	0.047	0.047	0.047	0.098	0.098	0.098	0.098	0.098	0.071	0.071	0.071	0.071	0.071	0.023	0.023	0.023	0.023	0.023	-	-	-	-
Cadmium	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00011	0.00011	0.00011	0.00011	0.000075	0.000075	0.000075	0.000075	0.000075	0.000037	0.000037	0.000037	0.000037	0.000037	-	-	-	-
Calcium	120	120	120	120	120	530	530	530	530	530	340	340	340	340	340	130	130	130	130	130	-	-	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0017	0.0017	0.0017	0.0017	0.0017	-	-	-	-
Copper	0.011	0.011	0.011	0.011	0.011	0.006	0.006	0.006	0.006	0.006	0.0087	0.0087	0.0087	0.0087	0.0087	0.0059	0.0059	0.0059	0.0059	0.0059	-	-	-	-
Iron	0.03	0.03	0.03	0.03	0.03	0.06	0.06	0.06	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.26	0.26	0.26	0.26	0.26	-	-	-	-
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-
Lithium	0.0019	0.0019	0.0019	0.0019	0.0019	0.0079	0.0079	0.0079	0.0079	0.0079	0.0071	0.0071	0.0071	0.0071	0.0071	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Magnesium	22	22	22	22	22	110	110	110	110	110	61	61	61	61	61	26	26	26	26	26	-	-	-	-
Manganese	0.012	0.012	0.012	0.012	0.012	0.014	0.014	0.014	0.014	0.014	0.047	0.047	0.047	0.047	0.047	1.2	1.2	1.2	1.2	1.2	-	-	-	-
Molybdenum	0.19	0.19	0.19	0.19	0.19	0.36	0.36	0.36	0.36	0.36	0.19	0.19	0.19	0.19	0.19	0.018	0.018	0.018	0.018	0.018	-	-	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00083	0.00083	0.00083	0.00083	0.00083	-	-	-	-
Potassium	1.3	1.3	1.3	1.3	1.3	2.8	2.8	2.8	2.8	2.8	2	2	2	2	2	5.2	5.2	5.2	5.2	5.2	-	-	-	-
Selenium	0.063	0.063	0.063	0.063	0.063	0.33	0.33	0.33	0.33	0.33	0.086	0.086	0.086	0.086	0.086	0.036	0.036	0.036	0.036	0.036	-	-	-	-
Silicon	6	6	6	6	6	5.6	5.6	5.6	5.6	5.6	7.2	7.2	7.2	7.2	7.2	6.1	6.1	6.1	6.1	6.1	-	-	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-
Sodium	12	12	12	12	12	30	30	30	30	30	19	19	19	19	19	8.8	8.8	8.8	8.8	8.8	-	-	-	-
Strontium	1.2	1.2	1.2	1.2	1.2	6.8	6.8	6.8	6.8	6.8	3.5	3.5	3.5	3.5	3.5	0.72	0.72	0.72	0.72	0.72	-	-	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 22					SERDS Seep 23					SERDS Seep 24					SERDS Seep 25					SERDS Seep 26	SERDS Seep 3	SERDS Seep 4	SERDS Seep 5
Uranium	0.0016	0.0016	0.0016	0.0016	0.0016	0.0029	0.0029	0.0029	0.0029	0.0029	0.0034	0.0034	0.0034	0.0034	0.0034	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	-
Vanadium	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-
Zinc	0.0033	0.0033	0.0033	0.0033	0.0033	0.0034	0.0034	0.0034	0.0034	0.0034	0.003	0.003	0.003	0.003	0.003	0.0035	0.0035	0.0035	0.0035	0.0035	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 6	SERDS Seep 7	SERDS Seep 8	SERDS Seep 9	South Toe Drain					TSF Clean Water Ditch	TSF Haul Road Seep 1	TSF Haul Road Seep 10	TSF Haul Road Seep 11					TSF Haul Road Seep 12				
Parameter					Minimum	5th Percentile	Median	95th Percentile	Maximum				Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	-	-	-	-	18					-	-	-	0					1				
pH	-	-	-	-	6.6	6.7	7.2	7.3	7.5	-	-	-	-	-	-	-	-	8.1	8.1	8.1	8.1	8.1
Conductivity	-	-	-	-	1300	1300	1400	1400	1400	-	-	-	-	-	-	-	-	1900	1900	1900	1900	1900
Temprature	-	-	-	-	7.6	8	8.5	11	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	-	-	-	-	0.06	0.088	0.33	0.7	0.88	-	-	-	-	-	-	-	-	0.88	0.88	0.88	0.88	0.88
Physical Tests	-	-	-	-	4					-	-	-	1					1				
Conductivity	-	-	-	-	1300	1300	1400	1400	1400	-	-	-	2200	2200	2200	2200	2200	1800	1800	1800	1800	1800
Hardness (as CaCO3)	-	-	-	-	520	520	550	580	590	-	-	-	1300	1300	1300	1300	1300	1000	1000	1000	1000	1000
pH	-	-	-	-	7	7.2	7.8	8.1	8.2	-	-	-	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Total Suspended Solids	-	-	-	-	1	1	1.2	1.6	1.7	-	-	-	4.7	4.7	4.7	4.7	4.7	25	25	25	25	25
Total Dissolved Solids	-	-	-	-	8.3	220	1100	1100	1100	-	-	-	2000	2000	2000	2000	2000	1500	1500	1500	1500	1500
Turbidity	-	-	-	-	0.46	0.57	1.2	1.3	1.3	-	-	-	3.2	3.2	3.2	3.2	3.2	6.1	6.1	6.1	6.1	6.1
Anions and Nutrients	-	-	-	-	4					-	-	-	1					1				
Alkalinity, Total (as CaCO3)	-	-	-	-	140	140	140	140	140	-	-	-	68	68	68	68	68	110	110	110	110	110
Ammonia, Total (as N)	-	-	-	-	0.17	0.17	0.18	0.2	0.2	-	-	-	0.005	0.005	0.005	0.005	0.005	0.023	0.023	0.023	0.023	0.023
Chloride	-	-	-	-	14	14	14	15	15	-	-	-	10	10	10	10	10	5	5	5	5	5
Fluoride	-	-	-	-	0.63	0.63	0.66	0.68	0.68	-	-	-	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2
Nitrate (as N)	-	-	-	-	0.025	0.025	0.027	0.078	0.087	-	-	-	66	66	66	66	66	38	38	38	38	38
Nitrite (as N)	-	-	-	-	0.005	0.005	0.005	0.005	0.005	-	-	-	0.02	0.02	0.02	0.02	0.02	0.017	0.017	0.017	0.017	0.017
Total Nitrogen	-	-	-	-	0.23	0.23	0.24	0.3	0.3	-	-	-	70	70	70	70	70	40	40	40	40	40
Orthophosphate-Dissolved (as P)	-	-	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	0.012	0.012	0.012	0.012	0.012	0.038	0.038	0.038	0.038	0.038
Phosphorus - Total Dissolved	-	-	-	-	0.0075	0.0076	0.0097	0.011	0.011	-	-	-	0.016	0.016	0.016	0.016	0.016	0.045	0.045	0.045	0.045	0.045
Phosphorus - Total	-	-	-	-	0.0074	0.0082	0.014	0.016	0.016	-	-	-	0.022	0.022	0.022	0.022	0.022	0.065	0.065	0.065	0.065	0.065
Sulfate	-	-	-	-	550	560	600	630	630	-	-	-	1000	1000	1000	1000	1000	780	780	780	780	780
Organic Carbon	-	-	-	-	4					-	-	-	1					1				
Dissolved Organic Carbon	-	-	-	-	2.9	2.9	3	1100	1400	-	-	-	4.9	4.9	4.9	4.9	4.9	6.9	6.9	6.9	6.9	6.9
Total Metals	-	-	-	-	4					-	-	-	1					1				
Aluminum	-	-	-	-	0.003	0.003	0.0031	0.012	0.013	-	-	-	0.079	0.079	0.079	0.079	0.079	0.58	0.58	0.58	0.58	0.58
Antimony	-	-	-	-	0.00018	0.00018	0.0002	0.00022	0.00022	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.00016	0.00016	0.00016	0.00016	0.00016
Arsenic	-	-	-	-	0.0025	0.0025	0.0026	0.0027	0.0028	-	-	-	0.00025	0.00025	0.00025	0.00025	0.00025	0.0008	0.0008	0.0008	0.0008	0.0008
Barium	-	-	-	-	0.027	0.027	0.027	0.029	0.029	-	-	-	0.077	0.077	0.077	0.077	0.077	0.067	0.067	0.067	0.067	0.067
Berylium	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	-	-	-	-	0.15	0.15	0.15	0.16	0.16	-	-	-	0.026	0.026	0.026	0.026	0.026	0.033	0.033	0.033	0.033	0.033
Cadmium	-	-	-	-	0.00023	0.00023	0.00026	0.00031	0.00032	-	-	-	0.00011	0.00011	0.00011	0.00011	0.00011	0.00013	0.00013	0.00013	0.00013	0.00013
Calcium	-	-	-	-	190	190	190	200	210	-	-	-	360	360	360	360	360	290	290	290	290	290
Chromium	-	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	-	-	0.0015	0.0015	0.0015	0.0017	0.0017	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.00067	0.00067	0.00067	0.00067	0.00067
Copper	-	-	-	-	0.014	0.014	0.015	0.016	0.017	-	-	-	0.0057	0.0057	0.0057	0.0057	0.0057	0.032	0.032	0.032	0.032	0.032
Iron	-	-	-	-	0.27	0.27	0.31	0.32	0.32	-	-	-	0.081	0.081	0.081	0.081	0.081	0.58	0.58	0.58	0.58	0.58
Lead	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Lithium	-	-	-	-	0.011	0.011	0.012	0.013	0.013	-	-	-	0.002	0.002	0.002	0.002	0.002	0.0037	0.0037	0.0037	0.0037	0.0037
Magnesium	-	-	-	-	23	23	24	26	27	-	-	-	99	99	99	99	99	70	70	70	70	70
Manganese	-	-	-	-	1.1	1.1	1.2	1.2	1.3	-	-	-	0.027	0.027	0.027	0.027	0.027	0.5	0.5	0.5	0.5	0.5
Molybdenum	-	-	-	-	0.42	0.42	0.45	0.45	0.45	-	-	-	0.0073	0.0073	0.0073	0.0073	0.0073	0.082	0.082	0.082	0.082	0.082
Nickel	-	-	-	-	0.0005	0.0005	0.00054	0.00057	0.00057	-	-	-	0.001	0.001	0.001	0.001	0.001	0.0014	0.0014	0.0014	0.0014	0.0014
Potassium	-	-	-	-	13	13	13	14	14	-	-	-	2.8	2.8	2.8	2.8	2.8	2.4	2.4	2.4	2.4	2.4
Selenium	-	-	-	-	0.002	0.0023	0.0042	0.0062	0.0065	-	-	-	0.32	0.32	0.32	0.32	0.32	0.23	0.23	0.23	0.23	0.23
Silicon	-	-	-	-	8	8.1	8.2	8.3	8.4	-	-	-	10	10	10	10	10	9.9	9.9	9.9	9.9	9.9
Silver	-	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	0.000011	0.000011	0.000011	0.000011	0.000011
Sodium	-	-	-	-	87	88	92	95	96	-	-	-	18	18	18	18	18	16	16	16	16	16
Strontium	-	-	-	-	2.7	2.7	2.7	2.8	2.9	-	-	-	1.4	1.4	1.4	1.4	1.4	1.1	1.1	1.1	1.1	1.1
Thallium	-	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	-	-	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	0.01	0.01	0.01	0.01	0.01	0.027	0.027	0.027	0.027	0.027
Uranium	-	-	-	-	0.0021	0.0021	0.0023	0.0026	0.0027	-	-	-	0.000035	0.000035	0.000035	0.000035	0.000035	0.00051	0.00051	0.00051	0.00051	0.00051
Vanadium	-	-	-	-	0.00076	0.00077	0.00084	0.00087	0.00087	-	-	-	0.001	0.001	0.001	0.001	0.001	0.0025	0.0025	0.0025	0.0025	0.0025
Zinc	-	-	-	-	0.003	0.003	0.0034	0.0038	0.0038	-	-	-	0.006	0.006	0.006	0.006	0.006	0.0056	0.0056	0.0056	0.0056	0.0056
Dissolved Metals	-	-	-	-	4					-	-	-	1					1				
Aluminum	-	-	-	-	0.003	0.003	0.003	0.0033	0.0034	-	-	-	0.0044	0.0044	0.0044	0.0044	0.0044	0.0061	0.0061	0.0061	0.0061	0.0061
Antimony	-	-	-	-	0.00015	0.00015	0.00018	0.00021	0.00021	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Arsenic	-	-	-	-	0.0023	0.0023	0.0025	0.0026	0.0026	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.00045	0.00045	0.00045	0.00045	0.00045
Barium	-	-	-	-	0.025	0.025	0.027	0.027	0.027	-	-	-	0.08	0.08	0.08	0.08	0.08	0.057	0.057	0.057	0.057	0.057
Berylium	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron	-	-	-	-	0.13	0.13	0.15	0.18	0.18	-	-	-	0.024	0.024	0.024	0.024	0.024	0.034	0.034	0.034	0.034	0.034
Cadmium	-	-	-	-	0.00015	0.00016	0.00024	0.00026	0.00027	-	-	-	0.000082	0.000082	0.000082	0.000082	0.000082	0.000055	0.000055	0.000055	0.000055	0.000055
Calcium	-	-	-	-	170	180	180	190	200	-	-	-	360	360	360	360	360	290	290	290	290	290
Chromium	-	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	-	-	0.0014	0.0014	0.0015	0.0016	0.0017	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Copper	-	-	-	-	0.011	0.011	0.013	0.014	0.014	-	-	-	0.0024	0.0024	0.0024	0.0024	0.0024	0.0062	0.0062	0.0062	0.0062	0.0062
Iron	-	-	-	-	0.24	0.24	0.25	0.26	0.26	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Lithium	-	-	-	-	0.011	0.011	0.011	0.011	0.011	-	-	-	0.002	0.002	0.002	0.002	0.002	0.0033	0.0033	0.0033	0.0033	0.0033
Magnesium	-	-	-	-	21	21	23	24	25	-	-	-	94	94	94	94	94	68	68	68	68	68
Manganese	-	-	-	-	1	1	1.1	1.2	1.2	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.022	0.022	0.022	0.022	0.022
Molybdenum	-	-	-	-	0.41	0.41	0.42	0.45	0.45	-	-	-	0.007	0.007	0.007	0.007	0.007	0.072	0.072	0.072	0.072	0.072
Nickel	-	-	-	-	0.0005	0.0005	0.00052	0.00057	0.00058	-	-	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Potassium	-	-	-	-	12	12	13	14	14	-	-	-	2.9	2.9	2.9	2.9	2.9	2.4	2.4	2.4	2.4	2.4
Selenium	-	-	-	-	0.0022	0.0024	0.0039	0.0062	0.0065	-	-	-	0.31	0.31	0.31	0.31	0.31	0.24	0.24	0.24	0.24	0.24
Silicon	-	-	-	-	7.1	7.1	7.7	8.4	8.4	-	-	-	9.7	9.7	9.7	9.7	9.7	8.9	8.9	8.9	8.9	8.9
Silver	-	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Sodium	-	-	-	-	82	83	90	95	96	-	-	-	18	18	18	18	18	16	16	16	16	16
Strontium	-	-	-	-	2.6	2.6	2.7	2.9	3	-	-	-	1.4	1.4	1.4	1.4	1.4	1.1	1.1	1.1	1.1	1.1
Thallium	-	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Tin	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Titanium	-	-	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	SERDS Seep 6	SERDS Seep 7	SERDS Seep 8	SERDS Seep 9	South Toe Drain					TSF Clean Water Ditch	TSF Haul Road Seep 1	TSF Haul Road Seep 10	TSF Haul Road Seep 11					TSF Haul Road Seep 12				
Uranium	-	-	-	-	0.002	0.0021	0.0022	0.0026	0.0027	-	-	-	0.000033	0.000033	0.000033	0.000033	0.000033	0.00049	0.00049	0.00049	0.00049	0.00049
Vanadium	-	-	-	-	0.0006	0.00061	0.00067	0.00068	0.00068	-	-	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc	-	-	-	-	0.003	0.003	0.0034	0.0047	0.0049	-	-	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	TSF Haul Road Seep 14	TSF Haul Road Seep 15	TSF Haul Road Seep 16					TSF Haul Road Seep 17	TSF Haul Road Seep 3	TSF Haul Road Seep 4	TSF Haul Road Seep 5					TSF Haul Road Seep 6				
Parameter			Minimum	5th Percentile	Median	95th Percentile	Maximum				Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	-	-	2					-	-	-	2					1				
pH	-	-	7.3	7.3	7.4	7.5	7.5	-	-	-	7.7	7.7	7.9	8	8.1	7.9	7.9	7.9	7.9	7.9
Conductivity	-	-	2.3	110	1100	2100	2200	-	-	-	1000	1000	1000	1100	1100	1100	1100	1100	1100	1100
Temprature	-	-	0.1	0.18	0.85	1.5	1.6	-	-	-	3.8	3.8	4	4.2	4.2	2.4	2.4	2.4	2.4	2.4
Turbidity	-	-	1.3	1.3	1.9	2.4	2.5	-	-	-	0.41	0.53	1.6	2.7	2.8	3.3	3.3	3.3	3.3	3.3
Physical Tests	-	-	2					-	-	-	2					1				
Conductivity	-	-	2100	2100	2100	2200	2200	-	-	-	970	970	1000	1000	1100	980	980	980	980	980
Hardness (as CaCO3)	-	-	1200	1200	1300	1300	1300	-	-	-	490	500	530	560	570	490	490	490	490	490
pH	-	-	7.7	7.7	7.8	7.9	8	-	-	-	8	8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Total Suspended Solids	-	-	4.8	7.2	29	51	53	-	-	-	1	1	1.2	1.4	1.4	1.1	1.1	1.1	1.1	1.1
Total Dissolved Solids	-	-	1900	1900	1900	1900	1900	-	-	-	680	680	730	780	790	760	760	760	760	760
Turbidity	-	-	0.2	1.1	9.1	17	18	-	-	-	0.14	0.14	0.15	0.15	0.15	0.25	0.25	0.25	0.25	0.25
Anions and Nutrients	-	-	2					-	-	-	2					1				
Alkalinity, Total (as CaCO3)	-	-	84	84	85	86	86	-	-	-	98	99	100	110	110	100	100	100	100	100
Ammonia, Total (as N)	-	-	0.005	0.0051	0.0058	0.0064	0.0065	-	-	-	0.005	0.0052	0.0073	0.0094	0.0096	0.018	0.018	0.018	0.018	0.018
Chloride	-	-	5	5.3	7.5	9.8	10	-	-	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Fluoride	-	-	0.2	0.21	0.3	0.39	0.4	-	-	-	0.59	0.59	0.59	0.59	0.59	0.54	0.54	0.54	0.54	0.54
Nitrate (as N)	-	-	40	40	41	43	43	-	-	-	3.5	3.5	4.1	4.8	4.8	3.3	3.3	3.3	3.3	3.3
Nitrite (as N)	-	-	0.01	0.011	0.015	0.02	0.02	-	-	-	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Total Nitrogen	-	-	41	41	43	45	45	-	-	-	3.3	3.4	4.3	5.3	5.4	3.4	3.4	3.4	3.4	3.4
Orthophosphate-Dissolved (as P)	-	-	0.001	0.0024	0.015	0.027	0.028	-	-	-	0.0064	0.0066	0.0083	0.0099	0.01	0.012	0.012	0.012	0.012	0.012
Phosphorus - Total Dissolved	-	-	0.0094	0.011	0.021	0.031	0.032	-	-	-	0.0099	0.0099	0.01	0.01	0.01	0.014	0.014	0.014	0.014	0.014
Phosphorus - Total	-	-	0.037	0.037	0.042	0.047	0.047	-	-	-	0.011	0.011	0.012	0.013	0.013	0.024	0.024	0.024	0.024	0.024
Sulfate	-	-	1000	1000	1100	1100	1200	-	-	-	430	430	440	450	460	420	420	420	420	420
Organic Carbon	-	-	2					-	-	-	2					1				
Dissolved Organic Carbon	-	-	6	6.1	6.3	6.6	6.6	-	-	-	1.3	1.3	1.4	1.5	1.6	1.9	1.9	1.9	1.9	1.9
Total Metals	-	-	2					-	-	-	2					1				
Aluminum	-	-	0.02	0.046	0.28	0.52	0.55	-	-	-	0.045	0.045	0.047	0.049	0.049	0.022	0.022	0.022	0.022	0.022
Antimony	-	-	0.00029	0.00029	0.00032	0.00035	0.00035	-	-	-	0.0023	0.0023	0.0023	0.0023	0.0023	0.0024	0.0024	0.0024	0.0024	0.0024
Arsenic	-	-	0.00056	0.00058	0.00076	0.00094	0.00096	-	-	-	0.0029	0.0029	0.0031	0.0033	0.0033	0.0032	0.0032	0.0032	0.0032	0.0032
Barium	-	-	0.032	0.033	0.044	0.054	0.055	-	-	-	0.02	0.02	0.021	0.021	0.021	0.024	0.024	0.024	0.024	0.024
Berylium	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	-	-	0.087	0.091	0.12	0.16	0.16	-	-	-	0.046	0.046	0.047	0.048	0.048	0.045	0.045	0.045	0.045	0.045
Cadmium	-	-	0.00009	0.000091	0.000095	0.0001	0.0001	-	-	-	0.00014	0.00014	0.00015	0.00015	0.00015	0.00013	0.00013	0.00013	0.00013	0.00013
Calcium	-	-	370	370	390	410	410	-	-	-	160	160	160	160	160	160	160	160	160	160
Chromium	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	0.0002	0.00022	0.00044	0.00066	0.00068	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.00015	0.00015	0.00015	0.00015	0.00015
Copper	-	-	0.0039	0.0055	0.019	0.033	0.035	-	-	-	0.008	0.0081	0.0092	0.01	0.011	0.0074	0.0074	0.0074	0.0074	0.0074
Iron	-	-	0.03	0.061	0.34	0.62	0.65	-	-	-	0.051	0.052	0.057	0.061	0.062	0.03	0.03	0.03	0.03	0.03
Lead	-	-	0.0001	0.00011	0.00016	0.00022	0.00023	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	-	-	0.007	0.0071	0.0079	0.0086	0.0087	-	-	-	0.013	0.013	0.013	0.014	0.014	0.013	0.013	0.013	0.013	0.013
Magnesium	-	-	84	87	110	140	140	-	-	-	33	33	33	34	34	34	34	34	34	34
Manganese	-	-	0.0045	0.013	0.091	0.17	0.18	-	-	-	0.0072	0.0078	0.013	0.018	0.019	0.026	0.026	0.026	0.026	0.026
Molybdenum	-	-	0.22	0.23	0.32	0.41	0.42	-	-	-	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17
Nickel	-	-	0.001	0.001	0.0012	0.0013	0.0013	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	-	-	2	2.2	4.5	6.7	7	-	-	-	0.76	0.76	0.77	0.79	0.79	0.83	0.83	0.83	0.83	0.83
Selenium	-	-	0.24	0.24	0.28	0.31	0.31	-	-	-	0.081	0.081	0.084	0.086	0.086	0.08	0.08	0.08	0.08	0.08
Silicon	-	-	6.9	6.9	7.4	7.9	7.9	-	-	-	12	12	12	12	12	12	12	12	12	12
Silver	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	-	-	24	30	81	130	140	-	-	-	12	12	12	12	13	12	12	12	12	12
Strontium	-	-	1.8	1.8	2	2.2	2.2	-	-	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Thallium	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	-	-	0.01	0.011	0.018	0.026	0.027	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium	-	-	0.0021	0.0021	0.0025	0.0028	0.0028	-	-	-	0.0059	0.0059	0.0062	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
Vanadium	-	-	0.001	0.0011	0.0015	0.002	0.002	-	-	-	0.0017	0.0017	0.0018	0.0019	0.0019	0.0016	0.0016	0.0016	0.0016	0.0016
Zinc	-	-	0.006	0.006	0.006	0.006	0.006	-	-	-	0.0064	0.0064	0.0064	0.0064	0.0064	0.0041	0.0041	0.0041	0.0041	0.0041
Dissolved Metals	-	-	2					-	-	-	2					1				
Aluminum	-	-	0.0045	0.0045	0.0046	0.0046	0.0046	-	-	-	0.003	0.0032	0.005	0.0067	0.0069	0.003	0.003	0.003	0.003	0.003
Antimony	-	-	0.00022	0.00022	0.00025	0.00028	0.00028	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
Arsenic	-	-	0.00024	0.00025	0.00039	0.00052	0.00053	-	-	-	0.0028	0.0028	0.003	0.0031	0.0031	0.003	0.003	0.003	0.003	0.003
Barium	-	-	0.03	0.031	0.038	0.046	0.047	-	-	-	0.019	0.019	0.02	0.022	0.022	0.024	0.024	0.024	0.024	0.024
Berylium	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	-	-	0.06	0.061	0.071	0.08	0.081	-	-	-	0.042	0.042	0.045	0.047	0.047	0.038	0.038	0.038	0.038	0.038
Cadmium	-	-	0.000075	0.000077	0.00009	0.0001	0.00011	-	-	-	0.00012	0.00012	0.00013	0.00013	0.00014	0.00012	0.00012	0.00012	0.00012	0.00012
Calcium	-	-	360	360	370	390	390	-	-	-	150	150	160	170	170	150	150	150	150	150
Chromium	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.00012	0.00012	0.00012	0.00012	0.00012
Copper	-	-	0.0021	0.0021	0.0027	0.0032	0.0032	-	-	-	0.0049	0.0049	0.0049	0.005	0.005	0.0056	0.0056	0.0056	0.0056	0.0056
Iron	-	-	0.03	0.03	0.03	0.03	0.03	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	-	-	0.0045	0.0046	0.0055	0.0063	0.0064	-	-	-	0.012	0.012	0.013	0.014	0.014	0.012	0.012	0.012	0.012	0.012
Magnesium	-	-	77	77	79	81	81	-	-	-	30	31	32	33	33	31	31	31	31	31
Manganese	-	-	0.0011	0.0011	0.0018	0.0024	0.0025	-	-	-	0.0018	0.0018	0.0022	0.0026	0.0026	0.023	0.023	0.023	0.023	0.023
Molybdenum	-	-	0.21	0.22	0.31	0.4	0.41	-	-	-	0.16	0.16	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16
Nickel	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	-	-	1.9	2	2.1	2.2	2.2	-	-	-	0.72	0.72	0.76	0.81	0.81	0.75	0.75	0.75	0.75	0.75
Selenium	-	-	0.23	0.24	0.27	0.31	0.31	-	-	-	0.079	0.079	0.082	0.084	0.084	0.075	0.075	0.075	0.075	0.075
Silicon	-	-	6.6	6.6	6.6	6.7	6.7	-	-	-	11	11	11	11	11	11	11	11	11	11
Silver	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	-	-	21	21	22	22	22	-	-	-	12	12	12	12	12	11	11	11	11	11
Strontium	-	-	1.7	1.7	1.9	2	2	-	-	-	0.37	0.37	0.39	0.42	0.42	0.37	0.37	0.37	0.37	0.37
Thallium	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	TSF Haul Road Seep 14	TSF Haul Road Seep 15	TSF Haul Road Seep 16					TSF Haul Road Seep 17	TSF Haul Road Seep 3	TSF Haul Road Seep 4	TSF Haul Road Seep 5					TSF Haul Road Seep 6				
Uranium	-	-	0.0015	0.0016	0.0021	0.0027	0.0027	-	-	-	0.0056	0.0056	0.0059	0.0062	0.0063	0.0062	0.0062	0.0062	0.0062	0.0062
Vanadium	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	0.0015	0.0015	0.0015	0.0015	0.0015	0.0013	0.0013	0.0013	0.0013	0.0013
Zinc	-	-	0.003	0.003	0.003	0.003	0.003	-	-	-	0.0051	0.0051	0.0052	0.0052	0.0052	0.0039	0.0039	0.0039	0.0039	0.0039

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	TSF Haul Road Seep 7
Parameter	
Field Parameters	-
pH	-
Conductivity	-
Temprature	-
Turbidity	-
Physical Tests	-
Conductivity	-
Hardness (as CaCO3)	-
pH	-
Total Suspended Solids	-
Total Dissolved Solids	-
Turbidity	-
Anions and Nutrients	-
Alkalinity, Total (as CaCO3)	-
Ammonia, Total (as N)	-
Chloride	-
Fluoride	-
Nitrate (as N)	-
Nitrite (as N)	-
Total Nitrogen	-
Orthophosphate-Dissolved (as P)	-
Phosphorus - Total Dissolved	-
Phosphorus - Total	-
Sulfate	-
Organic Carbon	-
Dissolved Organic Carbon	-
Total Metals	-
Aluminum	-
Antimony	-
Arsenic	-
Barium	-
Berylium	-
Bismuth	-
Boron	-
Cadmium	-
Calcium	-
Chromium	-
Cobalt	-
Copper	-
Iron	-
Lead	-
Lithium	-
Magnesium	-
Manganese	-
Molybdenum	-
Nickel	-
Potassium	-
Selenium	-
Silicon	-
Silver	-
Sodium	-
Strontium	-
Thallium	-
Tin	-
Titanium	-
Uranium	-
Vanadium	-
Zinc	-
Dissolved Metals	-
Aluminum	-
Antimony	-
Arsenic	-
Barium	-
Berylium	-
Bismuth	-
Boron	-
Cadmium	-
Calcium	-
Chromium	-
Cobalt	-
Copper	-
Iron	-
Lead	-
Lithium	-
Magnesium	-
Manganese	-
Molybdenum	-
Nickel	-
Potassium	-
Selenium	-
Silicon	-
Silver	-
Sodium	-
Strontium	-
Thallium	-
Tin	-
Titanium	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	TSF Haul Road Seep 7
Uranium	-
Vanadium	-
Zinc	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	TSF Haul Road Seep 8					TSF Haul Road Seep 9	TSF Road 5a	Waste Haul Road Seep 1	Waste Haul Road Seep 10	Waste Haul Road Seep 11					Waste Haul Road Seep 12	Waste Haul Road Seep 13	Waste Haul Road Seep 14	Waste Haul Road Seep 15
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum					Minimum	5th Percentile	Median	95th Percentile	Maximum				
Field Parameters	2					-	-	-	-	0					-	-	-	-
pH	7.1	7.1	7.2	7.2	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity	1000	1000	1000	1100	1100	-	-	-	-	-	-	-	-	-	-	-	-	-
Temprature	1.9	2.1	4.1	6.1	6.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	2	2	2.2	2.4	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Tests	2					-	-	-	-	1					-	-	-	-
Conductivity	1000	1000	1000	1000	1000	-	-	-	-	2200	2200	2200	2200	2200	-	-	-	-
Hardness (as CaCO3)	510	510	530	550	550	-	-	-	-	1300	1300	1300	1300	1300	-	-	-	-
pH	7.6	7.6	7.8	8.1	8.1	-	-	-	-	7.7	7.7	7.7	7.7	7.7	-	-	-	-
Total Suspended Solids	3.5	3.5	3.6	3.6	3.6	-	-	-	-	4.7	4.7	4.7	4.7	4.7	-	-	-	-
Total Dissolved Solids	770	770	770	780	780	-	-	-	-	2000	2000	2000	2000	2000	-	-	-	-
Turbidity	0.19	0.2	0.26	0.31	0.32	-	-	-	-	3.2	3.2	3.2	3.2	3.2	-	-	-	-
Anions and Nutrients	2					-	-	-	-	1					-	-	-	-
Alkalinity, Total (as CaCO3)	93	93	93	93	93	-	-	-	-	68	68	68	68	68	-	-	-	-
Ammonia, Total (as N)	0.005	0.005	0.005	0.005	0.005	-	-	-	-	0.005	0.005	0.005	0.005	0.005	-	-	-	-
Chloride	2.5	2.5	2.5	2.5	2.5	-	-	-	-	10	10	10	10	10	-	-	-	-
Fluoride	0.13	0.13	0.15	0.16	0.16	-	-	-	-	0.4	0.4	0.4	0.4	0.4	-	-	-	-
Nitrate (as N)	4.9	5	5.4	5.8	5.9	-	-	-	-	66	66	66	66	66	-	-	-	-
Nitrite (as N)	0.005	0.005	0.005	0.005	0.005	-	-	-	-	0.02	0.02	0.02	0.02	0.02	-	-	-	-
Total Nitrogen	4.5	4.6	5.5	6.3	6.4	-	-	-	-	70	70	70	70	70	-	-	-	-
Orthophosphate-Dissolved (as P)	0.0011	0.0013	0.0029	0.0044	0.0046	-	-	-	-	0.012	0.012	0.012	0.012	0.012	-	-	-	-
Phosphorus - Total Dissolved	0.004	0.0041	0.0051	0.0061	0.0062	-	-	-	-	0.016	0.016	0.016	0.016	0.016	-	-	-	-
Phosphorus - Total	0.0093	0.0096	0.013	0.015	0.016	-	-	-	-	0.022	0.022	0.022	0.022	0.022	-	-	-	-
Sulfate	440	440	450	450	450	-	-	-	-	1000	1000	1000	1000	1000	-	-	-	-
Organic Carbon	2					-	-	-	-	1					-	-	-	-
Dissolved Organic Carbon	0.66	0.67	0.74	0.81	0.82	-	-	-	-	4.9	4.9	4.9	4.9	4.9	-	-	-	-
Total Metals	2					-	-	-	-	1					-	-	-	-
Aluminum	0.029	0.037	0.1	0.17	0.18	-	-	-	-	0.079	0.079	0.079	0.079	0.079	-	-	-	-
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Arsenic	0.0002	0.0002	0.00021	0.00022	0.00022	-	-	-	-	0.00025	0.00025	0.00025	0.00025	0.00025	-	-	-	-
Barium	0.014	0.014	0.015	0.017	0.017	-	-	-	-	0.077	0.077	0.077	0.077	0.077	-	-	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Boron	0.029	0.029	0.03	0.031	0.031	-	-	-	-	0.026	0.026	0.026	0.026	0.026	-	-	-	-
Cadmium	0.00018	0.00019	0.0003	0.00041	0.00042	-	-	-	-	0.00011	0.00011	0.00011	0.00011	0.00011	-	-	-	-
Calcium	130	130	140	140	140	-	-	-	-	360	360	360	360	360	-	-	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-
Cobalt	0.0001	0.0001	0.00013	0.00015	0.00015	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Copper	0.0026	0.003	0.0066	0.01	0.011	-	-	-	-	0.0057	0.0057	0.0057	0.0057	0.0057	-	-	-	-
Iron	0.03	0.037	0.1	0.16	0.17	-	-	-	-	0.081	0.081	0.081	0.081	0.081	-	-	-	-
Lead	0.00005	0.000051	0.000062	0.000073	0.000074	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Lithium	0.0042	0.0042	0.0043	0.0044	0.0044	-	-	-	-	0.002	0.002	0.002	0.002	0.002	-	-	-	-
Magnesium	40	40	41	42	42	-	-	-	-	99	99	99	99	99	-	-	-	-
Manganese	0.0086	0.0091	0.013	0.018	0.018	-	-	-	-	0.027	0.027	0.027	0.027	0.027	-	-	-	-
Molybdenum	0.0061	0.0061	0.0061	0.0061	0.0061	-	-	-	-	0.0073	0.0073	0.0073	0.0073	0.0073	-	-	-	-
Nickel	0.0005	0.0005	0.00053	0.00056	0.00056	-	-	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Potassium	2.5	2.5	2.5	2.5	2.5	-	-	-	-	2.8	2.8	2.8	2.8	2.8	-	-	-	-
Selenium	0.092	0.092	0.093	0.094	0.095	-	-	-	-	0.32	0.32	0.32	0.32	0.32	-	-	-	-
Silicon	8.9	8.9	9.3	9.7	9.7	-	-	-	-	10	10	10	10	10	-	-	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-
Sodium	9.3	9.3	9.3	9.3	9.3	-	-	-	-	18	18	18	18	18	-	-	-	-
Strontium	0.48	0.48	0.49	0.5	0.5	-	-	-	-	1.4	1.4	1.4	1.4	1.4	-	-	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	-
Uranium	0.00032	0.00032	0.00033	0.00034	0.00034	-	-	-	-	0.000035	0.000035	0.000035	0.000035	0.000035	-	-	-	-
Vanadium	0.00068	0.00069	0.00076	0.00082	0.00083	-	-	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Zinc	0.0086	0.0087	0.01	0.011	0.011	-	-	-	-	0.006	0.006	0.006	0.006	0.006	-	-	-	-
Dissolved Metals	2					-	-	-	-	1					-	-	-	-
Aluminum	0.003	0.003	0.003	0.003	0.003	-	-	-	-	0.0044	0.0044	0.0044	0.0044	0.0044	-	-	-	-
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Arsenic	0.00011	0.00011	0.00013	0.00015	0.00015	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Barium	0.011	0.012	0.012	0.013	0.014	-	-	-	-	0.08	0.08	0.08	0.08	0.08	-	-	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Boron	0.029	0.029	0.029	0.029	0.029	-	-	-	-	0.024	0.024	0.024	0.024	0.024	-	-	-	-
Cadmium	0.00017	0.00017	0.00017	0.00017	0.00017	-	-	-	-	0.000082	0.000082	0.000082	0.000082	0.000082	-	-	-	-
Calcium	140	140	140	150	150	-	-	-	-	360	360	360	360	360	-	-	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Copper	0.0014	0.0014	0.0015	0.0016	0.0016	-	-	-	-	0.0024	0.0024	0.0024	0.0024	0.0024	-	-	-	-
Iron	0.03	0.03	0.03	0.03	0.03	-	-	-	-	0.03	0.03	0.03	0.03	0.03	-	-	-	-
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-
Lithium	0.0036	0.0036	0.0039	0.0042	0.0042	-	-	-	-	0.002	0.002	0.002	0.002	0.002	-	-	-	-
Magnesium	41	41	42	42	42	-	-	-	-	94	94	94	94	94	-	-	-	-
Manganese	0.0032	0.0034	0.005	0.0067	0.0068	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	-
Molybdenum	0.0057	0.0057	0.0058	0.0058	0.0059	-	-	-	-	0.007	0.007	0.007	0.007	0.007	-	-	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Potassium	2.3	2.3	2.4	2.5	2.5	-	-	-	-	2.9	2.9	2.9	2.9	2.9	-	-	-	-
Selenium	0.088	0.088	0.089	0.089	0.089	-	-	-	-	0.31	0.31	0.31	0.31	0.31	-	-	-	-
Silicon	8.2	8.2	8.3	8.5	8.5	-	-	-	-	9.7	9.7	9.7	9.7	9.7	-	-	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-
Sodium	9.3	9.3	9.6	9.9	9.9	-	-	-	-	18	18	18	18	18	-	-	-	-
Strontium	0.48	0.48	0.49	0.49	0.5	-	-	-	-	1.4	1.4	1.4	1.4	1.4	-	-	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	0.00002	0.00002	0.00002	0.00002	0.00002	-	-	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	TSF Haul Road Seep 8					TSF Haul Road Seep 9	TSF Road 5a	Waste Haul Road Seep 1	Waste Haul Road Seep 10	Waste Haul Road Seep 11					Waste Haul Road Seep 12	Waste Haul Road Seep 13	Waste Haul Road Seep 14	Waste Haul Road Seep 15
Uranium	0.00032	0.00032	0.00032	0.00032	0.00033	-	-	-	-	0.000033	0.000033	0.000033	0.000033	0.000033	-	-	-	-
Vanadium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	0.001	0.001	0.001	0.001	0.001	-	-	-	-
Zinc	0.0073	0.0073	0.0078	0.0082	0.0082	-	-	-	-	0.003	0.003	0.003	0.003	0.003	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 16	Waste Haul Road Seep 17	Waste Haul Road Seep 18	Waste Haul Road Seep 19					Waste Haul Road Seep 2	Waste Haul Road Seep 20	Waste Haul Road Seep 21	Waste Haul Road Seep 22	Waste Haul Road Seep 23	Waste Haul Road Seep 24	Waste Haul Road Seep 25
Parameter				Minimum	5th Percentile	Median	95th Percentile	Maximum							
Field Parameters	-	-	-	2					-	-	-	-	-	-	-
pH	-	-	-	8	8	8	8	8	-	-	-	-	-	-	-
Conductivity	-	-	-	520	570	1000	1500	1600	-	-	-	-	-	-	-
Temprature	-	-	-	1.4	1.4	1.4	1.4	1.4	-	-	-	-	-	-	-
Turbidity	-	-	-	0.13	0.69	5.8	11	11	-	-	-	-	-	-	-
Physical Tests	-	-	-	2					-	-	-	-	-	-	-
Conductivity	-	-	-	480	530	990	1400	1500	-	-	-	-	-	-	-
Hardness (as CaCO3)	-	-	-	220	250	550	850	880	-	-	-	-	-	-	-
pH	-	-	-	7.9	7.9	8	8.1	8.1	-	-	-	-	-	-	-
Total Suspended Solids	-	-	-	1	2.3	14	26	28	-	-	-	-	-	-	-
Total Dissolved Solids	-	-	-	360	410	870	1300	1400	-	-	-	-	-	-	-
Turbidity	-	-	-	0.32	1.1	8.5	16	17	-	-	-	-	-	-	-
Anions and Nutrients	-	-	-	2					-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	-	-	-	76	78	95	110	110	-	-	-	-	-	-	-
Ammonia, Total (as N)	-	-	-	0.005	0.0051	0.0058	0.0064	0.0065	-	-	-	-	-	-	-
Chloride	-	-	-	0.5	0.6	1.5	2.4	2.5	-	-	-	-	-	-	-
Fluoride	-	-	-	0.12	0.13	0.14	0.16	0.16	-	-	-	-	-	-	-
Nitrate (as N)	-	-	-	1.1	1.2	1.9	2.5	2.6	-	-	-	-	-	-	-
Nitrite (as N)	-	-	-	0.0027	0.0028	0.0039	0.0049	0.005	-	-	-	-	-	-	-
Total Nitrogen	-	-	-	1.5	1.6	2.2	2.9	3	-	-	-	-	-	-	-
Orthophosphate-Dissolved (as P)	-	-	-	0.0019	0.0021	0.0039	0.0057	0.0059	-	-	-	-	-	-	-
Phosphorus - Total Dissolved	-	-	-	0.0062	0.0063	0.0069	0.0075	0.0076	-	-	-	-	-	-	-
Phosphorus - Total	-	-	-	0.0076	0.0094	0.026	0.042	0.044	-	-	-	-	-	-	-
Sulfate	-	-	-	160	190	470	740	770	-	-	-	-	-	-	-
Organic Carbon	-	-	-	2					-	-	-	-	-	-	-
Dissolved Organic Carbon	-	-	-	2.2	2.3	2.5	2.7	2.7	-	-	-	-	-	-	-
Total Metals	-	-	-	2					-	-	-	-	-	-	-
Aluminum	-	-	-	0.019	0.067	0.49	0.92	0.97	-	-	-	-	-	-	-
Antimony	-	-	-	0.00021	0.00022	0.00027	0.00032	0.00033	-	-	-	-	-	-	-
Arsenic	-	-	-	0.0005	0.00052	0.00074	0.00096	0.00098	-	-	-	-	-	-	-
Barium	-	-	-	0.03	0.031	0.039	0.048	0.049	-	-	-	-	-	-	-
Berylium	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-	-	-
Bismuth	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-	-
Boron	-	-	-	0.026	0.027	0.033	0.039	0.04	-	-	-	-	-	-	-
Cadmium	-	-	-	0.00007	0.000072	0.000085	0.000099	0.0001	-	-	-	-	-	-	-
Calcium	-	-	-	65	74	160	240	250	-	-	-	-	-	-	-
Chromium	-	-	-	0.0005	0.00052	0.00071	0.0009	0.00092	-	-	-	-	-	-	-
Cobalt	-	-	-	0.0001	0.00014	0.00049	0.00083	0.00087	-	-	-	-	-	-	-
Copper	-	-	-	0.011	0.013	0.026	0.038	0.04	-	-	-	-	-	-	-
Iron	-	-	-	0.036	0.076	0.44	0.8	0.84	-	-	-	-	-	-	-
Lead	-	-	-	0.00005	0.000061	0.00016	0.00026	0.00027	-	-	-	-	-	-	-
Lithium	-	-	-	0.0044	0.0045	0.0053	0.006	0.0061	-	-	-	-	-	-	-
Magnesium	-	-	-	13	14	29	44	46	-	-	-	-	-	-	-
Manganese	-	-	-	0.069	0.072	0.1	0.13	0.13	-	-	-	-	-	-	-
Molybdenum	-	-	-	0.062	0.069	0.13	0.19	0.2	-	-	-	-	-	-	-
Nickel	-	-	-	0.00053	0.00057	0.00095	0.0013	0.0014	-	-	-	-	-	-	-
Potassium	-	-	-	1.3	1.3	1.6	1.8	1.8	-	-	-	-	-	-	-
Selenium	-	-	-	0.048	0.055	0.12	0.18	0.19	-	-	-	-	-	-	-
Silicon	-	-	-	7.3	7.5	9	10	11	-	-	-	-	-	-	-
Silver	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	-	-	-
Sodium	-	-	-	6.8	7.2	11	15	15	-	-	-	-	-	-	-
Strontium	-	-	-	0.2	0.23	0.44	0.65	0.67	-	-	-	-	-	-	-
Thallium	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	-	-	-
Tin	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-	-	-
Titanium	-	-	-	0.01	0.012	0.032	0.053	0.055	-	-	-	-	-	-	-
Uranium	-	-	-	0.0007	0.0008	0.0017	0.0025	0.0026	-	-	-	-	-	-	-
Vanadium	-	-	-	0.00053	0.00066	0.0019	0.0031	0.0032	-	-	-	-	-	-	-
Zinc	-	-	-	0.003	0.0031	0.0039	0.0046	0.0047	-	-	-	-	-	-	-
Dissolved Metals	-	-	-	2					-	-	-	-	-	-	-
Aluminum	-	-	-	0.003	0.0031	0.0045	0.0058	0.0059	-	-	-	-	-	-	-
Antimony	-	-	-	0.0002	0.00021	0.00025	0.0003	0.0003	-	-	-	-	-	-	-
Arsenic	-	-	-	0.00049	0.00049	0.00051	0.00052	0.00052	-	-	-	-	-	-	-
Barium	-	-	-	0.023	0.023	0.025	0.028	0.028	-	-	-	-	-	-	-
Berylium	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-	-	-
Bismuth	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-	-
Boron	-	-	-	0.026	0.027	0.032	0.037	0.038	-	-	-	-	-	-	-
Cadmium	-	-	-	0.00005	0.000052	0.000065	0.000079	0.00008	-	-	-	-	-	-	-
Calcium	-	-	-	67	77	170	260	270	-	-	-	-	-	-	-
Chromium	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	-	-	-
Cobalt	-	-	-	0.0001	0.0001	0.00014	0.00018	0.00018	-	-	-	-	-	-	-
Copper	-	-	-	0.0091	0.0092	0.0097	0.01	0.01	-	-	-	-	-	-	-
Iron	-	-	-	0.03	0.03	0.03	0.03	0.03	-	-	-	-	-	-	-
Lead	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-	-
Lithium	-	-	-	0.0033	0.0034	0.0047	0.0059	0.006	-	-	-	-	-	-	-
Magnesium	-	-	-	13	14	30	46	47	-	-	-	-	-	-	-
Manganese	-	-	-	0.071	0.072	0.082	0.093	0.094	-	-	-	-	-	-	-
Molybdenum	-	-	-	0.06	0.066	0.12	0.17	0.18	-	-	-	-	-	-	-
Nickel	-	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-	-	-	-	-
Potassium	-	-	-	1.1	1.2	1.5	1.8	1.8	-	-	-	-	-	-	-
Selenium	-	-	-	0.046	0.053	0.12	0.18	0.18	-	-	-	-	-	-	-
Silicon	-	-	-	6.6	6.7	7.2	7.8	7.9	-	-	-	-	-	-	-
Silver	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	-	-	-
Sodium	-	-	-	7	7.4	12	16	16	-	-	-	-	-	-	-
Strontium	-	-	-	0.2	0.23	0.44	0.66	0.69	-	-	-	-	-	-	-
Thallium	-	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-	-	-	-	-
Tin	-	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	-	-	-	-
Titanium	-	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 16	Waste Haul Road Seep 17	Waste Haul Road Seep 18	Waste Haul Road Seep 19					Waste Haul Road Seep 2	Waste Haul Road Seep 20	Waste Haul Road Seep 21	Waste Haul Road Seep 22	Waste Haul Road Seep 23	Waste Haul Road Seep 24	Waste Haul Road Seep 25
Uranium	-	-	-	0.00067	0.00076	0.0016	0.0024	0.0025	-	-	-	-	-	-	-
Vanadium	-	-	-	0.0005	0.00051	0.00061	0.0007	0.00071	-	-	-	-	-	-	-
Zinc	-	-	-	0.003	0.003	0.003	0.003	0.003	-	-	-	-	-	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 26	Waste Haul Road Seep 27	Waste Haul Road Seep 28					Waste Haul Road Seep 4				
Parameter			Minimum	5th Percentile	Median	95th Percentile	Maximum	Minimum	5th Percentile	Median	95th Percentile	Maximum
Field Parameters	-	-	2					2				
pH	-	-	7.8	7.9	8	8.1	8.2	7.8	7.9	8	8.1	8.2
Conductivity	-	-	400	400	430	470	470	400	400	430	470	470
Temprature	-	-	3.2	3.3	3.8	4.3	4.3	3.2	3.3	3.8	4.3	4.3
Turbidity	-	-	0.05	0.2	1.5	2.9	3	0.05	0.2	1.5	2.9	3
Physical Tests	-	-	2					2				
Conductivity	-	-	400	400	430	450	450	400	400	430	450	450
Hardness (as CaCO3)	-	-	180	180	190	200	200	180	180	190	200	200
pH	-	-	8	8	8.1	8.1	8.1	8	8	8.1	8.1	8.1
Total Suspended Solids	-	-	1	1	1	1	1	1	1	1	1	1
Total Dissolved Solids	-	-	290	290	310	320	320	290	290	310	320	320
Turbidity	-	-	0.74	0.77	1	1.3	1.4	0.74	0.77	1	1.3	1.4
Anions and Nutrients	-	-	2					2				
Alkalinity, Total (as CaCO3)	-	-	82	82	88	94	95	82	82	88	94	95
Ammonia, Total (as N)	-	-	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Chloride	-	-	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Fluoride	-	-	0.14	0.14	0.16	0.18	0.18	0.14	0.14	0.16	0.18	0.18
Nitrate (as N)	-	-	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Nitrite (as N)	-	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Nitrogen	-	-	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.9	1.9
Orthophosphate-Dissolved (as P)	-	-	0.022	0.022	0.025	0.028	0.028	0.022	0.022	0.025	0.028	0.028
Phosphorus - Total Dissolved	-	-	0.024	0.024	0.027	0.03	0.031	0.024	0.024	0.027	0.03	0.031
Phosphorus - Total	-	-	0.027	0.027	0.03	0.032	0.032	0.027	0.027	0.03	0.032	0.032
Sulfate	-	-	95	97	120	140	140	95	97	120	140	140
Organic Carbon	-	-	2					2				
Dissolved Organic Carbon	-	-	1.2	1.2	1.5	1.8	1.8	1.2	1.2	1.5	1.8	1.8
Total Metals	-	-	2					2				
Aluminum	-	-	0.028	0.029	0.039	0.049	0.05	0.028	0.029	0.039	0.049	0.05
Antimony	-	-	0.00013	0.00013	0.00014	0.00014	0.00014	0.00013	0.00013	0.00014	0.00014	0.00014
Arsenic	-	-	0.0026	0.0027	0.0033	0.0039	0.004	0.0026	0.0027	0.0033	0.0039	0.004
Barium	-	-	0.01	0.011	0.012	0.014	0.014	0.01	0.011	0.012	0.014	0.014
Berylium	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	-	-	0.23	0.24	0.3	0.36	0.37	0.23	0.24	0.3	0.36	0.37
Cadmium	-	-	0.00002	0.000021	0.000025	0.00003	0.00003	0.00002	0.000021	0.000025	0.00003	0.00003
Calcium	-	-	50	50	53	56	57	50	50	53	56	57
Chromium	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper	-	-	0.0051	0.0051	0.0056	0.0061	0.0062	0.0051	0.0051	0.0056	0.0061	0.0062
Iron	-	-	0.039	0.04	0.048	0.056	0.057	0.039	0.04	0.048	0.056	0.057
Lead	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Magnesium	-	-	11	11	12	12	12	11	11	12	12	12
Manganese	-	-	0.0076	0.0078	0.0091	0.01	0.011	0.0076	0.0078	0.0091	0.01	0.011
Molybdenum	-	-	0.03	0.03	0.036	0.041	0.042	0.03	0.03	0.036	0.041	0.042
Nickel	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	-	-	0.69	0.7	0.75	0.8	0.81	0.69	0.7	0.75	0.8	0.81
Selenium	-	-	0.011	0.011	0.013	0.016	0.016	0.011	0.011	0.013	0.016	0.016
Silicon	-	-	12	12	13	14	14	12	12	13	14	14
Silver	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	-	-	7.3	7.3	7.6	7.8	7.8	7.3	7.3	7.6	7.8	7.8
Strontium	-	-	0.25	0.25	0.26	0.26	0.27	0.25	0.25	0.26	0.26	0.27
Thallium	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium	-	-	0.0003	0.0003	0.0003	0.00031	0.00031	0.0003	0.0003	0.0003	0.00031	0.00031
Vanadium	-	-	0.0029	0.0029	0.0032	0.0035	0.0035	0.0029	0.0029	0.0032	0.0035	0.0035
Zinc	-	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Dissolved Metals	-	-	2					2				
Aluminum	-	-	0.003	0.003	0.0033	0.0036	0.0036	0.003	0.003	0.0033	0.0036	0.0036
Antimony	-	-	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012
Arsenic	-	-	0.0025	0.0026	0.0032	0.0038	0.0039	0.0025	0.0026	0.0032	0.0038	0.0039
Barium	-	-	0.0094	0.0095	0.011	0.012	0.012	0.0094	0.0095	0.011	0.012	0.012
Berylium	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron	-	-	0.23	0.24	0.3	0.37	0.37	0.23	0.24	0.3	0.37	0.37
Cadmium	-	-	0.00001	0.000011	0.000018	0.000024	0.000025	0.00001	0.000011	0.000018	0.000024	0.000025
Calcium	-	-	54	54	55	57	57	54	54	55	57	57
Chromium	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper	-	-	0.0032	0.0032	0.0032	0.0032	0.0032	0.0032	0.0032	0.0032	0.0032	0.0032
Iron	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium	-	-	0.0021	0.0021	0.0023	0.0025	0.0025	0.0021	0.0021	0.0023	0.0025	0.0025
Magnesium	-	-	11	11	12	13	13	11	11	12	13	13
Manganese	-	-	0.0061	0.0062	0.0072	0.0082	0.0083	0.0061	0.0062	0.0072	0.0082	0.0083
Molybdenum	-	-	0.027	0.028	0.034	0.039	0.04	0.027	0.028	0.034	0.039	0.04
Nickel	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Potassium	-	-	0.68	0.69	0.71	0.73	0.74	0.68	0.69	0.71	0.73	0.74
Selenium	-	-	0.011	0.011	0.013	0.015	0.016	0.011	0.011	0.013	0.015	0.016
Silicon	-	-	11	11	12	13	14	11	11	12	13	14
Silver	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium	-	-	7.8	7.8	8	8.1	8.2	7.8	7.8	8	8.1	8.2
Strontium	-	-	0.25	0.25	0.26	0.26	0.27	0.25	0.25	0.26	0.26	0.27
Thallium	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 26	Waste Haul Road Seep 27	Waste Haul Road Seep 28					Waste Haul Road Seep 4				
Uranium	-	-	0.00028	0.00028	0.00029	0.0003	0.0003	0.00028	0.00028	0.00029	0.0003	0.0003
Vanadium	-	-	0.0026	0.0027	0.003	0.0033	0.0033	0.0026	0.0027	0.003	0.0033	0.0033
Zinc	-	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 5					Waste Haul Road Seep 6	Waste Haul Road Seep 7
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum		
Field Parameters	1					-	-
pH	7.8	7.8	7.8	7.8	7.8	-	-
Conductivity	560	560	560	560	560	-	-
Temprature	4.6	4.6	4.6	4.6	4.6	-	-
Turbidity	4.7	4.7	4.7	4.7	4.7	-	-
Physical Tests	1					-	-
Conductivity	540	540	540	540	540	-	-
Hardness (as CaCO3)	240	240	240	240	240	-	-
pH	8.2	8.2	8.2	8.2	8.2	-	-
Total Suspended Solids	31	31	31	31	31	-	-
Total Dissolved Solids	380	380	380	380	380	-	-
Turbidity	3.9	3.9	3.9	3.9	3.9	-	-
Anions and Nutrients	1					-	-
Alkalinity, Total (as CaCO3)	110	110	110	110	110	-	-
Ammonia, Total (as N)	0.0095	0.0095	0.0095	0.0095	0.0095	-	-
Chloride	3.4	3.4	3.4	3.4	3.4	-	-
Fluoride	0.11	0.11	0.11	0.11	0.11	-	-
Nitrate (as N)	0.65	0.65	0.65	0.65	0.65	-	-
Nitrite (as N)	0.0014	0.0014	0.0014	0.0014	0.0014	-	-
Total Nitrogen	1	1	1	1	1	-	-
Orthophosphate-Dissolved (as P)	0.047	0.047	0.047	0.047	0.047	-	-
Phosphorus - Total Dissolved	0.049	0.049	0.049	0.049	0.049	-	-
Phosphorus - Total	0.082	0.082	0.082	0.082	0.082	-	-
Sulfate	170	170	170	170	170	-	-
Organic Carbon	1					-	-
Dissolved Organic Carbon	3.8	3.8	3.8	3.8	3.8	-	-
Total Metals	1					-	-
Aluminum	0.3	0.3	0.3	0.3	0.3	-	-
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Arsenic	0.00083	0.00083	0.00083	0.00083	0.00083	-	-
Barium	0.025	0.025	0.025	0.025	0.025	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Boron	0.062	0.062	0.062	0.062	0.062	-	-
Cadmium	0.000025	0.000025	0.000025	0.000025	0.000025	-	-
Calcium	73	73	73	73	73	-	-
Chromium	0.00092	0.00092	0.00092	0.00092	0.00092	-	-
Cobalt	0.00029	0.00029	0.00029	0.00029	0.00029	-	-
Copper	0.017	0.017	0.017	0.017	0.017	-	-
Iron	0.33	0.33	0.33	0.33	0.33	-	-
Lead	0.00015	0.00015	0.00015	0.00015	0.00015	-	-
Lithium	0.0016	0.0016	0.0016	0.0016	0.0016	-	-
Magnesium	16	16	16	16	16	-	-
Manganese	0.1	0.1	0.1	0.1	0.1	-	-
Molybdenum	0.031	0.031	0.031	0.031	0.031	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Potassium	1.4	1.4	1.4	1.4	1.4	-	-
Selenium	0.014	0.014	0.014	0.014	0.014	-	-
Silicon	12	12	12	12	12	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Sodium	8.1	8.1	8.1	8.1	8.1	-	-
Strontium	0.3	0.3	0.3	0.3	0.3	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium	0.018	0.018	0.018	0.018	0.018	-	-
Uranium	0.00021	0.00021	0.00021	0.00021	0.00021	-	-
Vanadium	0.0017	0.0017	0.0017	0.0017	0.0017	-	-
Zinc	0.003	0.003	0.003	0.003	0.003	-	-
Dissolved Metals	1					-	-
Aluminum	0.0069	0.0069	0.0069	0.0069	0.0069	-	-
Antimony	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Arsenic	0.00054	0.00054	0.00054	0.00054	0.00054	-	-
Barium	0.015	0.015	0.015	0.015	0.015	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Boron	0.062	0.062	0.062	0.062	0.062	-	-
Cadmium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Calcium	70	70	70	70	70	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Copper	0.0046	0.0046	0.0046	0.0046	0.0046	-	-
Iron	0.03	0.03	0.03	0.03	0.03	-	-
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Lithium	0.0012	0.0012	0.0012	0.0012	0.0012	-	-
Magnesium	17	17	17	17	17	-	-
Manganese	0.077	0.077	0.077	0.077	0.077	-	-
Molybdenum	0.029	0.029	0.029	0.029	0.029	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Potassium	1.2	1.2	1.2	1.2	1.2	-	-
Selenium	0.013	0.013	0.013	0.013	0.013	-	-
Silicon	10	10	10	10	10	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Sodium	8.2	8.2	8.2	8.2	8.2	-	-
Strontium	0.3	0.3	0.3	0.3	0.3	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 5					Waste Haul Road Seep 6	Waste Haul Road Seep 7
Uranium	0.00019	0.00019	0.00019	0.00019	0.00019	-	-
Vanadium	0.00064	0.00064	0.00064	0.00064	0.00064	-	-
Zinc	0.003	0.003	0.003	0.003	0.003	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 8					Waste Haul Road Seep 9	Waste Haul Road Under Culvert	West Main Toe Drain					WHR 29	Wight Pit Clean Water Ditch
Parameter	Minimum	5th Percentile	Median	95th Percentile	Maximum			Minimum	5th Percentile	Median	95th Percentile	Maximum		
Field Parameters	1					-	-	19					-	-
pH	7.2	7.2	7.2	7.2	7.2	-	-	7.4	7.4	7.7	7.8	7.8	-	-
Conductivity	1000	1000	1000	1000	1000	-	-	640	1100	1300	1300	1300	-	-
Temprature	0.6	0.6	0.6	0.6	0.6	-	-	7.5	7.6	8.4	11	12	-	-
Turbidity	2.9	2.9	2.9	2.9	2.9	-	-	0.1	0.12	0.31	0.99	1.6	-	-
Physical Tests	1					-	-	4					-	-
Conductivity	950	950	950	950	950	-	-	1200	1200	1300	1300	1300	-	-
Hardness (as CaCO3)	480	480	480	480	480	-	-	400	410	430	450	450	-	-
pH	8.1	8.1	8.1	8.1	8.1	-	-	8	8	8.1	8.2	8.2	-	-
Total Suspended Solids	1	1	1	1	1	-	-	1	1	1	1	1	-	-
Total Dissolved Solids	740	740	740	740	740	-	-	910	910	930	940	950	-	-
Turbidity	0.9	0.9	0.9	0.9	0.9	-	-	0.12	0.12	0.16	0.27	0.28	-	-
Anions and Nutrients	1					-	-	4					-	-
Alkalinity, Total (as CaCO3)	82	82	82	82	82	-	-	110	110	110	110	110	-	-
Ammonia, Total (as N)	0.015	0.015	0.015	0.015	0.015	-	-	0.1	0.1	0.1	0.11	0.11	-	-
Chloride	2.8	2.8	2.8	2.8	2.8	-	-	20	20	21	21	22	-	-
Fluoride	0.1	0.1	0.1	0.1	0.1	-	-	0.76	0.76	0.79	0.82	0.82	-	-
Nitrate (as N)	2.7	2.7	2.7	2.7	2.7	-	-	0.025	0.025	0.025	0.025	0.025	-	-
Nitrite (as N)	0.005	0.005	0.005	0.005	0.005	-	-	0.005	0.005	0.005	0.005	0.005	-	-
Total Nitrogen	3.1	3.1	3.1	3.1	3.1	-	-	0.13	0.13	0.13	0.15	0.15	-	-
Orthophosphate-Dissolved (as P)	0.015	0.015	0.015	0.015	0.015	-	-	0.011	0.011	0.013	0.013	0.013	-	-
Phosphorus - Total Dissolved	0.018	0.018	0.018	0.018	0.018	-	-	0.023	0.024	0.025	0.027	0.027	-	-
Phosphorus - Total	0.022	0.022	0.022	0.022	0.022	-	-	0.022	0.022	0.024	0.026	0.026	-	-
Sulfate	440	440	440	440	440	-	-	500	510	530	560	560	-	-
Organic Carbon	1					-	-	4					-	-
Dissolved Organic Carbon	5.1	5.1	5.1	5.1	5.1	-	-	3.3	3.4	3.8	3.9	3.9	-	-
Total Metals	1					-	-	4					-	-
Aluminum	0.055	0.055	0.055	0.055	0.055	-	-	0.003	0.003	0.0031	0.0032	0.0032	-	-
Antimony	0.00014	0.00014	0.00014	0.00014	0.00014	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Arsenic	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	0.0019	0.0019	0.0021	0.0022	0.0022	-	-
Barium	0.036	0.036	0.036	0.036	0.036	-	-	0.043	0.044	0.045	0.046	0.046	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Boron	0.029	0.029	0.029	0.029	0.029	-	-	0.15	0.15	0.16	0.17	0.17	-	-
Cadmium	0.00004	0.00004	0.00004	0.00004	0.00004	-	-	0.00006	0.000063	0.00012	0.00072	0.00082	-	-
Calcium	140	140	140	140	140	-	-	140	140	140	150	150	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.00075	0.00075	0.00078	0.00084	0.00085	-	-
Copper	0.0078	0.0078	0.0078	0.0078	0.0078	-	-	0.0012	0.0013	0.0016	0.0018	0.0019	-	-
Iron	0.068	0.068	0.068	0.068	0.068	-	-	0.049	0.05	0.053	0.054	0.054	-	-
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Lithium	0.0015	0.0015	0.0015	0.0015	0.0015	-	-	0.0095	0.0095	0.01	0.011	0.011	-	-
Magnesium	28	28	28	28	28	-	-	24	24	25	26	26	-	-
Manganese	0.0087	0.0087	0.0087	0.0087	0.0087	-	-	0.65	0.65	0.67	0.7	0.7	-	-
Molybdenum	0.048	0.048	0.048	0.048	0.048	-	-	0.26	0.26	0.26	0.27	0.28	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.00054	0.00055	-	-
Potassium	1.5	1.5	1.5	1.5	1.5	-	-	20	20	20	20	20	-	-
Selenium	0.061	0.061	0.061	0.061	0.061	-	-	0.00019	0.00019	0.00023	0.00036	0.00038	-	-
Silicon	9.4	9.4	9.4	9.4	9.4	-	-	7.4	7.4	7.5	7.7	7.7	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Sodium	13	13	13	13	13	-	-	100	100	100	110	110	-	-
Strontium	0.45	0.45	0.45	0.45	0.45	-	-	2.9	2.9	3.1	3.2	3.2	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	-	-
Uranium	0.00042	0.00042	0.00042	0.00042	0.00042	-	-	0.0016	0.0016	0.0017	0.0019	0.0019	-	-
Vanadium	0.0014	0.0014	0.0014	0.0014	0.0014	-	-	0.00055	0.00055	0.00059	0.00065	0.00066	-	-
Zinc	0.003	0.003	0.003	0.003	0.003	-	-	0.003	0.003	0.003	0.003	0.003	-	-
Dissolved Metals	1					-	-	4					-	-
Aluminum	0.0035	0.0035	0.0035	0.0035	0.0035	-	-	0.003	0.003	0.003	0.0071	0.0078	-	-
Antimony	0.00014	0.00014	0.00014	0.00014	0.00014	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Arsenic	0.00045	0.00045	0.00045	0.00045	0.00045	-	-	0.0018	0.0019	0.0019	0.002	0.002	-	-
Barium	0.035	0.035	0.035	0.035	0.035	-	-	0.042	0.042	0.044	0.045	0.045	-	-
Berylium	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Bismuth	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Boron	0.029	0.029	0.029	0.029	0.029	-	-	0.13	0.14	0.15	0.18	0.18	-	-
Cadmium	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	0.0000056	0.000014	0.00006	0.000064	0.000065	-	-
Calcium	140	140	140	140	140	-	-	130	130	130	140	140	-	-
Chromium	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.0005	0.0005	-	-
Cobalt	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.00072	0.00072	0.00075	0.0008	0.0008	-	-
Copper	0.0065	0.0065	0.0065	0.0065	0.0065	-	-	0.0005	0.0005	0.0005	0.00068	0.00071	-	-
Iron	0.03	0.03	0.03	0.03	0.03	-	-	0.045	0.046	0.051	0.058	0.059	-	-
Lead	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	-	-
Lithium	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	0.009	0.009	0.0095	0.01	0.01	-	-
Magnesium	30	30	30	30	30	-	-	22	22	24	25	25	-	-
Manganese	0.0063	0.0063	0.0063	0.0063	0.0063	-	-	0.58	0.58	0.64	0.69	0.7	-	-
Molybdenum	0.046	0.046	0.046	0.046	0.046	-	-	0.25	0.25	0.26	0.27	0.27	-	-
Nickel	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	0.0005	0.0005	0.0005	0.00055	0.00056	-	-
Potassium	1.3	1.3	1.3	1.3	1.3	-	-	18	18	19	20	20	-	-
Selenium	0.059	0.059	0.059	0.059	0.059	-	-	0.00011	0.00013	0.0002	0.00033	0.00035	-	-
Silicon	8.5	8.5	8.5	8.5	8.5	-	-	6.4	6.5	7.2	7.7	7.7	-	-
Silver	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Sodium	14	14	14	14	14	-	-	95	95	100	110	110	-	-
Strontium	0.45	0.45	0.45	0.45	0.45	-	-	2.8	2.9	3.1	3.1	3.1	-	-
Thallium	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	0.00001	0.00001	0.00001	0.00001	0.00001	-	-
Tin	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	0.0001	0.0001	0.0001	0.0001	0.0001	-	-
Titanium	0.01	0.01	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.01	-	-

Appendix G - 2022 Contact and Seep Sampling Water Quality Summary Statistics

	Waste Haul Road Seep 8					Waste Haul Road Seep 9	Waste Haul Road Under Culvert	West Main Toe Drain					WHR 29	Wight Pit Clean Water Ditch
Uranium	0.0004	0.0004	0.0004	0.0004	0.0004	-	-	0.0016	0.0016	0.0016	0.0018	0.0018	-	-
Vanadium	0.00095	0.00095	0.00095	0.00095	0.00095	-	-	0.0005	0.0005	0.00051	0.00054	0.00054	-	-
Zinc	0.003	0.003	0.003	0.003	0.003	-	-	0.003	0.003	0.003	0.003	0.003	-	-

Appendix R

Investigation Reports

(Electronic format only)

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

Update to Minister/End-of-Spill Report Form

Environmental Emergency Program
SpillReports@gov.bc.ca

This report template can be completed to satisfy the requirements of either the End-of-Spill Report or the Update to Minister Report. Please specify which report you are completing in section I of this form. If any of the fields of this form are not applicable to the spill for which this form is being completed, indicate 'N/A' in the field; reports with incomplete fields will be sent back to the responsible person.

End-of-Spill Report: Section 6 of the Spill Reporting Regulation outlines the requirements for the End-of-Spill Report. Responsible persons must submit a written End-of-Spill Report to the Ministry of Environment and Climate Change Strategy within 30 days following the emergency response completion date of a spill as outlined in section 6 (1) of the Spill Reporting Regulation. Responsible persons must submit a written report to the Ministry of Environment and Climate Change Strategy as soon as practicable if either of the following two conditions are present:

1. The spill entered, or was likely to enter, a body of water as defined in the Spill Reporting Regulation
2. The quantity of the substance spilled was, or was likely to be, equal to or greater than the listed quantity for the listed substance as outlined in the Spill Reporting Regulation

Update to Minister Report: Section 5 of the Spill Reporting Regulation outlines the requirements for the Update to Minister Report. Responsible persons must submit a written report to the Ministry of Environment and Climate Change Strategy as soon as practicable if any of the following three conditions are present:

1. On request of the Minister
2. At least once every 30 days after the date that the spill began
3. At any time that the responsible person has reason to believe that information previously reported in the Initial Report has become inaccurate or incomplete

Complete this form and submit it by email to SpillReports@gov.bc.ca. For additional information, please visit the British Columbia Environmental Emergency Program Report a Spill webpage.

Dangerous Goods Incident Report (DGIR) number: 230286

Section I: Type of report
Sections 5 and 6 of Spill Reporting Regulation

This form is completed to satisfy the requirements of the:

☐ Update to Minister Report ☐ End-of-Spill Report

Section II: Contact information
Section 6 (2) (a) of the Spill Reporting Regulation

Details for person filling out the report	Name of company representative: Gabriel Holmes
	Company name: Mount Polley Mining Corporation
	Email: gabriel.holmes@mountpolley.com
	Address: PO Box 12, Likely, BC, V0L 1N0
	Telephone number: 236 317 4939

Details for responsible person Same as above ☑	Name of company representative:
	Company name:
	Email:
	Address:
	Telephone number:
Details for owner of the substance spilled Same as above ☑	Name of company representative:
	Company name:
	Email:
	Address:
	Telephone number:

Section III: Timing of the spill
Section 6 (2) (b) of the Spill Reporting Regulation

Date of spill: 2023-01-21 Time of spill: 01:20 Duration of the spill (days): <1

Date reported: 2023-01-23 Emergency response completion date[1]: 2023-01-21

Section IV: Site description
Section 6 (2) (c) (d) of the Spill Reporting Regulation

Provide a description of the spill site and the sites affected by the spill. The description of the spill site may include a description of the receiving environment, the proximity to a nearby city/town/roadway, the type of vegetation in the area, how densely populated the area is, accessibility to spill site, nearby waterways, and any other defining characteristics of the area.

The spill occurred in an active mining area within Mount Polley Mine. The spilled material reported to the frozen haul road. No vegetation or soils were present. No waterways were affected.

Latitude: Degrees 52 Minutes 32 Seconds 40.537

Longitude: Degrees 121 Minutes 38 Seconds 42.356

or

Site civic address or location: Street

City Postal Code

or

DLS or BCNTS (if applicable): Site ID number (if applicable):

[1] For the definition of the *emergency response completion date*, please refer to B.C. Reg. 187/2017 Spill Reporting Regulation

Section V: Description of the source, type, and quantity of the spill
Section 6 (2) (e) (f) of the Spill Reporting Regulation

Description of the source of the spill (pipeline, rail, truck, facility, etc.):

The spill occurred from a CAT 789 Haul Truck on the Waste Haul Road near the Cariboo Pit at Mount Polley Mine.

Type of substance spilled (common name): Recochem Ethylene Glycol Antifreeze, heavy duty, 50/50 premix

United Nations (UN) number of substance spilled (if applicable): N/A

Item number from the table in the Schedule in the Spill Reporting Regulation: 13

Quantity (in litres or kilograms) of the substance spilled – if the quantity is unknown, provide a reasonable estimate and explain why the quantity is unknown and cannot be determined: ~200L based on refilled quantity

Section VI: Description of the circumstances, cause, and impacts of the spill
Section 6 (2) (g) (i) (ii) (iii) of the Spill Reporting Regulation

Provide a description of the activity during which the spill occurred (transportation, transfer of cargo, fuelling, cleaning, maintenance, etc.):

Active production hauling

Provide a description of the incident leading to the spill (tank rupture, overfill, collision, rollover, derailment, fire, explosion, etc.):

The haul truck was operating normally when the driver observed steam coming from the engine area. The driver pulled over and stopped to evaluate. It was found that antifreeze was leaking from a failed radiator hose and onto the ground.

Provide a description of the underlying cause of the spill (human error, external conditions, organizational or management failure, etc.):

Mechanical failure. Failure of radiator hose.

Section VII: Impacts to human health, the environment, and infrastructure
Section 6 (2) (g) (iv) (v) of the Spill Reporting Regulation

Describe any adverse effects of the spill on human health (please state 'N/A' if there were no adverse effects on human health): N/A

Number of people evacuated: N/A

Number of fatalities: N/A

Number of people injured: N/A

Describe any adverse impacts on infrastructure[2] (please state 'N/A' if there were no adverse impacts to infrastructure):

N/A

Impacts to water

Was there an impact to a body of water? ☐ Yes ◯ No

[2] For the definition of *infrastructure,* refer to section 91.1 of the *Environmental Management Act 2003*

Description of impact:

N/A

Describe the body of water (stream, aquifer, fish habitat, naturally formed body of water, ditch, lake, etc.):

N/A

Name of body of water: N/A

Impacts to the environment

Was there an impact on flora (vegetation)? ☐ YES ◯ NO	If yes, list the common and species names: N/A

Provide a description of the impact on flora (oiled, removed, etc.):

N/A

Was there an impact on fauna (animals)? ☐ YES ◯ NO	If yes, list the common and species names: N/A

Provide a description of impact on fauna (include injured, dead, etc.):

N/A

Was there an impact on aquatic and/or terrestrial habitats? ☐ YES ◯ NO	If yes, list the type of habitat (riparian, breeding ground, etc.): N/A

Provide a description of impact on aquatic and terrestrial habitats, including response actions taken to restore any of the impacts listed:

N/A

Section VIII: Spill response actions **Section 6 (2) (h) of the Spill Reporting Regulation**		
Action taken to comply with section 91.2 of the *Environmental Management Act 2003*	Who took the action (company, person, contractor, etc.)	Date that the action was taken (click the arrow or enter the date using the format YYYY-MM-DD)
The spill was actioned by the Pit Shifter and the response was immediate. The spill was contained and was then cleaned up as per the spill response plan	Pit Shifter Roland Mailhot and Mount Polley Mine Operations personnel	2023-01-21
The spill was reported by mine management to the environmental department as outlined in the spill response plan.	Acting Mine Manager, John Thummerer	2023-01-22
The spill was reported to EMBC.	Environmental Coordinator, Gabriel Holmes	2023-01-23

Section IX: Waste disposal (please state 'N/A' if no waste was produced) **Section 6 (2) (i) of the Spill Reporting Regulation**		
List the type of waste	Method of disposal	Location of disposal
Contaminated spill pads	Outside services	GFL
Contaminated snow and ice	Outside services	GFL

Section X: Attached reports, maps, and photographs **Section 6 (2) (j) (k) of the Spill Reporting Regulation**	
Report of results of sampling, testing, monitoring, and/or assessing carried out during spill response actions (including reports from Qualified Professionals), if applicable	Copy attached ☑
Map of the incident site and areas surrounding the incident site (required)	Copy attached ☑
Photographs of the spill (required)	Copy attached ☑

Section XI: Agencies on scene or notified **Section 6 (2) (l) (m) of the Spill Reporting Regulation**
List the names of all agencies that were at the incident site: Mount Polley Mining Corporation

List the names of other persons or agencies that were advised about the spill:

BC Ministry of Environment representatives - Taylor Strosher, Luc Lachance, Abhirosh Chandran
Public Liaison Committee Members - all members (30) were notified including Xatsull FN and Williams Lake FN, local and regional government representatives

Section XII: Additional comments

N/A

Section XIII: Verification of information provided

I confirm that the above information is true and complete.

Name of person completing form:	Date completed (YYYY-MM-DD)
Gabriel Holmes	2023-01-23

Name of responsible person (person or company):	Date completed (YYYY-MM-DD)
Mount Polley Mining Corporation	2023-01-23

Section XIV: Approval - For internal use only

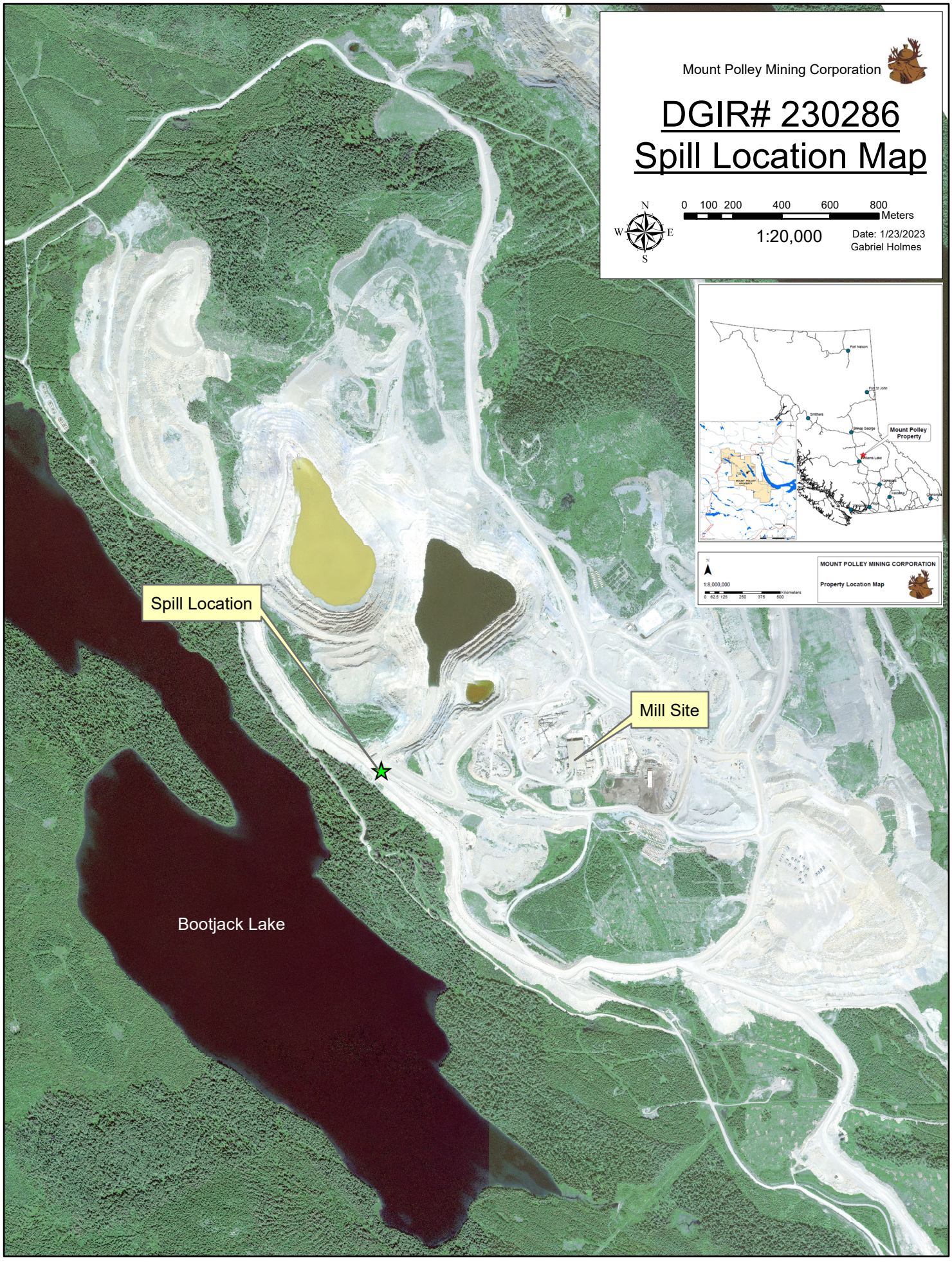
Reviewed by:	Date completed (YYYY-MM-DD)

Save Reset Form

Spill Report Form

Complete and forward to Environmental Department

DATE OF REPORT	Jan 21, 2023
DATE AND TIME OF SPILL	Jan 21, 2023 1:20 Am
NAME OF PERSON REPORTING SPILL	Roland Maillet
VOLUME OF MATERIAL SPILLED (report all quantities over 20 litres) ***If greater than 100 litres report to shift boss immediately.*	≈ 200 Liters
TYPE OF PRODUCT SPILLED	Antifreeze
DESCRIPTION OF HOW SPILL OCCURRED (include location, equipment and people involved)	lower Rad Hose on 15-036 Haul Truck failed
DESCRIPTION OF HOW SPILL WAS CLEANED UP	Buckets, Spill pads, Excavator and shovels placed into proper containments
SUPERVISOR NAME	Roland Maillet
SUPERVISOR SIGNATURE	
FOLLOW UP REQUIRED?	
Environmental Department: Name: _____ Sign: _____	


Mount Polley Mining Corporation
DGIR# 230286
Spill Location Map
N
W
E
S
0 100 200 400 600 800
Meters
1:20,000
Date: 1/23/2023
Gabriel Holmes
Mount Polley Property
MOUNT POLLEY MINING CORPORATION
Property Location Map
Spill Location
Mill Site
Bootjack Lake

Before

Before

After

Failed hose

GFL Bin

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

Update to Minister/End-of-Spill Report Form

Environmental Emergency Program
SpillReports@gov.bc.ca

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Update to Minister Report: Section 5 of the Spill Reporting Regulation outlines the requirements for the Update to Minister Report. Responsible persons must submit a written report to the Ministry of Environment and Climate Change Strategy as soon as practicable if any of the following three conditions are present:

1. On request of the Minister
2. At least once every 30 days after the date that the spill began
3. At any time that the responsible person has reason to believe that information previously reported in the Initial Report has become inaccurate or incomplete

Complete this form and submit it by email to SpillReports@gov.bc.ca. For additional information, please visit the British Columbia Environmental Emergency Program Report a Spill webpage.

Dangerous Goods Incident Report (DGIR) number: 230286

Section I: Type of report
Sections 5 and 6 of Spill Reporting Regulation

This form is completed to satisfy the requirements of the:

☐ Update to Minister Report ☐ End-of-Spill Report

Section II: Contact information
Section 6 (2) (a) of the Spill Reporting Regulation

Details for person filling out the report	Name of company representative: Gabriel Holmes
	Company name: Mount Polley Mining Corporation
	Email: gabriel.holmes@mountpolley.com
	Address: PO Box 12, Likely, BC, V0L 1N0
	Telephone number: 236 317 4939

Details for responsible person Same as above ☑	Name of company representative:
	Company name:
	Email:
	Address:
	Telephone number:
Details for owner of the substance spilled Same as above ☑	Name of company representative:
	Company name:
	Email:
	Address:
	Telephone number:

Section III: Timing of the spill
Section 6 (2) (b) of the Spill Reporting Regulation

Date of spill: 2023-01-21 Time of spill: 01:20 Duration of the spill (days): <1

Date reported: 2023-01-23 Emergency response completion date[1]: 2023-01-21

Section IV: Site description
Section 6 (2) (c) (d) of the Spill Reporting Regulation

Provide a description of the spill site and the sites affected by the spill. The description of the spill site may include a description of the receiving environment, the proximity to a nearby city/town/roadway, the type of vegetation in the area, how densely populated the area is, accessibility to spill site, nearby waterways, and any other defining characteristics of the area.

The spill occurred in an active mining area within Mount Polley Mine. The spilled material reported to the frozen haul road. No vegetation or soils were present. No waterways were affected.

Latitude: Degrees 52 Minutes 32 Seconds 40.537

Longitude: Degrees 121 Minutes 38 Seconds 42.356

or

Site civic address or location: Street

City Postal Code

or

DLS or BCNTS (if applicable): Site ID number (if applicable):

[1] For the definition of the *emergency response completion date*, please refer to B.C. Reg. 187/2017 Spill Reporting Regulation

Section V: Description of the source, type, and quantity of the spill **Section 6 (2) (e) (f) of the Spill Reporting Regulation**
Description of the source of the spill (pipeline, rail, truck, facility, etc.): The spill occurred from a CAT 789 Haul Truck on the Waste Haul Road near the Cariboo Pit at Mount Polley Mine.
Type of substance spilled (common name): Recochem Ethylene Glycol Antifreeze, heavy duty, 50/50 premix
United Nations (UN) number of substance spilled (if applicable): N/A
Item number from the table in the Schedule in the Spill Reporting Regulation: 13
Quantity (in litres or kilograms) of the substance spilled – if the quantity is unknown, provide a reasonable estimate and explain why the quantity is unknown and cannot be determined: ~200L based on refilled quantity

Section VI: Description of the circumstances, cause, and impacts of the spill **Section 6 (2) (g) (i) (ii) (iii) of the Spill Reporting Regulation**
Provide a description of the activity during which the spill occurred (transportation, transfer of cargo, fuelling, cleaning, maintenance, etc.): Active production hauling
Provide a description of the incident leading to the spill (tank rupture, overfill, collision, rollover, derailment, fire, explosion, etc.): The haul truck was operating normally when the driver observed steam coming from the engine area. The driver pulled over and stopped to evaluate. It was found that antifreeze was leaking from a failed radiator hose and onto the ground. The engine was stopped and response was initiated.
Provide a description of the underlying cause of the spill (human error, external conditions, organizational or management failure, etc.): Mechanical failure. Failure of radiator hose.

Section VII: Impacts to human health, the environment, and infrastructure **Section 6 (2) (g) (iv) (v) of the Spill Reporting Regulation**
Describe any adverse effects of the spill on human health (please state 'N/A' if there were no adverse effects on human health): N/A
Number of people evacuated: N/A
Number of fatalities: N/A
Number of people injured: N/A
Describe any adverse impacts on infrastructure[2] (please state 'N/A' if there were no adverse impacts to infrastructure): N/A
Impacts to water
Was there an impact to a body of water? ◯ Yes ◯ No

[2] For the definition of *infrastructure,* refer to section 91.1 of the *Environmental Management Act 2003*

Description of impact:

N/A

Describe the body of water (stream, aquifer, fish habitat, naturally formed body of water, ditch, lake, etc.):

N/A

Name of body of water: N/A

Impacts to the environment

Was there an impact on flora (vegetation)? ◯ YES ◯ NO	If yes, list the common and species names: N/A

Provide a description of the impact on flora (oiled, removed, etc.):

N/A

Was there an impact on fauna (animals)? ◯ YES ◯ NO	If yes, list the common and species names: N/A

Provide a description of impact on fauna (include injured, dead, etc.):

N/A

Was there an impact on aquatic and/or terrestrial habitats? ◯ YES ◯ NO	If yes, list the type of habitat (riparian, breeding ground, etc.): N/A

Provide a description of impact on aquatic and terrestrial habitats, including response actions taken to restore any of the impacts listed:

N/A

Section VIII: Spill response actions **Section 6 (2) (h) of the Spill Reporting Regulation**		
Action taken to comply with section 91.2 of the *Environmental Management Act 2003*	Who took the action (company, person, contractor, etc.)	Date that the action was taken (click the arrow or enter the date using the format YYYY-MM-DD)
The spill was actioned by the Pit Shifter and the response was immediate. The spill was contained and was then cleaned up as per the spill response plan	Pit Shifter Roland Mailhot and Mount Polley Mine Operations personnel	2023-01-21
The spill was reported by mine management to the environmental department as outlined in the spill response plan.	Acting Mine Manager, John Thummerer	2023-01-22
The spill was reported to EMBC.	Environmental Coordinator, Gabriel Holmes	2023-01-23

Section IX: Waste disposal (please state 'N/A' if no waste was produced) **Section 6 (2) (i) of the Spill Reporting Regulation**		
List the type of waste	Method of disposal	Location of disposal
Contaminated spill pads	Outside services	GFL
Contaminated snow and ice	Outside services	GFL

Section X: Attached reports, maps, and photographs **Section 6 (2) (j) (k) of the Spill Reporting Regulation**	
Report of results of sampling, testing, monitoring, and/or assessing carried out during spill response actions (including reports from Qualified Professionals), if applicable	Copy attached ☑
Map of the incident site and areas surrounding the incident site (required)	Copy attached ☑
Photographs of the spill (required)	Copy attached ☑

Section XI: Agencies on scene or notified **Section 6 (2) (l) (m) of the Spill Reporting Regulation**
List the names of all agencies that were at the incident site: Mount Polley Mining Corporation

List the names of other persons or agencies that were advised about the spill:

BC Ministry of Environment representatives - Taylor Strosher, Luc Lachance, Abhirosh Chandran
Public Liaison Committee Members - all members (30) were notified including Xatsull FN and Williams Lake FN, local and regional government representatives

Section XII: Additional comments

N/A

Section XIII: Verification of information provided

I confirm that the above information is true and complete.

Name of person completing form:	Date completed (YYYY-MM-DD)
Gabriel Holmes	2023-01-23

Name of responsible person (person or company):	Date completed (YYYY-MM-DD)
Mount Polley Mining Corporation	2023-01-23

Section XIV: Approval - For internal use only

Reviewed by:	Date completed (YYYY-MM-DD)

Save Reset Form

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Environmental Incident Report

Date of Incident: March 27, 2023	**Incident Reported:** March 28, 2023 **Final Report:** April 25, 2023
Incident: Lower Long Ditch Sump – Unauthorized Discharge	
Department: Technical Services/Environmental	**Supervisor:** Gabriel Holmes

BACKGROUND:

A 30" pipeline in the Mount Polley Mine site contact water collection system became obstructed and contact water spilled to the environment. A contingency pipeline at that location was engaged but was also partially obstructed by a pneumatic knife gate valve that had slowly closed from approximately 2013 to present due to depressurization of the cylinder. The contingency pipeline accommodated the flow eventually but not the initial surge of water once the pipeline was fully obstructed. The contingency pipeline was working as intended within ~6.75 hours. Increased flows were occurring in the ditch due to pumping water from the Wight Pit to supplement the onsite water treatment plant. The most recent inspection of ditch infrastructure conducted on March 8, 2023 by MPMC personnel did not identify the partially closed valve.

DESCRIPTION OF INCIDENT:

Monday March 27, 2023	
16:15	Pump watch personnel note in their daily log that the Lower Long Ditch Sump is in the "Yellow" on the gauge for visual inspections as described in the MPMC Water Management Inspection Manual and requires action.
16:30	Pump watch personnel travelled to the Wight Pit and turned off the pumps to reduce water volumes in the Long Ditch
17:20	Pump Watch personnel noted that the Upper Long Ditch Sump had very high-water level. Upon further inspections they observed the contingency Lower Long Ditch Sump was also high and that water was discharging from the sump towards the adjacent forest.
17:30	Pump Watch personnel notified the site supervisor
17:40-01:00	Site Services personnel periodically monitored the site for changes
23:00	Discharge ceased from the Long Ditch to the environment due to cessation of pumping from Wight Pit
Tuesday March 28, 2023	
06:30	MPMC Environmental coordinator notified of incident

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07:00	MPMC Environmental staff inspect the site and observed a partially closed knife gate on the contingency pipeline
08:00	Site services personnel opened and chained the knife gate on the contingency pipeline
10:00	BC Spill reporting hotline was called and the spill reported. DGIR # 231129
11:34	MPMC Public Liaison Committee notified of incident
12:02	BC Ministry of Environment Environmental Compliance notified of the event
13:00	Site services suspect that the pipeline is frozen but cannot determine where the obstruction is. A steam truck is used from the downstream end to find the obstruction but was not successful.
Wednesday March 29, 2023	
09:13	Environment and Climate Change Canada notified of the incident
Thursday March 30, 2023	
14:05	Call with Deborah Portman at ECCC to discuss incident and actions taken
Friday March 31, 2023	
08:00	Site services attempt to clear the pipeline by plunging it with an excavator and hear what sounds like ice moving within most of the length of the pipeline. Not successful.
Monday April 3, 2023	
12:00	Site services determined that ~300 m of the pipeline was frozen and applied mobile heaters to the pipeline. A steam truck was also assigned to thaw the pipe
Monday April 3, 2023 – April 7, 2023	
10:00	Site services use heaters and steam truck the thaw the pipeline. Multiple holes were drilled in the pipeline to facilitate steam thawing due to the length of frozen pipe.
Friday April 7, 2023	
12:00	Long Ditch Pipeline thawed, unobstructed and operating as intended

Summary

On the evening of March 27, 2023, a 30" HDPE pipeline at the end of the Long Ditch (LD), a component of the site contact water collection system, became obstructed. The pipeline drains from the Upper Long Ditch Sump towards the Central Collection Sump (CCS). Once the pipeline was obstructed the sump water level rose and engaged the contingency system comprised of the Lower Long Ditch Sump and an additional 30" HDPE pipeline. A pneumatic knife gate valve that was installed at the inlet of the contingency pipeline

was partially closed due to the cylinder "weeping" since it was installed in 2013. The partially closed knife gate prevented the full capacity of the contingency pipeline from being engaged. The contingency pipeline had approximately 50% capacity once engaged. The water flowing down the Long Ditch overwhelmed both sumps and the partially obstructed contingency pipeline. Once full, the Lower Long Ditch Sump discharged through the overflow channel to the environment.

The high-water levels were observed by MPMC Pump Watch personnel during routine daily inspections and action was immediately taken to cease all unnecessary flow in the Long Ditch. At the time of the incident water was being pumped from the Wight Pit, which is being used for temporary surplus water storage, to the Long Ditch. The pumps were turned off reducing the flow in the ditch by greater than 50%. Pumping from the Wight Pit comprised ~60% of the total water in the ditch.

Water quality samples were taken from the sump the following day. Water quality data sets used to evaluate "typical" chemistry at the discharge location are listed below. The sample names and locations are as follows:

LD – Long Ditch Sump. Includes combined chemistry from all sources
E10 – Wight Pit pump, end of pipe pumping from the Wight Pit
JCP – Joe's Creek Pipe, end of pipe gravity fed seepage collection from the North Bell Dump

The lab reports below represent the most recent water chemistry from the sites listed above. LD was sampled on March 28, 2023, E10 was sampled on March 21, 2023, and JCP was sampled on January 18, 2023. The LD sample from March 28 represents typical combined chemistry from all sources when the Wight Pit (E10) pumps are off.

It was determined that an estimate of between **1235.8** and **2471.6 cubic meters** of water was released from the Lower Long Ditch Sump to the adjacent forest. A precise volume could not be calculated because of the short and irregular discharge conditions.

The lab reports included below represent the most recent sample results for the spill location. MPMC maintains a large data set for the Long Ditch water chemistry and can make it available upon request. Additionally, no acute toxicity samples were taken due to the short nature of the event and the lack of qualified staff on site at the time. While MPMC does not have toxicological data for the Long Ditch System, toxicological reports can be provided for the MPMC Tailings Pond Supernatant and the regularly sampled Water Treatment Plant (HAD-3). This is somewhat relevant as the Long Ditch system provides a large proportion of the of the influent water supplied to the Water Treatment Plant.

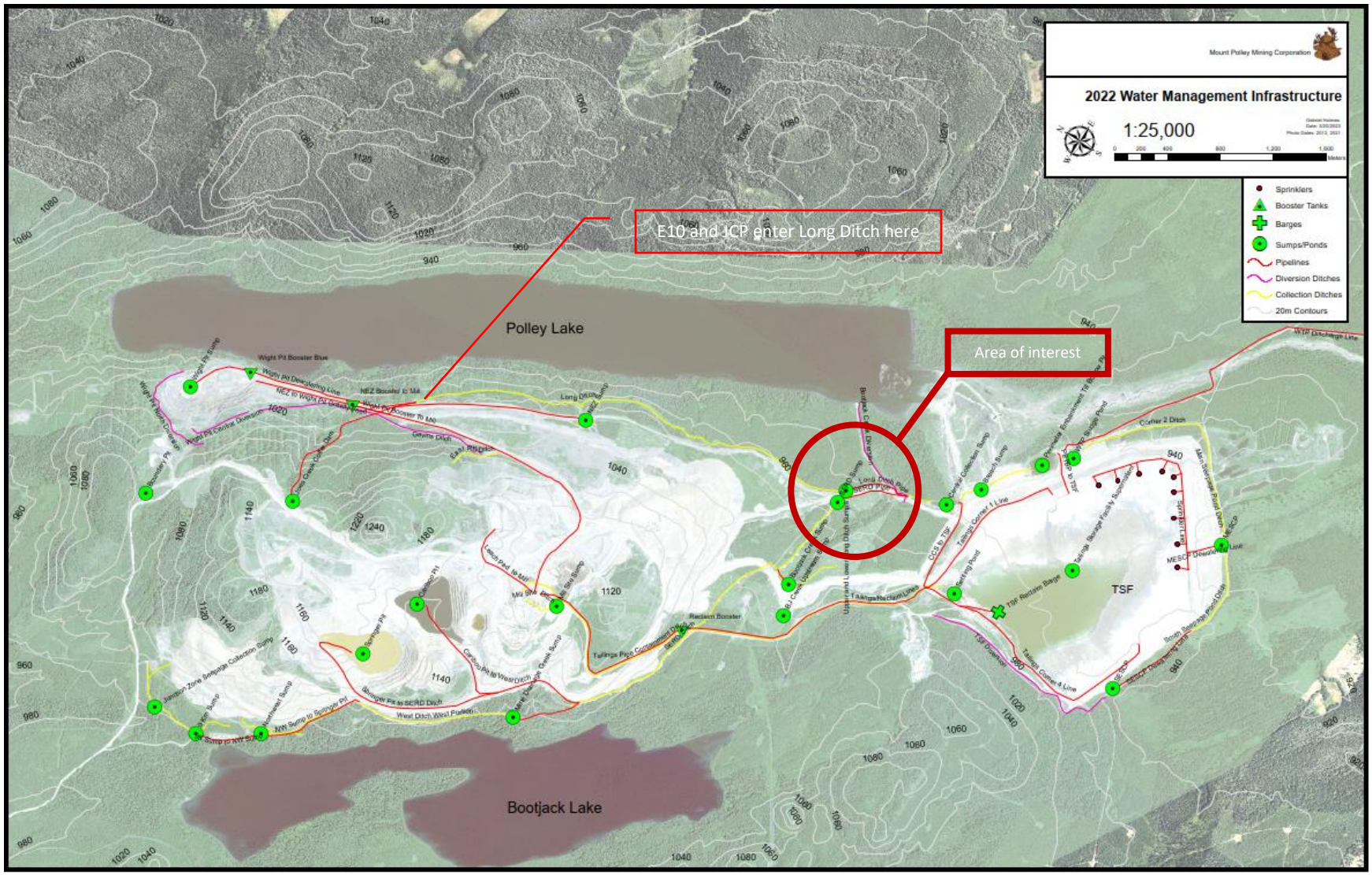

Figure 1 Water management infrastructure at Mount Polley Mine showing the area of interest.

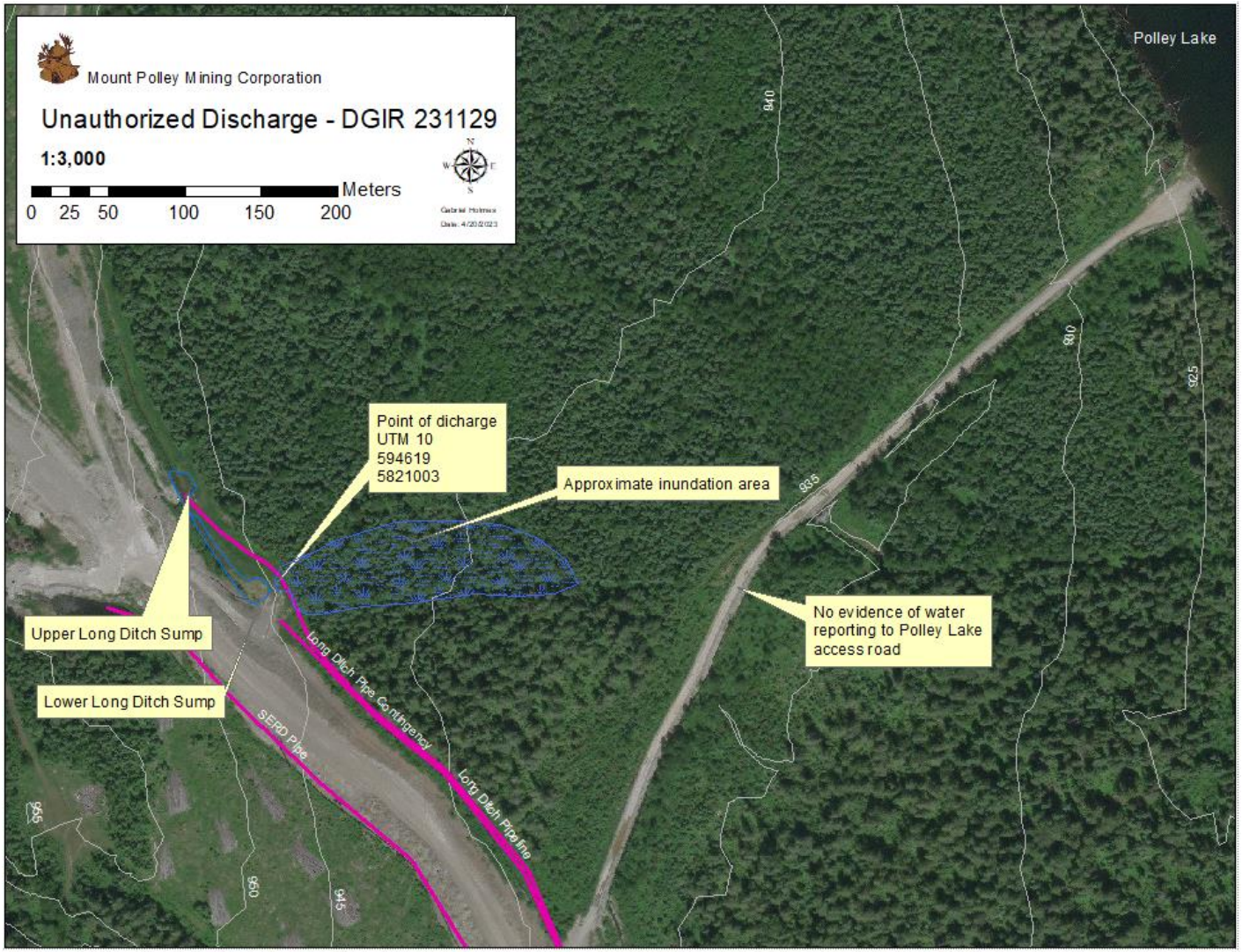

Figure 2 Incident location overview map.

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Volumetric Calculation

Flow rates were estimated using pumping rating curves from the Wight Pit pump, typical bucket flow measured rates at JCP and ocular estimates from site seepage rates. These are the best estimates based on the most recent available data. The length of time was determined to be the longest possible duration based on MPMC Pump Watch personnel's first observance of the sump being in the "yellow" zone on the sump gauge requiring immediate action. The sump discharged after the initial inspection but before the confirmation that that the sump was discharging. This assessment assumes that the contingency system was partially compromised. The contingency system accommodated ~50% of the flow.

Long Ditch Sump Discharge

A. Volume Estimates from Individual Sources in Long Ditch

Maximum Pumping Flow Rate from Wight Pit (E10) – ~ 0.0917 m3/sec (based on max. pump curve rate)
Discharge Period Duration – 24,300 seconds (6.75 hours)
Volume – 2,227.5 cubic meters

JCP Typical Flow Rate (JCP) – ~0.00404 m3/sec (average based on measured values from 2017 to present)
Discharge Period Duration – 24,300 seconds (6.75 hours)
Volume – 98.3 cubic meters

Estimated Site Seepage Flow Rate in Long Ditch (Seeps) - ~0.006 m3/sec (ocular estimate, compared to JCP flow rate with no Wight Pit pumping)
Discharge Period Duration – 24,300 seconds (6.75 hours)
Volume – 145.8 cubic meters

B. Total Volume Estimate in the Long Ditch

E10 volume 2,227.5 m3 + JCP volume 98.3 m3 + Seeps volume 145.8 m3 = 2,471.6 cubic meters
Total Volume Estimate in the Long Ditch over the Discharge Period – ~2,471.6 cubic meters

C. Volume Estimate to the Environment

Minus ~50% due to the contingency system being engaged
Total Long Ditch Volume 2,471.6 m3 – Contingency System 1,235.8 m3 = 1,235.8 cubic meters

Discharge Characteristics

The discharged substance was mine affected surface water runoff that was collected in water management infrastructure at Mount Polley Mine. The sump from which the discharge occurred serves to collect water from the east flank of the mine site and conveys it south towards the Tailings Storage Facility and the Water Treatment Plant. The discharged water flowed over the designed overflow spillway and reported to the adjacent forest. Field turbidity measurements taken the next day indicate that "typical" water in the Long Ditch has low turbidity. This indicates that very little particulate matter was being transported because of the spill.

The primary chemical constituent of concern is copper. The following charts show copper concentrations at the Long Ditch sample site (LD) and main inputs to the Long Ditch from 2021 to present. The main

inputs were pumping from the Wight Pit, sample site E10, and seepage from the North Bell Dump known as Joe's Creek Pipe or JCP. The concentrations in the tables below are compared to the BC Water Quality Guidelines and to the BC Contaminated Sites Regulation for reference.

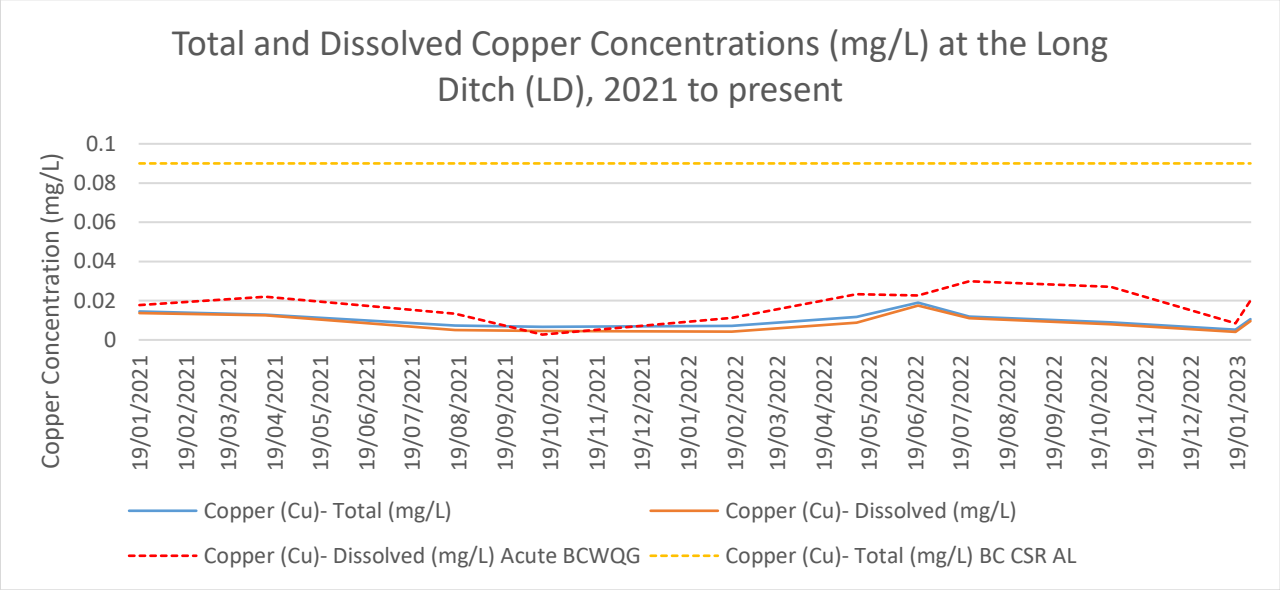

Figure 3 Copper concentrations at LD from 2021 to present compared to the BC CSR AL and the acute BCWQG. This sample site captures all inputs to the Long Ditch including the Wight Pit pumping, Joe's Creek Pipe (JCP) and all mine site seepage on the east flank of the mine.

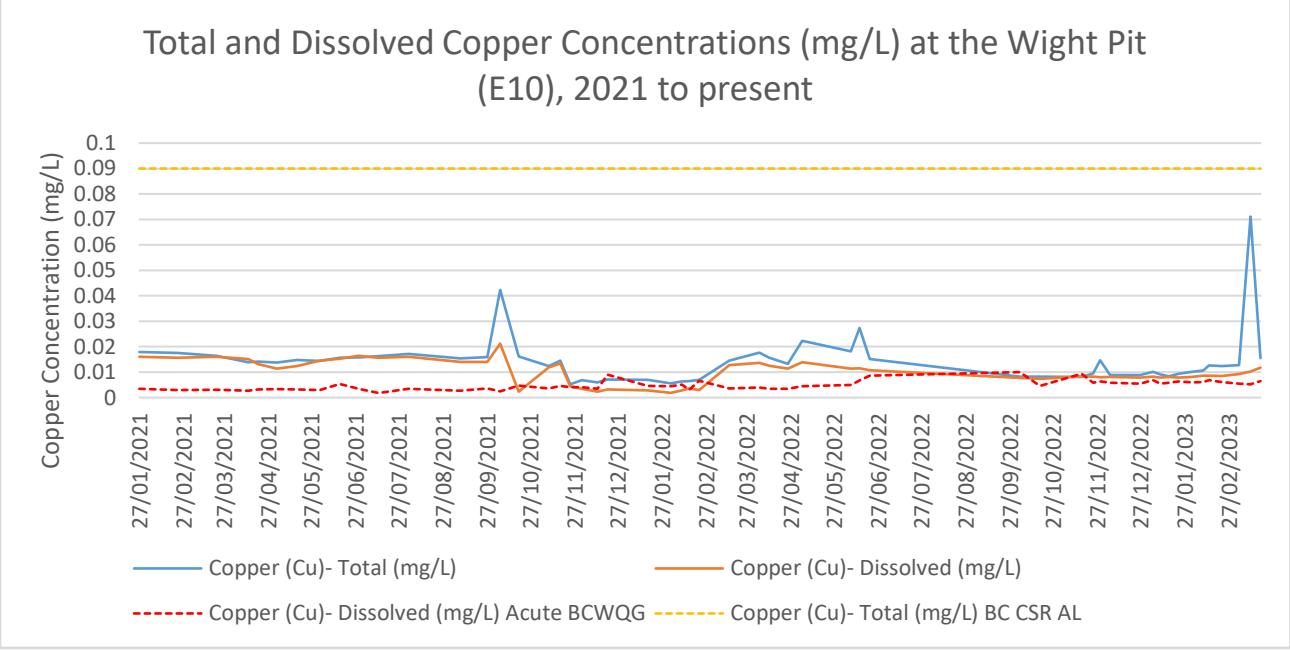

Figure 4 Copper concentrations from Wight Pit pumping (E10) from 2021 to present compared to the BC CSR AL and the acute BCWQG.

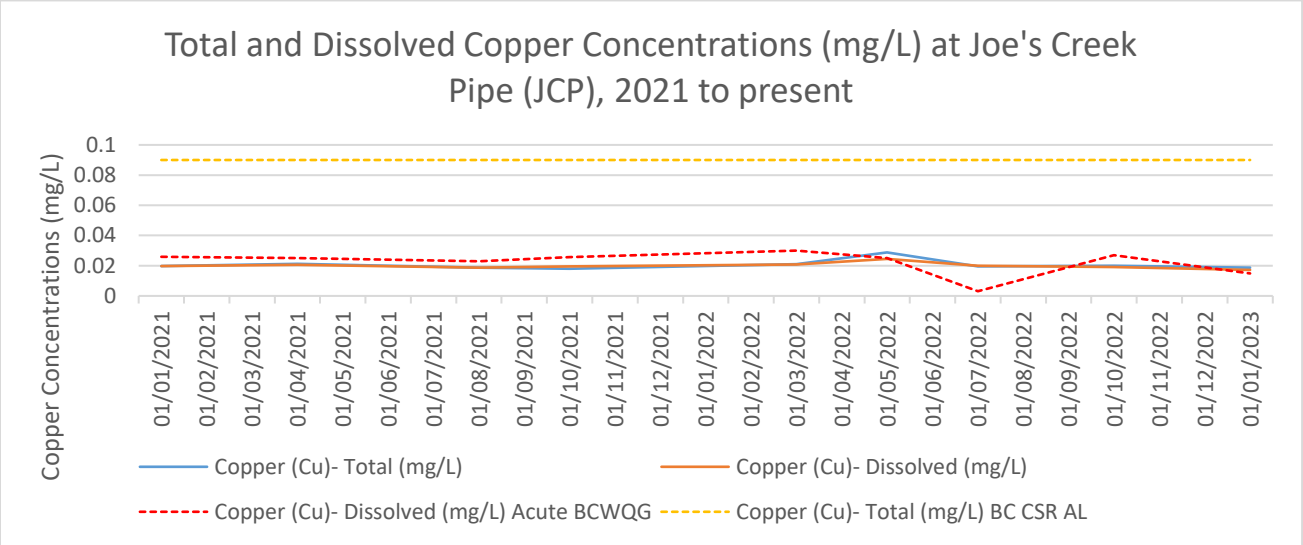

Figure 5 Copper concentrations at Joe's Creek Pipe (JCP) from 2021 to present compared to the BC CSR AL and the acute BCWQG.

Receiving Environment

Water that flowed from the Long Ditch Sump reported to the adjacent forest and then to ground. There was ~0.5-0.7 m of snow covering the ground at the time. Inspection of the site indicated the water flowed less than 300 m from the sump. No trace evidence of the discharge was observed at the nearby Polley Lake access road (Figure 2) which is located down slope of the sump. It is assumed the incident resulted in a small inundation area in the forest of less than 0.7 ha in size. Visibility in the area was severely impaired by the snow cover. No aquatic ecosystems were affected. The closest fish bearing water body is Polley Lake and it sits approximately 660 m from the Long Ditch Sump.

Physical Disturbance

No erosion was observed in the mine site infrastructure or along the flow path.

Root Cause

The underlying cause of the incident was the frozen pipeline downstream of the Long Ditch Sump. Extended sub-zero daily low temperatures were a contributing factor as was the partially closed knife gate on the contingency pipeline. The pipeline has operated as intended for ~10 years without issue with the only distinct operational change being the intermittent pumping from the Wight Pit. It appears that ice was forming inside the pipe walls for days, weeks or months leading up to March 27 when the pipeline was finally obstructed. The intermittent pumping from the Wight Pit caused water levels to rise and fall within the ditch system and within the pipeline. This may have allowed for ice buildup to occur readily within the pipe.

Future Mitigation

As part of the future mitigation strategy, MPMC will; 1) maintain on-site contingency systems and ensure the full contingency capacity is available; 2) continue routine inspections of the system; 3) continue to follow the Water Management Manual and daily check list.

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Figure 6 March 28, 2023. The Lower Long Ditch Sump showing discharge channel under snow in upper left and partially closed knife gate in upper right after incident. Note high water mark shown by ice level.

Figure 7 March 28, 2023. Lower Long Ditch Sump with knife gate opened.

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Figure 8 March 28, 2023. Lower Long Ditch Sump looking upstream.

Figure 9 March 28, 2023. Upper Long Ditch Sump inundated with primary pipeline submerged. Discharge to lower sump occurring in lower left.

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Figure 10 March 29, 2023. Upper Long Ditch Sump with primary pipeline submerged. The pipeline is frozen and not conveying water. Discharge to Lower Long Ditch Sump in upper left.

Figure 11 March 29, 2023. Upper Long Ditch Sump with primary pipeline submerged. The pipeline is frozen and not conveying water.

Figure 12 March 29, 2023. Overflow channel under snow and adjacent forest lands.

Figure 13 March 29, 2023. Path of flow from sump along pipeline and into adjacent forest.

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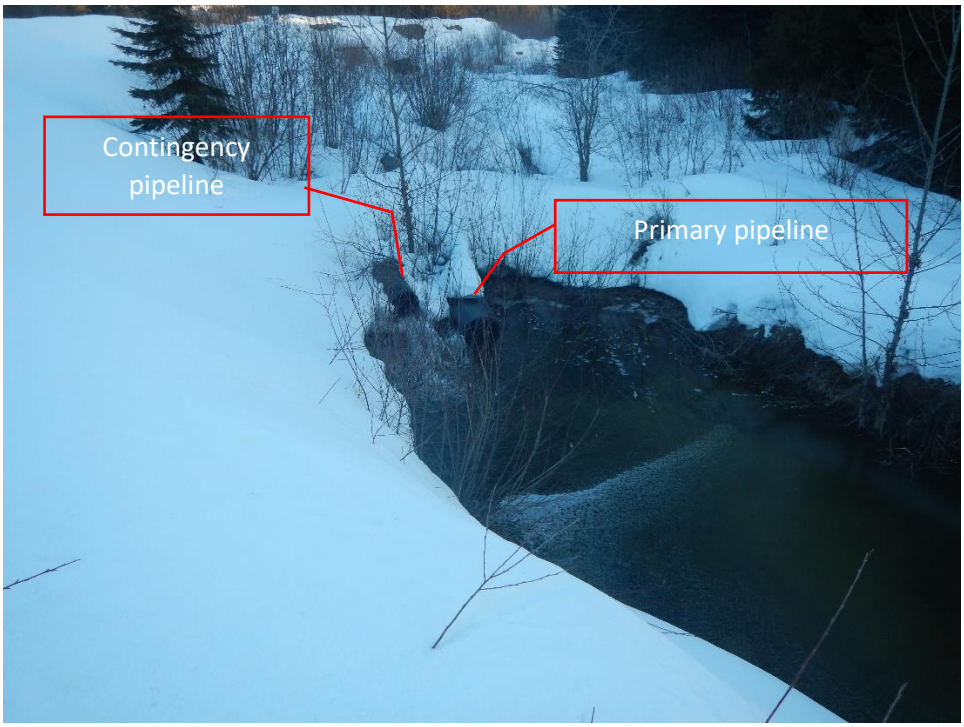

Figure 14 March 28, 2023. Contingency pipeline is engaged, and the primary pipeline is not. Reporting to downstream section of the Long Ditch.

Figure 15 March 11, 2023. Primary Long Ditch Pipeline operating as intended.

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Figure 16 March 11, 2023. Primary Long Ditch Pipeline operating as intended and discharging downstream. The pipe across the ditch was used to insert steam apparatus into frozen pipe and is not part of the collection system.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6706**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 29-Mar-2023 11:30
PO	: 5590012190	Date Analysis Commenced	: 29-Mar-2023
C-O-C number	: A0219	Issue Date	: 04-Apr-2023 14:28
Sampler	: A N, D S, K A, M J		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Erin Sanchez		Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	W8z	COW Drain	LD	----	----
					Client sampling date / time	28-Mar-2023 11:40	28-Mar-2023 12:16	28-Mar-2023 12:50	----	----
						VA23A6706-001	VA23A6706-002	VA23A6706-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		27.3	120	108	----	----
Conductivity	----	E100	2.0	µS/cm		72.2	1360	1100	----	----
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		34.0	606	577	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		33.4	597	562	----	----
pH	----	E108	0.10	pH units		7.22	8.07	8.03	----	----
Solids, total dissolved [TDS]	----	E162	10	mg/L		100	1060	884	----	----
Solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	1.4	----	----
Turbidity	----	E121	0.10	NTU		0.99	<0.10	0.81	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0096	<0.0050	<0.0050	----	----
Chloride	16887-00-6	E235.Cl	0.50	mg/L		0.88	12.2	2.56	----	----
Fluoride	16984-48-8	E235.F	0.020	mg/L		0.030	0.608	0.228	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.433	1.40	6.46	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.433	1.40	6.46	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0050 DLDS	<0.0050 DLDS	----	----
Nitrogen, total	7727-37-9	E366	0.030	mg/L		1.36	1.68	6.81	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0016	0.0090	0.0018	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0206	0.0134	0.0077	----	----
Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0187	0.0114	0.0045	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.17	620	503	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		25.1	2.20	5.69	----	----
Total Metals										
Aluminum, total	7429-90-5	E420	0.0030	mg/L		0.224	0.0030	0.0539	----	----
Antimony, total	7440-36-0	E420	0.00010	mg/L		0.00012	0.00065	0.00032	----	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00053	0.00110	0.00051	----	----
Barium, total	7440-39-3	E420	0.00010	mg/L		0.00686	0.0234	0.0364	----	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	W8z	COW Drain	LD	----	----
					Client sampling date / time	28-Mar-2023 11:40	28-Mar-2023 12:16	28-Mar-2023 12:50	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6706-001	VA23A6706-002	VA23A6706-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
Boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.133	0.050	----	----
Cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000174	<0.000160 DLM	0.0000763	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L		8.81	187	169	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L		0.00121	<0.00050	<0.00050	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00013	<0.00010	0.00010	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L		0.00648	0.0360	0.0105	----	----
Iron, total	7439-89-6	E420	0.030	mg/L		0.376	<0.030	0.052	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L		0.000065	<0.000050	<0.000050	----	----
Lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	0.0100	0.0034	----	----
Magnesium, total	7439-95-4	E420	0.100	mg/L		2.77	31.6	33.9	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L		0.00373	0.00042	0.0108	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000142	0.359	0.0774	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L		0.00175	<0.00050	<0.00050	----	----
Potassium, total	7440-09-7	E420	0.050	mg/L		0.462	7.18	1.73	----	----
Selenium, total	7782-49-2	E420	0.000050	mg/L		0.000113	0.0519	0.0372	----	----
Silicon, total	7440-21-3	E420	0.10	mg/L		6.29	6.86	4.96	----	----
Silver, total	7440-22-4	E420	0.000010	mg/L		0.000012	<0.000010	<0.000010	----	----
Sodium, total	7440-23-5	E420	0.050	mg/L		3.83	65.7	14.0	----	----
Strontium, total	7440-24-6	E420	0.00020	mg/L		0.122	2.36	3.10	----	----
Thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
Uranium, total	7440-61-1	E420	0.000010	mg/L		0.000082	0.00348	0.00152	----	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00146	0.00080	0.00077	----	----
Zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	0.0039	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.186	<0.0030	0.0042	----	----
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00010	0.00069	0.00033	----	----
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00044	0.00108	0.00046	----	----
Barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00615	0.0245	0.0373	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	W8z	COW Drain	LD	----	----
					Client sampling date / time	28-Mar-2023 11:40	28-Mar-2023 12:16	28-Mar-2023 12:50	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6706-001	VA23A6706-002	VA23A6706-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.146	0.056	----	----
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000109	0.000170	0.0000676	----	----
Calcium, dissolved	7440-70-2	E421	0.050	mg/L		9.25	191	179	----	----
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L		0.00109	<0.00050	<0.00050	----	----
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00493	0.0351	0.00966	----	----
Iron, dissolved	7439-89-6	E421	0.030	mg/L		0.339	<0.030	<0.030	----	----
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	0.0107	0.0036	----	----
Magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.66	31.3	31.5	----	----
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00244	0.00040	0.00927	----	----
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000109	0.349	0.0734	----	----
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00163	<0.00050	<0.00050	----	----
Potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.483	7.56	1.81	----	----
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000113	0.0539	0.0359	----	----
Silicon, dissolved	7440-21-3	E421	0.050	mg/L		6.16	6.99	4.78	----	----
Silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Sodium, dissolved	7440-23-5	E421	0.050	mg/L		4.03	65.3	14.1	----	----
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.112	2.40	3.01	----	----
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000076	0.00349	0.00153	----	----
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00131	0.00068	0.00057	----	----
Zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	0.0036	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A6706**	Page	: 1 of 18
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 29-Mar-2023 11:30
PO	: 5590012190	Date Analysis Commenced	: 29-Mar-2023
C-O-C number	: A0219	Issue Date	: 04-Apr-2023 14:19
Sampler	: A N, D S, K A, M J 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Erin Sanchez		Vancouver Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 880591)											
VA23A6706-003	LD	pH	----	E108	0.10	pH units	8.03	8.02	0.125%	4%	----
Physical Tests (QC Lot: 880592)											
VA23A6706-003	LD	Conductivity	----	E100	2.0	µS/cm	1100	1100	0.455%	10%	----
Physical Tests (QC Lot: 880593)											
VA23A6706-003	LD	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	108	114	5.22%	20%	----
Physical Tests (QC Lot: 880696)											
VA23A6586-003	Anonymous	Turbidity	----	E121	0.10	NTU	0.84	0.78	0.06	Diff <2x LOR	----
Physical Tests (QC Lot: 880697)											
VA23A6706-002	COW Drain	Turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 882360)											
KS2300975-001	Anonymous	Solids, total dissolved [TDS]	----	E162	13	mg/L	77	72	5	Diff <2x LOR	----
Physical Tests (QC Lot: 883723)											
KS2300994-001	Anonymous	Solids, total dissolved [TDS]	----	E162	13	mg/L	72	75	3	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880594)											
VA23A6718-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	300	mg/L	335	349	13.2	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880595)											
VA23A6718-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	5.00	mg/L	8.70	8.17	0.531	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880596)											
VA23A6718-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880597)											
VA23A6718-001	Anonymous	Fluoride	16984-48-8	E235.F	20.0	mg/L	<20.0	<20.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880598)											
VA23A6718-001	Anonymous	Chloride	16887-00-6	E235.Cl	500	mg/L	62700	61100	2.56%	20%	----
Anions and Nutrients (QC Lot: 880602)											
VA23A6560-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880879)											
VA23A6688-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.030	mg/L	0.087	0.086	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880880)											
VA23A6688-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 880882)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 880882) - continued											
VA23A6706-001	W8z	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0206	0.0213	3.34%	20%	----
Anions and Nutrients (QC Lot: 880883)											
VA23A6706-001	W8z	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0187	0.0196	0.0009	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 880881)											
VA23A6706-001	W8z	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	25.1	26.6	5.80%	20%	----
Total Metals (QC Lot: 881150)											
VA23A6706-002	COW Drain	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0030	0.0041	0.0010	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00065	0.00064	0.000006	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00110	0.00105	4.45%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0234	0.0236	0.948%	20%	----
		Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.133	0.130	2.65%	20%	----
		Cadmium, total	7440-43-9	E420	0.000160	mg/L	<0.000160	<0.000160	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	187	183	2.09%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.0360	0.0361	0.242%	20%	----
		Iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0100	0.0096	0.0004	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	31.6	31.4	0.790%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00042	0.00046	0.00004	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.359	0.361	0.470%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	7.18	7.09	1.32%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.0519	0.0526	1.21%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	6.86	6.72	2.10%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	65.7	64.1	2.47%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	2.36	2.41	1.87%	20%	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 881150) - continued											
VA23A6706-002	COW Drain	Uranium, total	7440-61-1	E420	0.000010	mg/L	0.00348	0.00350	0.677%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00080	0.00078	0.00002	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 881472)											
KS2300947-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	95.0	93.2	1.83%	20%	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	0.0175	0.0168	3.86%	20%	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	0.126	0.124	1.94%	20%	----
		Barium, total	7440-39-3	E420	0.00100	mg/L	1.65	1.66	0.377%	20%	----
		Beryllium, total	7440-41-7	E420	0.000200	mg/L	0.00157	0.00154	0.000028	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000500	mg/L	0.00100	0.000996	0.000009	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.100	mg/L	0.289	0.286	0.004	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	0.000882	0.000948	7.23%	20%	----
		Calcium, total	7440-70-2	E420	0.500	mg/L	421	413	1.86%	20%	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	0.174	0.169	2.79%	20%	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.0990	0.0965	2.51%	20%	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	2.29	2.20	3.71%	20%	----
		Iron, total	7439-89-6	E420	0.100	mg/L	154	155	0.475%	20%	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.0671	0.0656	2.16%	20%	----
		Lithium, total	7439-93-2	E420	0.0100	mg/L	0.123	0.121	1.90%	20%	----
		Magnesium, total	7439-95-4	E420	0.0500	mg/L	171	169	1.53%	20%	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	5.96	5.59	6.48%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0559	0.0545	2.49%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	0.136	0.132	2.56%	20%	----
		Potassium, total	7440-09-7	E420	0.500	mg/L	40.3	39.6	1.81%	20%	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	0.0139	0.0142	2.00%	20%	----
		Silicon, total	7440-21-3	E420	1.00	mg/L	112	112	0.581%	20%	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	0.00328	0.00322	1.80%	20%	----
		Sodium, total	7440-23-5	E420	0.500	mg/L	932	892	4.38%	20%	----
		Strontium, total	7440-24-6	E420	0.00200	mg/L	6.00	5.79	3.44%	20%	----
		Thallium, total	7440-28-0	E420	0.000100	mg/L	0.000145	0.000158	0.000012	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	0.00130	0.00114	0.00016	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	2.47	2.48	0.572%	20%	----
		Uranium, total	7440-61-1	E420	0.000100	mg/L	0.00301	0.00306	1.89%	20%	----
		Vanadium, total	7440-62-2	E420	0.00500	mg/L	0.508	0.501	1.36%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 881472) - continued											
KS2300947-001	Anonymous	Zinc, total	7440-66-6	E420	0.0300	mg/L	0.685	0.664	3.12%	20%	----
Dissolved Metals (QC Lot: 881241)											
VA23A6706-001	W8z	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.186	0.189	1.64%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00010	0.00014	0.00004	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00044	0.00048	0.00004	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00615	0.00619	0.538%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000109	0.0000122	0.0000014	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	9.25	9.31	0.622%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00109	0.00105	0.00004	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	0.00010	0.000003	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00493	0.00472	0.00021	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	0.339	0.334	1.54%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	2.66	2.64	0.373%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00244	0.00234	3.89%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000109	0.000098	0.000012	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00163	0.00161	0.00002	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.483	0.490	0.007	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000113	0.000135	0.000022	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.16	6.27	1.77%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	4.03	4.00	0.658%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.112	0.110	0.848%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000076	0.000083	0.000006	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00131	0.00135	0.00004	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 880592)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 880593)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 880696)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 880697)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 882053)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 882360)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 883723)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 880594)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 880595)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 880596)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 880597)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 880598)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 880602)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 880879)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 880880)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 880882)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 880883)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 880881)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 881150)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 881472)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 881241)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 881241) - continued						
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 880591)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 880592)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	104	90.0	110	----
Physical Tests (QCLot: 880593)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 880696)									
Turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 880697)									
Turbidity	----	E121	0.1	NTU	200 NTU	99.1	85.0	115	----
Physical Tests (QCLot: 882053)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	97.5	85.0	115	----
Physical Tests (QCLot: 882360)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.3	85.0	115	----
Physical Tests (QCLot: 883723)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.1	85.0	115	----
Anions and Nutrients (QCLot: 880594)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 880595)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 880596)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 880597)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 880598)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 880602)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 880879)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	96.5	75.0	125	----
Anions and Nutrients (QCLot: 880880)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 880882)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	89.1	80.0	120	----
Anions and Nutrients (QCLot: 880883)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	93.9	80.0	120	----
Organic / Inorganic Carbon (QCLot: 880881)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	98.1	80.0	120	----
Total Metals (QCLot: 881150)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	93.2	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.6	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	91.7	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.4	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	95.8	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.6	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.5	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	93.3	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	105	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.9	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.5	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 881150) - continued									
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	100	80.0	120	----
Total Metals (QCLot: 881472)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.6	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.6	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.5	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.0	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.2	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.0	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	112	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.3	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 881241)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.2	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.9	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	95.0	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.6	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.1	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.4	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.5	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.1	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	94.1	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.7	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.5	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	94.7	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.8	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.1	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.4	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	95.6	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.9	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.2	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	96.7	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.3	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	92.5	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.9	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 880594)										
VA23A6718-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	99400 mg/L	100000 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 880595)										
VA23A6718-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2480 mg/L	2500 mg/L	99.2	75.0	125	----
Anions and Nutrients (QCLot: 880596)										
VA23A6718-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	493 mg/L	500 mg/L	98.6	75.0	125	----
Anions and Nutrients (QCLot: 880597)										
VA23A6718-002	Anonymous	Fluoride	16984-48-8	E235.F	971 mg/L	1000 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 880598)										
VA23A6718-002	Anonymous	Chloride	16887-00-6	E235.Cl	98400 mg/L	100000 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 880602)										
VA23A6560-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0274 mg/L	0.03 mg/L	91.5	70.0	130	----
Anions and Nutrients (QCLot: 880879)										
VA23A6688-002	Anonymous	Nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 880880)										
VA23A6688-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 880882)										
VA23A6706-002	COW Drain	Phosphorus, total	7723-14-0	E372-U	0.0436 mg/L	0.05 mg/L	87.3	70.0	130	----
Anions and Nutrients (QCLot: 880883)										
VA23A6706-002	COW Drain	Phosphorus, total dissolved	7723-14-0	E375-T	0.0463 mg/L	0.05 mg/L	92.6	70.0	130	----
Organic / Inorganic Carbon (QCLot: 880881)										
VA23A6706-002	COW Drain	Carbon, dissolved organic [DOC]	----	E358-L	4.82 mg/L	5 mg/L	96.4	70.0	130	----
Total Metals (QCLot: 881150)										
VA23A6706-003	LD	Aluminum, total	7429-90-5	E420	0.200 mg/L	0.2 mg/L	99.9	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0366 mg/L	0.04 mg/L	91.4	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00955 mg/L	0.01 mg/L	95.5	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 881150) - continued										
VA23A6706-003	LD	Boron, total	7440-42-8	E420	0.086 mg/L	0.1 mg/L	86.3	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00395 mg/L	0.004 mg/L	98.8	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Copper, total	7440-50-8	E420	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.6	70.0	130	----
		Lead, total	7439-92-1	E420	0.0179 mg/L	0.02 mg/L	89.4	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0895 mg/L	0.1 mg/L	89.5	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		Molybdenum, total	7439-98-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		Potassium, total	7440-09-7	E420	3.99 mg/L	4 mg/L	99.7	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0427 mg/L	0.04 mg/L	107	70.0	130	----
		Silicon, total	7440-21-3	E420	9.66 mg/L	10 mg/L	96.6	70.0	130	----
		Silver, total	7440-22-4	E420	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00365 mg/L	0.004 mg/L	91.2	70.0	130	----
		Tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00400 mg/L	0.004 mg/L	100	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	94.9	70.0	130	----
Total Metals (QCLot: 881472)										
VA23A6825-002	Anonymous	Aluminum, total	7429-90-5	E420	0.189 mg/L	0.2 mg/L	94.5	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0370 mg/L	0.04 mg/L	92.4	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00962 mg/L	0.01 mg/L	96.2	70.0	130	----
		Boron, total	7440-42-8	E420	0.084 mg/L	0.1 mg/L	84.3	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 881472) - continued										
VA23A6825-002	Anonymous	Chromium, total	7440-47-3	E420	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Copper, total	7440-50-8	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Iron, total	7439-89-6	E420	1.86 mg/L	2 mg/L	93.2	70.0	130	----
		Lead, total	7439-92-1	E420	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0847 mg/L	0.1 mg/L	84.7	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0181 mg/L	0.02 mg/L	90.5	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0396 mg/L	0.04 mg/L	99.0	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		Silicon, total	7440-21-3	E420	9.99 mg/L	10 mg/L	99.9	70.0	130	----
		Silver, total	7440-22-4	E420	0.00374 mg/L	0.004 mg/L	93.6	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00362 mg/L	0.004 mg/L	90.5	70.0	130	----
		Tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00395 mg/L	0.004 mg/L	98.8	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0984 mg/L	0.1 mg/L	98.4	70.0	130	----
		Zinc, total	7440-66-6	E420	0.395 mg/L	0.4 mg/L	98.7	70.0	130	----
Dissolved Metals (QCLot: 881241)										
VA23A6706-002	COW Drain	Aluminum, dissolved	7429-90-5	E421	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00866 mg/L	0.01 mg/L	86.6	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		Copper, dissolved	7440-50-8	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 881241) - continued										
VA23A6706-002	COW Drain	Iron, dissolved	7439-89-6	E421	1.89 mg/L	2 mg/L	94.5	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.11 mg/L	10 mg/L	91.1	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00374 mg/L	0.004 mg/L	93.6	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00371 mg/L	0.004 mg/L	92.7	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00376 mg/L	0.004 mg/L	93.9	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.381 mg/L	0.4 mg/L	95.3	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

Chain of Custody (COC) / Analytical Request Form

COC Number: A0219

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Environmental Division Vancouver
Work Order Reference
VA23A6706

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	PO BOX 12	Email 1 or Fax: On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Likely, BC	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Postal Code:	V0L 1N0	Email 3	Additional fees may apply to rush requests on weekends,
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.
Company:		Email 1 or Fax: On File	
Contact:	On File	Email 2: gabriel.holmes@mountpolley.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590008044 Q2 2022	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	6706	ALS Contact: Can Dang	Sampler: AN/MJ/DS/KA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	Hardness	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
							F	P	F/P		P	F/P					
	W8z	28-Mar-23	11:40	Water	6	R	R	R	R	R	R						
	COW Drain	28-Mar-23	12:16	Water	6	P3	P3	P3	P3	P3	P3						
	LD	28-Mar-23	12:50	Water	6	P3	P3	P3	P3	P3	P3						

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							2°

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Amanda Nicholson	Date: March 28, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: RD	Date: March 29, 23	Time: 11:30AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6147**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Mar-2023 08:30
PO	: 5590012190	Date Analysis Commenced	: 23-Mar-2023
C-O-C number	: M0006	Issue Date	: 29-Mar-2023 10:10
Sampler	: KA, MJ		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E11c	Field Blank	E1a	E10	----
					Client sampling date / time	21-Mar-2023 11:13	21-Mar-2023 12:58	21-Mar-2023 12:29	21-Mar-2023 13:15	----
						VA23A6147-001	VA23A6147-002	VA23A6147-003	VA23A6147-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		75.4	<1.0	18.0	101	----
Conductivity	----	E100	2.0	µS/cm		805	<2.0	1130	1200	----
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		347	----	324	593	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		334	<0.50	290	585	----
pH	----	E108	0.10	pH units		8.01	5.46	7.33	7.99	----
Solids, total dissolved [TDS]	----	E162	10	mg/L		599	<10	820	1000	----
Solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	8.8	1.0	----
Turbidity	----	E121	0.10	NTU		1.19	<0.10	7.42	0.97	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.178	<0.0050	0.393	0.0097	----
Chloride	16887-00-6	E235.Cl	0.50	mg/L		3.94	<0.50	22.7	5.21	----
Fluoride	16984-48-8	E235.F	0.020	mg/L		0.377	<0.020	0.695	0.566	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		1.57	<0.0050	3.30	2.77	----
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L		1.87	<0.0051	3.57	2.78	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.298	<0.0010	0.272	0.0097	----
Nitrogen, total	7727-37-9	E366	0.030	mg/L		2.12	<0.030	4.28	3.11	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	0.0025	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0147	<0.0020	0.0147	0.0117	----
Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0048	<0.0020	0.0030	0.0048	----
Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		335	<0.30	497	568	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		1.80	<0.50	7.85	1.91	----
Total Metals										
Aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0596	<0.0030	0.0599	0.0400	----
Antimony, total	7440-36-0	E420	0.00010	mg/L		0.00282	<0.00010	0.00172	0.00100	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00312	<0.00010	0.00245	0.00098	----
Barium, total	7440-39-3	E420	0.00010	mg/L		0.0235	<0.00010	0.0556	0.0468	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	E11c	Field Blank	E1a	E10	----
					Client sampling date / time	21-Mar-2023 11:13	21-Mar-2023 12:58	21-Mar-2023 12:29	21-Mar-2023 13:15	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6147-001	VA23A6147-002	VA23A6147-003	VA23A6147-004	--------
						Result	Result	Result	Result	----
Total Metals										
Boron, total	7440-42-8	E420	0.010	mg/L		0.253	<0.010	0.116	0.123	----
Cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000500 DLM	<0.0000050	<0.0000400 DLM	0.000193	----
Calcium, total	7440-70-2	E420	0.050	mg/L		97.7	<0.050	97.0	189	----
Chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00020	<0.00010	<0.00010	<0.00010	----
Copper, total	7440-50-8	E420	0.00050	mg/L		0.0227	<0.00050	0.00247	0.0155	----
Iron, total	7439-89-6	E420	0.030	mg/L		0.060	<0.030	0.052	0.045	----
Lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	0.000071	----
Lithium, total	7439-93-2	E420	0.0010	mg/L		0.0061	<0.0010	0.0099	0.0078	----
Magnesium, total	7439-95-4	E420	0.100	mg/L		21.8	<0.100	11.7	27.4	----
Manganese, total	7439-96-5	E420	0.00010	mg/L		0.0874	<0.00010	0.0108	0.0162	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.158	<0.000050	0.218	0.156	----
Nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	0.00053	----
Potassium, total	7440-09-7	E420	0.050	mg/L		1.09	<0.050	11.6	2.08	----
Selenium, total	7782-49-2	E420	0.000050	mg/L		0.0164	<0.000050	0.0280	0.0390	----
Silicon, total	7440-21-3	E420	0.10	mg/L		7.43	<0.10	3.80	4.88	----
Silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
Sodium, total	7440-23-5	E420	0.050	mg/L		28.0	<0.050	85.2	24.7	----
Strontium, total	7440-24-6	E420	0.00020	mg/L		0.807	<0.00020	1.17	5.84	----
Thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
Tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
Titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	----
Uranium, total	7440-61-1	E420	0.000010	mg/L		0.00572	<0.000010	0.000488	0.00285	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00196	<0.00050	0.00209	0.00106	----
Zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	<0.0030	0.0103	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0042	----	0.0149	0.0036	----
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00274	----	0.00164	0.00086	----
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00296	----	0.00229	0.00081	----
Barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0229	----	0.0576	0.0454	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	E11c	Field Blank	E1a	E10	----
					Client sampling date / time	21-Mar-2023 11:13	21-Mar-2023 12:58	21-Mar-2023 12:29	21-Mar-2023 13:15	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6147-001	VA23A6147-002	VA23A6147-003	VA23A6147-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	----	<0.000100	<0.000100	----
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	<0.000050	<0.000100 DLA	----
Boron, dissolved	7440-42-8	E421	0.010	mg/L		0.233	----	0.109	0.109	----
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000450 DLM	----	<0.0000250 DLM	0.000178	----
Calcium, dissolved	7440-70-2	E421	0.050	mg/L		103	----	109	193	----
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	<0.00050	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00014	----	<0.00010	<0.00020 DLA	----
Copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.0159	----	0.00086	0.0118	----
Iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	----	<0.030	<0.030	----
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	<0.000050	<0.000100 DLA	----
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0063	----	0.0107	0.0078	----
Magnesium, dissolved	7439-95-4	E421	0.100	mg/L		21.8	----	12.7	26.9	----
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0869	----	0.0106	0.0139	----
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.164	----	0.218	0.151	----
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	----	<0.00050	<0.00100 DLA	----
Potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.06	----	13.5	2.01	----
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.0164	----	0.0242	0.0364	----
Silicon, dissolved	7440-21-3	E421	0.050	mg/L		7.55	----	3.74	4.86	----
Silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	<0.000010	<0.000020 DLA	----
Sodium, dissolved	7440-23-5	E421	0.050	mg/L		28.0	----	92.5	23.3	----
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.814	----	1.32	6.08	----
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	----	<0.000010	<0.000020 DLA	----
Tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	----	<0.00010	<0.00020 DLA	----
Titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	----	<0.0100	<0.0100	----
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00540	----	0.000489	0.00270	----
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00178	----	0.00198	<0.00100 DLA	----
Zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	----	<0.0030	0.0090	----
Dissolved metals filtration location	----	EP421	-	-		Field	----	Field	Field	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A6147**	Page	: 1 of 15
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Mar-2023 08:30
PO	: 5590012190	Date Analysis Commenced	: 23-Mar-2023
C-O-C number	: M0006	Issue Date	: 29-Mar-2023 10:10
Sampler	: KA, MJ ----		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 872911)											
VA23A6041-001	Anonymous	pH	----	E108	0.10	pH units	8.17	8.18	0.122%	4%	----
Physical Tests (QC Lot: 872912)											
VA23A6041-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	551	549	0.364%	10%	----
Physical Tests (QC Lot: 872913)											
VA23A6041-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	194	195	0.726%	20%	----
Physical Tests (QC Lot: 873660)											
VA23A6020-005	Anonymous	Turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 873661)											
VA23A6147-003	E1a	Turbidity	----	E121	0.10	NTU	7.42	7.76	4.40%	15%	----
Physical Tests (QC Lot: 877128)											
VA23A6033-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	245	255	4.00%	20%	----
Anions and Nutrients (QC Lot: 872904)											
VA23A6041-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	104	104	0.251%	20%	----
Anions and Nutrients (QC Lot: 872905)											
VA23A6041-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 872906)											
VA23A6041-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0212	0.0202	0.0010	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 872907)											
VA23A6041-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0028	0.0033	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 872908)											
VA23A6041-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.192	0.191	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 872915)											
VA23A6041-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 874218)											
VA23A6022-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.400	mg/L	15.5	14.7	5.24%	20%	----
Anions and Nutrients (QC Lot: 874221)											
VA23A6022-001	Anonymous	Nitrogen, total	7727-37-9	E366	3.00	mg/L	80.1	80.7	0.724%	20%	----
Anions and Nutrients (QC Lot: 874222)											
VA23A6022-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0038	0.0040	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 874223)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 874223) - continued											
VA23A6022-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	1.00	mg/L	12.0	13.4	10.6%	20%	----
Organic / Inorganic Carbon (QC Lot: 874219)											
VA23A6022-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.90	3.02	0.12	Diff <2x LOR	----
Total Metals (QC Lot: 872820)											
VA23A6031-012	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 872820) - continued											
VA23A6031-012	Anonymous	Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 873266)											
VA23A6147-001	E11c	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0042	0.0039	0.0003	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00274	0.00277	0.953%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00296	0.00294	0.608%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0229	0.0221	3.36%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.233	0.240	2.68%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000450	mg/L	<0.0000450	<0.0000450	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	103	100	2.88%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00014	0.00016	0.00002	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.0159	0.0158	0.544%	20%	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0063	0.0062	0.0001	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	21.8	21.5	1.26%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0869	0.0865	0.474%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.164	0.162	0.942%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.06	1.06	0.433%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.0164	0.0165	0.504%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.55	7.46	1.17%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	28.0	27.9	0.316%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.814	0.814	0.0106%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00540	0.00539	0.294%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00178	0.00177	0.00002	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 872912)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 872913)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 873660)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 873661)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 877118)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 877128)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 872904)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 872905)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 872906)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 872907)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 872908)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 872915)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 874218)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 874221)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	# 0.146	B
Anions and Nutrients (QCLot: 874222)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 874223)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 874219)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 872820)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 873266)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 873266) - continued						
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 872911)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 872912)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 872913)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	111	85.0	115	----
Physical Tests (QCLot: 873660)									
Turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 873661)									
Turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 877118)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	100	85.0	115	----
Physical Tests (QCLot: 877128)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 872904)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 872905)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 872906)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 872907)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 872908)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 872915)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	104	80.0	120	----
Anions and Nutrients (QCLot: 874218)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	97.1	80.0	120	----
Anions and Nutrients (QCLot: 874221)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 874222)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Anions and Nutrients (QCLot: 874222) - continued									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	94.0	80.0	120	----
Anions and Nutrients (QCLot: 874223)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	111	85.0	115	----
Organic / Inorganic Carbon (QCLot: 874219)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	114	80.0	120	----
Total Metals (QCLot: 872820)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	95.9	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100.0	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	92.4	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.3	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.2	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.3	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.3	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.7	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	93.0	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	108	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.6	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	95.1	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.7	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	111	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.1	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	92.7	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 872820) - continued									
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.2	80.0	120	----
Dissolved Metals (QCLot: 873266)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.7	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.5	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	91.8	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100.0	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.3	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.2	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	108	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.2	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	99.7	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.8	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.8	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.2	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 872904)										
VA23A6041-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	109 mg/L	100 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 872905)										
VA23A6041-002	Anonymous	Chloride	16887-00-6	E235.Cl	108 mg/L	100 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 872906)										
VA23A6041-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.70 mg/L	2.5 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 872907)										
VA23A6041-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.526 mg/L	0.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 872908)										
VA23A6041-002	Anonymous	Fluoride	16984-48-8	E235.F	1.06 mg/L	1 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 872915)										
VA23A6041-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0295 mg/L	0.03 mg/L	98.5	70.0	130	----
Anions and Nutrients (QCLot: 874218)										
VA23A6022-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 874221)										
VA23A6022-002	Anonymous	Nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 874222)										
VA23A6022-002	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 874223)										
VA23A6022-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Organic / Inorganic Carbon (QCLot: 874219)										
VA23A6022-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.40 mg/L	5 mg/L	108	70.0	130	----
Total Metals (QCLot: 872820)										
VA23A6126-001	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00943 mg/L	0.01 mg/L	94.3	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 872820) - continued										
VA23A6126-001	Anonymous	Boron, total	7440-42-8	E420	0.097 mg/L	0.1 mg/L	97.2	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00400 mg/L	0.004 mg/L	100	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		Copper, total	7440-50-8	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0185 mg/L	0.02 mg/L	92.7	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0977 mg/L	0.1 mg/L	97.7	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		Silicon, total	7440-21-3	E420	9.18 mg/L	10 mg/L	91.8	70.0	130	----
		Silver, total	7440-22-4	E420	0.00405 mg/L	0.004 mg/L	101	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00368 mg/L	0.004 mg/L	92.1	70.0	130	----
		Tin, total	7440-31-5	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Zinc, total	7440-66-6	E420	0.384 mg/L	0.4 mg/L	96.1	70.0	130	----
Dissolved Metals (QCLot: 873266)										
VA23A6147-003	E1a	Aluminum, dissolved	7429-90-5	E421	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00849 mg/L	0.01 mg/L	84.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00379 mg/L	0.004 mg/L	94.7	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 873266) - continued										
VA23A6147-003	E1a	Chromium, dissolved	7440-47-3	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0182 mg/L	0.02 mg/L	91.1	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.83 mg/L	2 mg/L	91.4	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0374 mg/L	0.04 mg/L	93.4	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.24 mg/L	10 mg/L	92.4	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00317 mg/L	0.004 mg/L	79.2	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00368 mg/L	0.004 mg/L	92.0	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0379 mg/L	0.04 mg/L	94.6	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00377 mg/L	0.004 mg/L	94.2	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0965 mg/L	0.1 mg/L	96.5	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.369 mg/L	0.4 mg/L	92.2	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

Chain of Custody (COC) / Analytical Request Form

COC Number: M0006

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division Vancouver
Work Order Reference
VA23A6147

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabe Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	gabriel.holmes@mountpolley.com

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Additional fees may apply to rush requests on weekends, sta
Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	6147	ALS Contact: Can Dang	Sampler: MJ, KA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	Hardness	TN-NH3					SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
								F	P	F/P												
	E11c	21-Mar-23	11:13	Water	6	R	R	R	R	R	R											
	Field Blank	21-Mar-23	12:58	Water	6	R	R	R	R	R	R											
	E1a	21-Mar-23	12:29	Water	6	R	R	R	R	R	R											
	E10	21-Mar-23	13:15	Water	6	R	R	R	R	R	R											

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							3°

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Maea Johnson	Date: March 21, 2023	Time: 14:23	Received by:	Date:	Time:	Received by: RD	Date: March 22, 23	Time: 8:30AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LECIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A1454**	Page	: 1 of 9
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Jan-2023 11:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 20-Jan-2023
C-O-C number	: D0028	Issue Date	: 01-Feb-2023 16:07
Sampler	: DS		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Richard Chong		Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: JCP	NEZ Seep 1	LD	SERD	E18
Client sampling date / time					18-Jan-2023 11:05	18-Jan-2023 11:37	18-Jan-2023 12:24	18-Jan-2023 12:36	18-Jan-2023 13:10
					VA23A1454-001	VA23A1454-002	VA23A1454-003	VA23A1454-004	VA23A1454-005
					Result	Result	Result	Result	Result
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	107	65.1	104	76.8	63.3
Conductivity	----	E100	2.0	µS/cm	1800	1650	1210	964	1080
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	997	884	621	434	450
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L	1180	1060	695	494	503
pH	----	E108	0.10	pH units	8.13	7.91	8.16	8.07	7.94
Solids, total dissolved [TDS]	----	E162	10	mg/L	1640	1490	973	752	860
Solids, total suspended [TSS]	----	E164	1.0	mg/L	<1.0	8.4	1.4	5.5	<1.0
Turbidity	----	E121	0.10	NTU	0.18	2.18	0.75	1.13	1.92
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0092	0.0064	0.0068	0.0086	0.153
Chloride	16887-00-6	E235.Cl	0.50	mg/L	<5.00 DLDS	<5.00 DLDS	5.09	6.14	9.74
Fluoride	16984-48-8	E235.F	0.020	mg/L	0.219	0.375	0.492	0.368	0.482
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	9.75	1.05	4.72 HTD, RRV	5.02	3.92
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L	9.75	1.05	4.72	5.03	4.00
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0100 DLDS	<0.0100 DLDS	0.0058 HTD, RRV	0.0069	0.0773
Nitrogen, total	7727-37-9	E366	0.030	mg/L	8.81	1.13	4.44	4.54	3.66
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0365	0.0010	0.0021	<0.0010	<0.0010
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0409	0.0104	0.0044	0.0055	0.0075
Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0400	0.0020	0.0033	0.0026	0.0027
Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	982	946	605	423	486
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	8.14	3.64	2.31	2.38	3.82
Total Metals									
Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0081	0.347	0.0462	0.0775	0.115
Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00048	0.00036	0.00085	0.00111	0.00121
Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00132	0.00040	0.00082	0.00127	0.00166
Barium, total	7440-39-3	E420	0.00010	mg/L	0.0474	0.0370	0.0501	0.0486	0.0544
Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	JCP	NEZ Seep 1	LD	SERD	E18
					Client sampling date / time	18-Jan-2023 11:05	18-Jan-2023 11:37	18-Jan-2023 12:24	18-Jan-2023 12:36	18-Jan-2023 13:10
						VA23A1454-001	VA23A1454-002	VA23A1454-003	VA23A1454-004	VA23A1454-005
						Result	Result	Result	Result	Result
Total Metals										
Boron, total	7440-42-8	E420	0.010	mg/L		0.068	0.060	0.105	0.137	0.113
Cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000750 DLM	<0.000360 DLM	<0.000105 DLM	<0.0000800 DLM	<0.0000800 DLM
Calcium, total	7440-70-2	E420	0.050	mg/L		353	320	223	149	159
Chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	0.00053	<0.00050
Cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	0.00135	<0.00010	0.00014	0.00013
Copper, total	7440-50-8	E420	0.00050	mg/L		0.0187	0.462	0.00520	0.0132	0.00763
Iron, total	7439-89-6	E420	0.030	mg/L		<0.030	0.256	0.049	0.093	0.094
Lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	0.000204	<0.000050	<0.000050	<0.000050
Lithium, total	7439-93-2	E420	0.0010	mg/L		0.0043	0.0035	0.0066	0.0059	0.0072
Magnesium, total	7439-95-4	E420	0.100	mg/L		71.5	62.2	33.5	29.6	25.7
Manganese, total	7439-96-5	E420	0.00010	mg/L		0.00936	0.341	0.00678	0.0254	0.0167
Molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0762	0.231	0.146	0.151	0.172
Nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00327	<0.00050	<0.00050	<0.00050
Potassium, total	7440-09-7	E420	0.050	mg/L		2.06	2.11	2.20	2.01	7.41
Selenium, total	7782-49-2	E420	0.000050	mg/L		0.0922	0.109	0.0463	0.0455	0.0388
Silicon, total	7440-21-3	E420	0.10	mg/L		6.52	4.22	5.51	6.61	5.61
Silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	0.000011	<0.000010	<0.000010	<0.000010
Sodium, total	7440-23-5	E420	0.050	mg/L		16.9	20.9	24.7	27.9	48.5
Strontium, total	7440-24-6	E420	0.00020	mg/L		3.19	3.77	5.86	1.14	2.38
Thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium, total	7440-61-1	E420	0.000010	mg/L		0.00138	0.00134	0.00262	0.00273	0.00173
Vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00066	0.00104	0.00093	0.00168	0.00212
Zinc, total	7440-66-6	E420	0.0030	mg/L		0.0059	0.0138	0.0040	<0.0030	<0.0030
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0048	0.0068	<0.0030 DLA	<0.0030	0.0083
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00045	0.00030	0.00080	0.00108	0.00117
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00117	<0.00020 DLA	0.00076	0.00120	0.00172
Barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0456	0.0326	0.0512	0.0453	0.0548

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	JCP	NEZ Seep 1	LD	SERD	E18
					Client sampling date / time	18-Jan-2023 11:05	18-Jan-2023 11:37	18-Jan-2023 12:24	18-Jan-2023 12:36	18-Jan-2023 13:10
						VA23A1454-001	VA23A1454-002	VA23A1454-003	VA23A1454-004	VA23A1454-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100 DLA	<0.000100 DLA	<0.000100 DLA	<0.000100	<0.000100
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000100 DLA	<0.000100 DLA	<0.000100 DLA	<0.000050	<0.000050
Boron, dissolved	7440-42-8	E421	0.010	mg/L		0.060	0.052	0.095	0.125	0.101
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000500	0.000246	0.0000530	0.0000113	0.0000138
Calcium, dissolved	7440-70-2	E421	0.050	mg/L		301	272	198	131	141
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050	<0.00050
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00020 DLA	0.00093	<0.00020 DLA	<0.00010	<0.00010
Copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.0172	0.119	0.00408	0.00848	0.00490
Iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030 DLA	<0.030 DLA	<0.030 DLA	<0.030	<0.030
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000100 DLA	<0.000100 DLA	<0.000100 DLA	<0.000050	<0.000050
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0040	0.0030	0.0064	0.0056	0.0069
Magnesium, dissolved	7439-95-4	E421	0.100	mg/L		59.6	49.8	30.7	26.0	23.8
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00621	0.274	0.00434	0.0190	0.0130
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0705	0.218	0.146	0.146	0.168
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00100 DLA	0.00219	<0.00100 DLA	<0.00050	<0.00050
Potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.96	1.91	2.33	2.03	7.50
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.0780	0.0881	0.0406	0.0407	0.0352
Silicon, dissolved	7440-21-3	E421	0.050	mg/L		5.55	3.19	4.97	5.79	4.92
Silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000020 DLA	<0.000020 DLA	<0.000020 DLA	<0.000010	<0.000010
Sodium, dissolved	7440-23-5	E421	0.050	mg/L		15.1	17.8	23.5	25.6	46.7
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L		3.13	3.82	5.96	1.19	2.45
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000020 DLA	<0.000020 DLA	<0.000020 DLA	<0.000010	<0.000010
Tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00020 DLA	<0.00020 DLA	<0.00020 DLA	<0.00010	<0.00010
Titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100 DLA	<0.0100 DLA	<0.0100 DLA	<0.0100	<0.0100
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00136	0.00117	0.00250	0.00264	0.00173
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00100 DLA	<0.00100 DLA	<0.00100 DLA	0.00133	0.00184
Zinc, dissolved	7440-66-6	E421	0.0030	mg/L		0.0056	0.0109	0.0041	<0.0030	<0.0030
Dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Upstream Drain	E22	STD	----	----
					Client sampling date / time	18-Jan-2023 13:38	18-Jan-2023 14:14	18-Jan-2023 14:56	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A1454-006	VA23A1454-007	VA23A1454-008	--------	--------
						Result	Result	Result	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		114	235	137	----	----
Conductivity	----	E100	2.0	µS/cm		1280	1330	1400	----	----
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		491	789	549	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		549	828	624	----	----
pH	----	E108	0.10	pH units		8.17	8.05	8.21	----	----
Solids, total dissolved [TDS]	----	E162	10	mg/L		942	1060	1080	----	----
Solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	<1.0	----	----
Turbidity	----	E121	0.10	NTU		0.30	0.23	1.24	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.195	0.0508	0.172	----	----
Chloride	16887-00-6	E235.Cl	0.50	mg/L		14.2	11.9	13.5	----	----
Fluoride	16984-48-8	E235.F	0.020	mg/L		0.802	0.283	0.631	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0691	1.86	0.0263	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0691	1.87	0.0263	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	0.0066	<0.0050 DLDS	----	----
Nitrogen, total	7727-37-9	E366	0.030	mg/L		0.333	1.67	0.227	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0021	<0.0010	<0.0010	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0095	0.0026	0.0074	----	----
Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0046	0.0022	0.0075	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		578	552	631	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.84	3.22	3.10	----	----
Total Metals										
Aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0045	0.0050	<0.0030	----	----
Antimony, total	7440-36-0	E420	0.00010	mg/L		0.00021	0.00021	0.00022	----	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00189	0.00047	0.00250	----	----
Barium, total	7440-39-3	E420	0.00010	mg/L		0.0362	0.0268	0.0267	----	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Boron, total	7440-42-8	E420	0.010	mg/L		0.163	0.035	0.146	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Upstream Drain	E22	STD	----	----
					Client sampling date / time	18-Jan-2023 13:38	18-Jan-2023 14:14	18-Jan-2023 14:56	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A1454-006	VA23A1454-007	VA23A1454-008	--------	--------
						Result	Result	Result	----	----
Total Metals										
Cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.000175 DLM	<0.000175 DLM	<0.000315 DLM	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L		174	239	206	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00118	<0.00010	0.00151	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L		0.00547	0.0239	0.0144	----	----
Iron, total	7439-89-6	E420	0.030	mg/L		<0.030	<0.030	0.265	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Lithium, total	7439-93-2	E420	0.0010	mg/L		0.0105	0.0109	0.0114	----	----
Magnesium, total	7439-95-4	E420	0.100	mg/L		27.8	56.1	26.6	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L		1.00	0.0205	1.13	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.339	0.188	0.449	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L		0.00053	0.00051	0.00057	----	----
Potassium, total	7440-09-7	E420	0.050	mg/L		10.7	1.56	13.0	----	----
Selenium, total	7782-49-2	E420	0.000050	mg/L		0.00552	0.0946	0.00392	----	----
Silicon, total	7440-21-3	E420	0.10	mg/L		7.52	7.22	8.12	----	----
Silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Sodium, total	7440-23-5	E420	0.050	mg/L		82.3	20.0	91.9	----	----
Strontium, total	7440-24-6	E420	0.00020	mg/L		2.02	4.32	2.66	----	----
Thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
Uranium, total	7440-61-1	E420	0.000010	mg/L		0.00275	0.00508	0.00269	----	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00083	0.00055	0.00076	----	----
Zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0038	0.0038	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		<0.0030	<0.0030	0.0034	----	----
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L		0.00020	0.00022	0.00021	----	----
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00200	0.00052	0.00240	----	----
Barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0376	0.0275	0.0268	----	----
Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Upstream Drain	E22	STD	----	----
					Client sampling date / time	18-Jan-2023 13:38	18-Jan-2023 14:14	18-Jan-2023 14:56	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A1454-006	VA23A1454-007	VA23A1454-008	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Boron, dissolved	7440-42-8	E421	0.010	mg/L		0.148	0.034	0.128	----	----
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000510	0.000122	0.000153	----	----
Calcium, dissolved	7440-70-2	E421	0.050	mg/L		155	233	182	----	----
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00120	<0.00010	0.00142	----	----
Copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00400	0.0216	0.0131	----	----
Iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	0.243	----	----
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0103	0.0116	0.0111	----	----
Magnesium, dissolved	7439-95-4	E421	0.100	mg/L		25.2	50.3	22.9	----	----
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.988	0.0191	1.00	----	----
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.334	0.203	0.426	----	----
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Potassium, dissolved	7440-09-7	E421	0.050	mg/L		11.2	1.65	12.1	----	----
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00489	0.0938	0.00353	----	----
Silicon, dissolved	7440-21-3	E421	0.050	mg/L		6.96	6.65	7.28	----	----
Silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Sodium, dissolved	7440-23-5	E421	0.050	mg/L		78.8	18.8	81.7	----	----
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.12	5.02	2.74	----	----
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00271	0.00558	0.00268	----	----
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00078	<0.00050	0.00068	----	----
Zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	0.0040	0.0049	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **VA23A1454**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Jan-2023 11:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 20-Jan-2023
C-O-C number	: D0028	Issue Date	: 01-Feb-2023 16:08
Sampler	: DS ----		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Richard Chong		Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 809759)											
VA23A1443-003	Anonymous	pH	----	E108	0.10	pH units	7.84	7.84	0.00%	4%	----
Physical Tests (QC Lot: 809760)											
VA23A1443-003	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	48.1	48.0	0.208%	20%	----
Physical Tests (QC Lot: 809761)											
VA23A1443-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	233	233	0.00%	10%	----
Physical Tests (QC Lot: 810595)											
VA23A1187-001	Anonymous	Turbidity	----	E121	0.10	NTU	0.78	0.78	0.003	Diff <2x LOR	----
Physical Tests (QC Lot: 810596)											
VA23A1454-005	E18	Turbidity	----	E121	0.10	NTU	1.92	1.99	3.59%	15%	----
Physical Tests (QC Lot: 812941)											
VA23A1405-002	Anonymous	Solids, total dissolved [TDS]	----	E162	13	mg/L	31	25	5	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 809763)											
VA23A1443-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.202	0.192	0.010	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 809764)											
VA23A1443-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	1.42	1.38	0.03	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 809765)											
VA23A1443-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.610	0.598	1.98%	20%	----
Anions and Nutrients (QC Lot: 809766)											
VA23A1443-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 809767)											
VA23A1443-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	20.1	19.8	1.52%	20%	----
Anions and Nutrients (QC Lot: 809768)											
VA23A1450-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0288	0.0281	2.64%	20%	----
Anions and Nutrients (QC Lot: 812948)											
VA23A1443-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.030	mg/L	0.515	0.524	1.79%	20%	----
Anions and Nutrients (QC Lot: 812949)											
VA23A1443-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0127	0.0129	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 812950)											
VA23A1443-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0114	0.0114	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 812951)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 812951) - continued											
VA23A1443-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 812947)											
VA23A1443-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.81	0.88	0.07	Diff <2x LOR	----
Total Metals (QC Lot: 810954)											
VA23A1468-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0150	mg/L	0.316	0.321	1.35%	20%	----
		Antimony, total	7440-36-0	E420	0.00050	mg/L	0.0208	0.0202	3.03%	20%	----
		Arsenic, total	7440-38-2	E420	0.00050	mg/L	0.0209	0.0202	3.42%	20%	----
		Barium, total	7440-39-3	E420	0.00050	mg/L	0.0524	0.0527	0.698%	20%	----
		Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.050	mg/L	0.297	0.286	0.011	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000750	mg/L	<0.0000750	<0.0000750	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.250	mg/L	396	392	1.14%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	0.00077	0.00104	0.00027	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00250	mg/L	0.0666	0.0675	1.39%	20%	----
		Iron, total	7439-89-6	E420	0.050	mg/L	0.184	0.184	0.00007	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0250	mg/L	1.22	1.25	1.76%	20%	----
		Manganese, total	7439-96-5	E420	0.00050	mg/L	0.00328	0.00284	0.00044	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000250	mg/L	0.190	0.184	2.94%	20%	----
		Nickel, total	7440-02-0	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.250	mg/L	152	154	1.39%	20%	----
		Selenium, total	7782-49-2	E420	0.000250	mg/L	0.0310	0.0297	4.57%	20%	----
		Silicon, total	7440-21-3	E420	0.50	mg/L	8.11	7.70	5.13%	20%	----
		Silver, total	7440-22-4	E420	0.000050	mg/L	0.000060	0.000061	0.0000009	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.250	mg/L	1020	1030	1.13%	20%	----
		Strontium, total	7440-24-6	E420	0.00100	mg/L	5.79	5.70	1.56%	20%	----
		Thallium, total	7440-28-0	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00150	mg/L	0.00184	0.00236	0.00053	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00250	mg/L	0.0551	0.0551	0.113%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 810954) - continued											
VA23A1468-001	Anonymous	Zinc, total	7440-66-6	E420	0.0150	mg/L	<0.0150	<0.0150	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 810227)											
VA23A1443-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0098	0.0115	0.0018	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00055	0.00056	0.00001	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0154	0.0151	2.19%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.053	0.054	0.0009	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000083	<0.0000050	0.0000033	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	62.2	63.0	1.30%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00014	0.00013	0.000007	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00224	0.00226	0.00002	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000052	0.000052	0.0000001	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0038	0.0039	0.00009	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	21.0	21.1	0.605%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00200	0.00201	0.295%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.0215	0.0212	1.13%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.711	0.708	0.519%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00231	0.00221	4.64%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.30	7.42	1.60%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	12.4	12.3	0.125%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.307	0.302	1.70%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000748	0.000744	0.555%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00255	0.00254	0.000009	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	0.0148	0.0144	0.0004	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 809760)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 809761)						
Conductivity	----	E100	1	µS/cm	1.6	----
Physical Tests (QCLot: 810595)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 810596)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 812935)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 812941)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 809763)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 809764)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 809765)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 809766)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 809767)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 809768)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 812948)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 812949)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 812950)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 812951)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 812947)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 810954)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 810227)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 810227) - continued						
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 809759)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 809760)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 809761)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.6	90.0	110	----
Physical Tests (QCLot: 810595)									
Turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 810596)									
Turbidity	----	E121	0.1	NTU	200 NTU	99.0	85.0	115	----
Physical Tests (QCLot: 812935)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	93.5	85.0	115	----
Physical Tests (QCLot: 812941)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 809763)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 809764)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 809765)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 809766)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.6	90.0	110	----
Anions and Nutrients (QCLot: 809767)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 809768)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.4	80.0	120	----
Anions and Nutrients (QCLot: 812948)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	83.4	75.0	125	----
Anions and Nutrients (QCLot: 812949)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 812950)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	95.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 812951)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.9	85.0	115	----
Organic / Inorganic Carbon (QCLot: 812947)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	109	80.0	120	----
Total Metals (QCLot: 810954)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	98.0	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.9	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	96.3	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.7	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.1	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.0	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	95.1	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.0	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.4	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.2	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.3	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	101	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.7	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	96.8	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	95.5	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.5	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.5	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 810954) - continued									
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.5	80.0	120	----
Dissolved Metals (QCLot: 810227)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	94.9	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.5	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.2	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.4	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	84.8	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	92.9	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	94.2	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.8	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.6	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.6	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.7	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.8	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.6	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	93.2	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	91.4	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	91.2	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.6	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	120	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.0	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.0	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.3	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	92.6	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 809763)										
VA23A1443-002	Anonymous	Fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 809764)										
VA23A1443-002	Anonymous	Chloride	16887-00-6	E235.Cl	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 809765)										
VA23A1443-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.57 mg/L	2.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 809766)										
VA23A1443-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.494 mg/L	0.5 mg/L	98.7	75.0	125	----
Anions and Nutrients (QCLot: 809767)										
VA23A1443-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	98.9 mg/L	100 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 809768)										
VA23A1450-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0305 mg/L	0.03 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 812948)										
VA23A1443-002	Anonymous	Nitrogen, total	7727-37-9	E366	0.380 mg/L	0.4 mg/L	94.9	70.0	130	----
Anions and Nutrients (QCLot: 812949)										
VA23A1443-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0493 mg/L	0.05 mg/L	98.6	70.0	130	----
Anions and Nutrients (QCLot: 812950)										
VA23A1443-002	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0477 mg/L	0.05 mg/L	95.4	70.0	130	----
Anions and Nutrients (QCLot: 812951)										
VA23A1443-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0950 mg/L	0.1 mg/L	95.0	75.0	125	----
Organic / Inorganic Carbon (QCLot: 812947)										
VA23A1443-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.48 mg/L	5 mg/L	110	70.0	130	----
Total Metals (QCLot: 810954)										
VA23A1468-002	Anonymous	Aluminum, total	7429-90-5	E420	0.934 mg/L	1 mg/L	93.4	70.0	130	----
		Antimony, total	7440-36-0	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0976 mg/L	0.1 mg/L	97.6	70.0	130	----
		Barium, total	7440-39-3	E420	0.0977 mg/L	0.1 mg/L	97.7	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.188 mg/L	0.2 mg/L	94.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 810954) - continued										
VA23A1468-002	Anonymous	Bismuth, total	7440-69-9	E420	0.0464 mg/L	0.05 mg/L	92.9	70.0	130	----
		Boron, total	7440-42-8	E420	0.425 mg/L	0.5 mg/L	85.0	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.0191 mg/L	0.02 mg/L	95.6	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.183 mg/L	0.2 mg/L	91.3	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0935 mg/L	0.1 mg/L	93.5	70.0	130	----
		Copper, total	7440-50-8	E420	0.0901 mg/L	0.1 mg/L	90.1	70.0	130	----
		Iron, total	7439-89-6	E420	9.56 mg/L	10 mg/L	95.6	70.0	130	----
		Lead, total	7439-92-1	E420	0.0926 mg/L	0.1 mg/L	92.6	70.0	130	----
		Lithium, total	7439-93-2	E420	0.474 mg/L	0.5 mg/L	94.8	70.0	130	----
		Magnesium, total	7439-95-4	E420	4.86 mg/L	5 mg/L	97.2	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0992 mg/L	0.1 mg/L	99.2	70.0	130	----
		Molybdenum, total	7439-98-7	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Nickel, total	7440-02-0	E420	0.187 mg/L	0.2 mg/L	93.7	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Selenium, total	7782-49-2	E420	0.209 mg/L	0.2 mg/L	105	70.0	130	----
		Silicon, total	7440-21-3	E420	48.5 mg/L	50 mg/L	97.0	70.0	130	----
		Silver, total	7440-22-4	E420	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0183 mg/L	0.02 mg/L	91.5	70.0	130	----
		Tin, total	7440-31-5	E420	0.0983 mg/L	0.1 mg/L	98.3	70.0	130	----
		Titanium, total	7440-32-6	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		Uranium, total	7440-61-1	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.506 mg/L	0.5 mg/L	101	70.0	130	----
		Zinc, total	7440-66-6	E420	1.84 mg/L	2 mg/L	92.2	70.0	130	----
Dissolved Metals (QCLot: 810227)										
VA23A1443-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.189 mg/L	0.2 mg/L	94.7	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00871 mg/L	0.01 mg/L	87.1	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00364 mg/L	0.004 mg/L	91.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 810227) - continued										
VA23A1443-002	Anonymous	Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.85 mg/L	2 mg/L	92.4	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0939 mg/L	0.1 mg/L	93.9	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0369 mg/L	0.04 mg/L	92.4	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.93 mg/L	4 mg/L	98.2	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	8.75 mg/L	10 mg/L	87.5	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00382 mg/L	0.004 mg/L	95.6	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00362 mg/L	0.004 mg/L	90.5	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00382 mg/L	0.004 mg/L	95.4	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.370 mg/L	0.4 mg/L	92.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0028

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabe Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	On File
Email 2	gabriel.holmes@mountpolley.com

Project Information	
ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590008044 Q2 2022
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):	ALS Contact: Can Dang	Sampler: DS

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals (F)	TN, NH3 (P)	DOC (F/P)	TSS (Whole Bottle)	Total Metals (Preserved) (P)	Dissolved Metals (F/P)	Hardness (F/P)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	JCP	18-Jan-23	11:05	Water	6	R	R	R	R	R	R						
	NEZ Seep 1	18-Jan-23	11:37	Water	6	R	R	R	R	R	R						
	LD	18-Jan-23	12:24	Water	6	R	R	R	R	R	R						
	SERD	18-Jan-23	12:36	Water	6	R	R	R	R	R	R						
	E18	18-Jan-23	13:10	Water	6	R	R	R	R	R	R						
	Upstream Drain	18-Jan-23	13:38	Water	6	R	R	R	R	R	R						
	E22	18-Jan-23	14:14	Water	6	R	R	R	R	R	R						
	STD	18-Jan-23	14:56	Water	6	R	R	R	R	R	R						

Environmental Division
Vancouver
Work Order Reference
VA23A1454

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	Date: January 19, 2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: 20/1/23	Time: 1140am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

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Environmental Incident Report

Date of Incident: March 27, 2023	**Incident Reported:** March 28, 2023 **Final Report:** April 25, 2023
Incident: Lower Long Ditch Sump – Unauthorized Discharge	
Department: Technical Services/Environmental	**Supervisor:** Gabriel Holmes

BACKGROUND:

A 30" pipeline in the Mount Polley Mine site contact water collection system became obstructed and contact water spilled to the environment. A contingency pipeline at that location was engaged but was also partially obstructed by a pneumatic knife gate valve that had slowly closed from approximately 2013 to present due to depressurization of the cylinder. The contingency pipeline accommodated the flow eventually but not the initial surge of water once the pipeline was fully obstructed. The contingency pipeline was working as intended within ~6.75 hours. Increased flows were occurring in the ditch due to pumping water from the Wight Pit to supplement the onsite water treatment plant. The most recent inspection of ditch infrastructure conducted on March 8, 2023 by MPMC personnel did not identify the partially closed valve.

DESCRIPTION OF INCIDENT:

Monday March 27, 2023	
16:15	Pump watch personnel note in their daily log that the Lower Long Ditch Sump is in the "Yellow" on the gauge for visual inspections as described in the MPMC Water Management Inspection Manual and requires action.
16:30	Pump watch personnel travelled to the Wight Pit and turned off the pumps to reduce water volumes in the Long Ditch
17:20	Pump Watch personnel noted that the Upper Long Ditch Sump had very high-water level. Upon further inspections they observed the contingency Lower Long Ditch Sump was also high and that water was discharging from the sump towards the adjacent forest.
17:30	Pump Watch personnel notified the site supervisor
17:40-01:00	Site Services personnel periodically monitored the site for changes
23:00	Discharge ceased from the Long Ditch to the environment due to cessation of pumping from Wight Pit
Tuesday March 28, 2023	
06:30	MPMC Environmental coordinator notified of incident

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07:00	MPMC Environmental staff inspect the site and observed a partially closed knife gate on the contingency pipeline
08:00	Site services personnel opened and chained the knife gate on the contingency pipeline
10:00	BC Spill reporting hotline was called and the spill reported. DGIR # 231129
11:34	MPMC Public Liaison Committee notified of incident
12:02	BC Ministry of Environment Environmental Compliance notified of the event
13:00	Site services suspect that the pipeline is frozen but cannot determine where the obstruction is. A steam truck is used from the downstream end to find the obstruction but was not successful.
Wednesday March 29, 2023	
09:13	Environment and Climate Change Canada notified of the incident
Thursday March 30, 2023	
14:05	Call with Deborah Portman at ECCC to discuss incident and actions taken
Friday March 31, 2023	
08:00	Site services attempt to clear the pipeline by plunging it with an excavator and hear what sounds like ice moving within most of the length of the pipeline. Not successful.
Monday April 3, 2023	
12:00	Site services determined that ~300 m of the pipeline was frozen and applied mobile heaters to the pipeline. A steam truck was also assigned to thaw the pipe
Monday April 3, 2023 – April 7, 2023	
10:00	Site services use heaters and steam truck the thaw the pipeline. Multiple holes were drilled in the pipeline to facilitate steam thawing due to the length of frozen pipe.
Friday April 7, 2023	
12:00	Long Ditch Pipeline thawed, unobstructed and operating as intended

Summary

On the evening of March 27, 2023, a 30" HDPE pipeline at the end of the Long Ditch (LD), a component of the site contact water collection system, became obstructed. The pipeline drains from the Upper Long Ditch Sump towards the Central Collection Sump (CCS). Once the pipeline was obstructed the sump water level rose and engaged the contingency system comprised of the Lower Long Ditch Sump and an additional 30" HDPE pipeline. A pneumatic knife gate valve that was installed at the inlet of the contingency pipeline

was partially closed due to the cylinder "weeping" since it was installed in 2013. The partially closed knife gate prevented the full capacity of the contingency pipeline from being engaged. The contingency pipeline had approximately 50% capacity once engaged. The water flowing down the Long Ditch overwhelmed both sumps and the partially obstructed contingency pipeline. Once full, the Lower Long Ditch Sump discharged through the overflow channel to the environment.

The high-water levels were observed by MPMC Pump Watch personnel during routine daily inspections and action was immediately taken to cease all unnecessary flow in the Long Ditch. At the time of the incident water was being pumped from the Wight Pit, which is being used for temporary surplus water storage, to the Long Ditch. The pumps were turned off reducing the flow in the ditch by greater than 50%. Pumping from the Wight Pit comprised ~60% of the total water in the ditch.

Water quality samples were taken from the sump the following day. Water quality data sets used to evaluate "typical" chemistry at the discharge location are listed below. The sample names and locations are as follows:

LD – Long Ditch Sump. Includes combined chemistry from all sources
E10 – Wight Pit pump, end of pipe pumping from the Wight Pit
JCP – Joe's Creek Pipe, end of pipe gravity fed seepage collection from the North Bell Dump

The lab reports below represent the most recent water chemistry from the sites listed above. LD was sampled on March 28, 2023, E10 was sampled on March 21, 2023, and JCP was sampled on January 18, 2023. The LD sample from March 28 represents typical combined chemistry from all sources when the Wight Pit (E10) pumps are off.

It was determined that an estimate of between **1235.8** and **2471.6 cubic meters** of water was released from the Lower Long Ditch Sump to the adjacent forest. A precise volume could not be calculated because of the short and irregular discharge conditions.

The lab reports included below represent the most recent sample results for the spill location. MPMC maintains a large data set for the Long Ditch water chemistry and can make it available upon request. Additionally, no acute toxicity samples were taken due to the short nature of the event and the lack of qualified staff on site at the time. While MPMC does not have toxicological data for the Long Ditch System, toxicological reports can be provided for the MPMC Tailings Pond Supernatant and the regularly sampled Water Treatment Plant (HAD-3). This is somewhat relevant as the Long Ditch system provides a large proportion of the of the influent water supplied to the Water Treatment Plant.

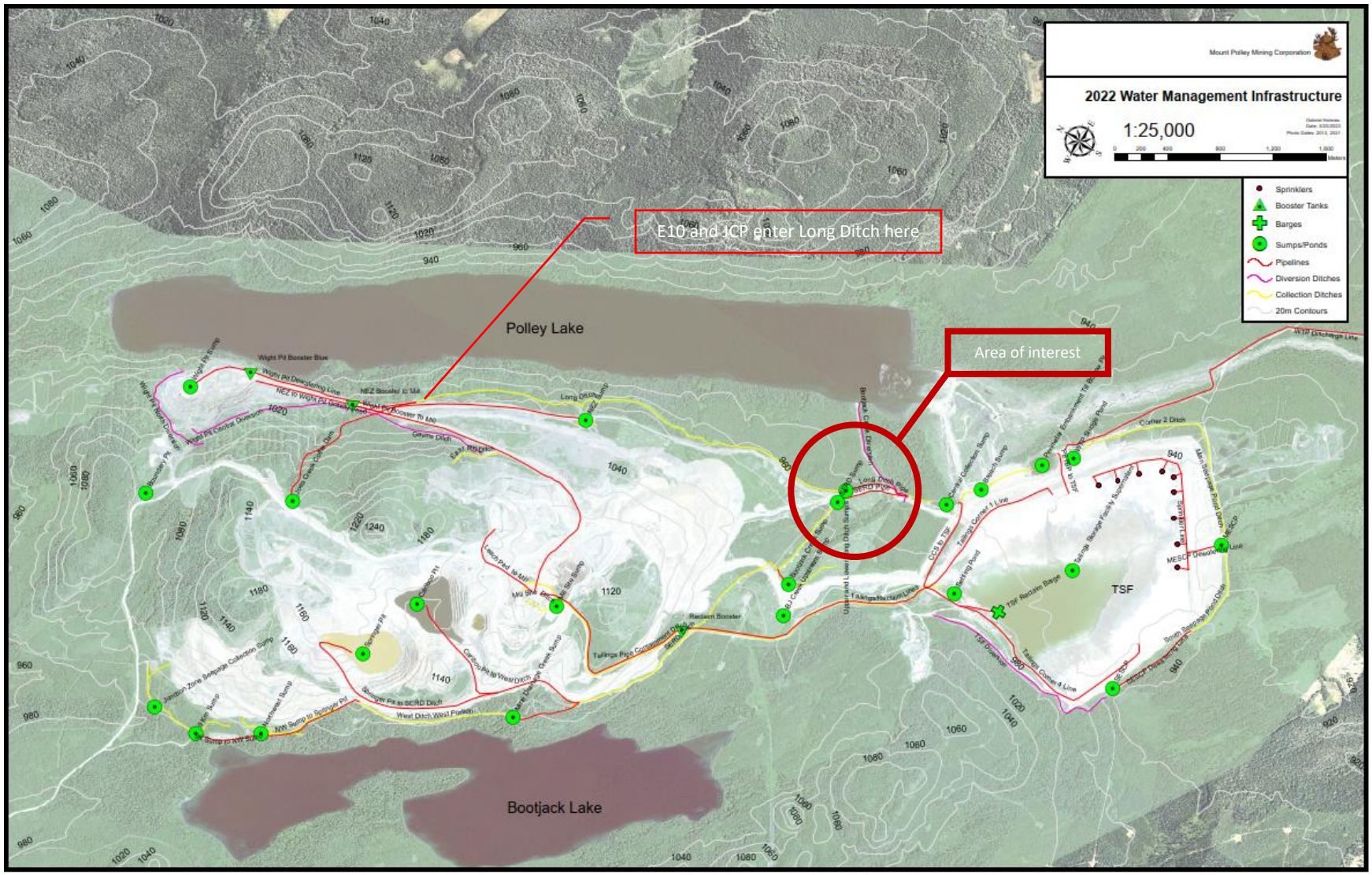

Figure 1 Water management infrastructure at Mount Polley Mine showing the area of interest.

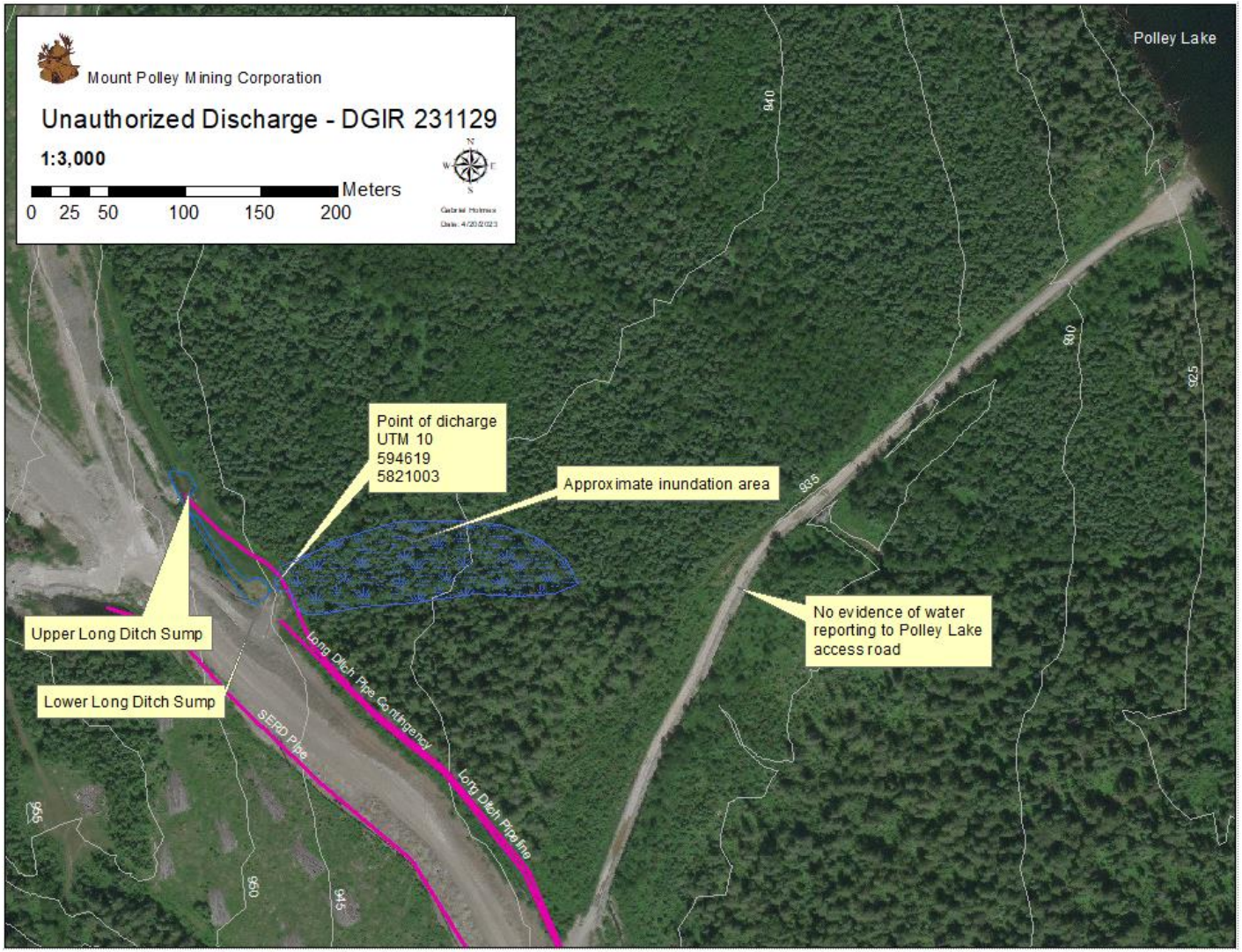

Figure 2 Incident location overview map.

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Volumetric Calculation

Flow rates were estimated using pumping rating curves from the Wight Pit pump, typical bucket flow measured rates at JCP and ocular estimates from site seepage rates. These are the best estimates based on the most recent available data. The length of time was determined to be the longest possible duration based on MPMC Pump Watch personnel's first observance of the sump being in the "yellow" zone on the sump gauge requiring immediate action. The sump discharged after the initial inspection but before the confirmation that that the sump was discharging. This assessment assumes that the contingency system was partially compromised. The contingency system accommodated ~50% of the flow.

Long Ditch Sump Discharge

A. Volume Estimates from Individual Sources in Long Ditch

Maximum Pumping Flow Rate from Wight Pit (E10) – ~ 0.0917 m3/sec (based on max. pump curve rate)
Discharge Period Duration – 24,300 seconds (6.75 hours)
Volume – 2,227.5 cubic meters

JCP Typical Flow Rate (JCP) – ~0.00404 m3/sec (average based on measured values from 2017 to present)
Discharge Period Duration – 24,300 seconds (6.75 hours)
Volume – 98.3 cubic meters

Estimated Site Seepage Flow Rate in Long Ditch (Seeps) - ~0.006 m3/sec (ocular estimate, compared to JCP flow rate with no Wight Pit pumping)
Discharge Period Duration – 24,300 seconds (6.75 hours)
Volume – 145.8 cubic meters

B. Total Volume Estimate in the Long Ditch

E10 volume 2,227.5 m3 + JCP volume 98.3 m3 + Seeps volume 145.8 m3 = 2,471.6 cubic meters
Total Volume Estimate in the Long Ditch over the Discharge Period – ~2,471.6 cubic meters

C. Volume Estimate to the Environment

Minus ~50% due to the contingency system being engaged
Total Long Ditch Volume 2,471.6 m3 – Contingency System 1,235.8 m3 = 1,235.8 cubic meters

Discharge Characteristics

The discharged substance was mine affected surface water runoff that was collected in water management infrastructure at Mount Polley Mine. The sump from which the discharge occurred serves to collect water from the east flank of the mine site and conveys it south towards the Tailings Storage Facility and the Water Treatment Plant. The discharged water flowed over the designed overflow spillway and reported to the adjacent forest. Field turbidity measurements taken the next day indicate that "typical" water in the Long Ditch has low turbidity. This indicates that very little particulate matter was being transported because of the spill.

The primary chemical constituent of concern is copper. The following charts show copper concentrations at the Long Ditch sample site (LD) and main inputs to the Long Ditch from 2021 to present. The main

inputs were pumping from the Wight Pit, sample site E10, and seepage from the North Bell Dump known as Joe's Creek Pipe or JCP. The concentrations in the tables below are compared to the BC Water Quality Guidelines and to the BC Contaminated Sites Regulation for reference.

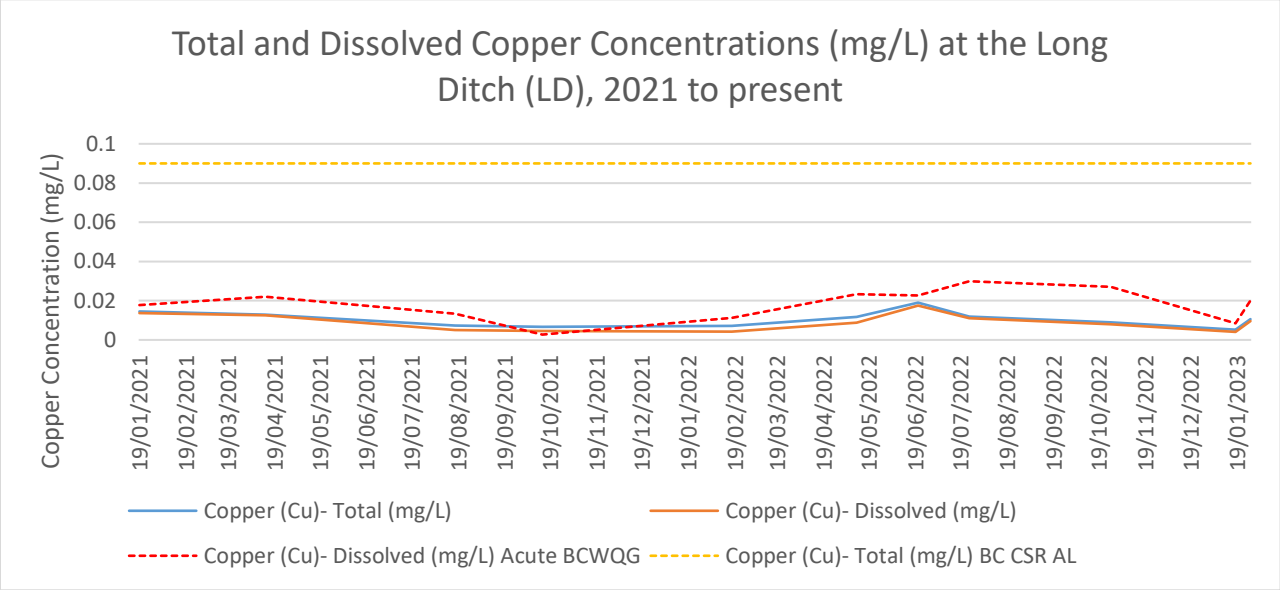

Figure 3 Copper concentrations at LD from 2021 to present compared to the BC CSR AL and the acute BCWQG. This sample site captures all inputs to the Long Ditch including the Wight Pit pumping, Joe's Creek Pipe (JCP) and all mine site seepage on the east flank of the mine.

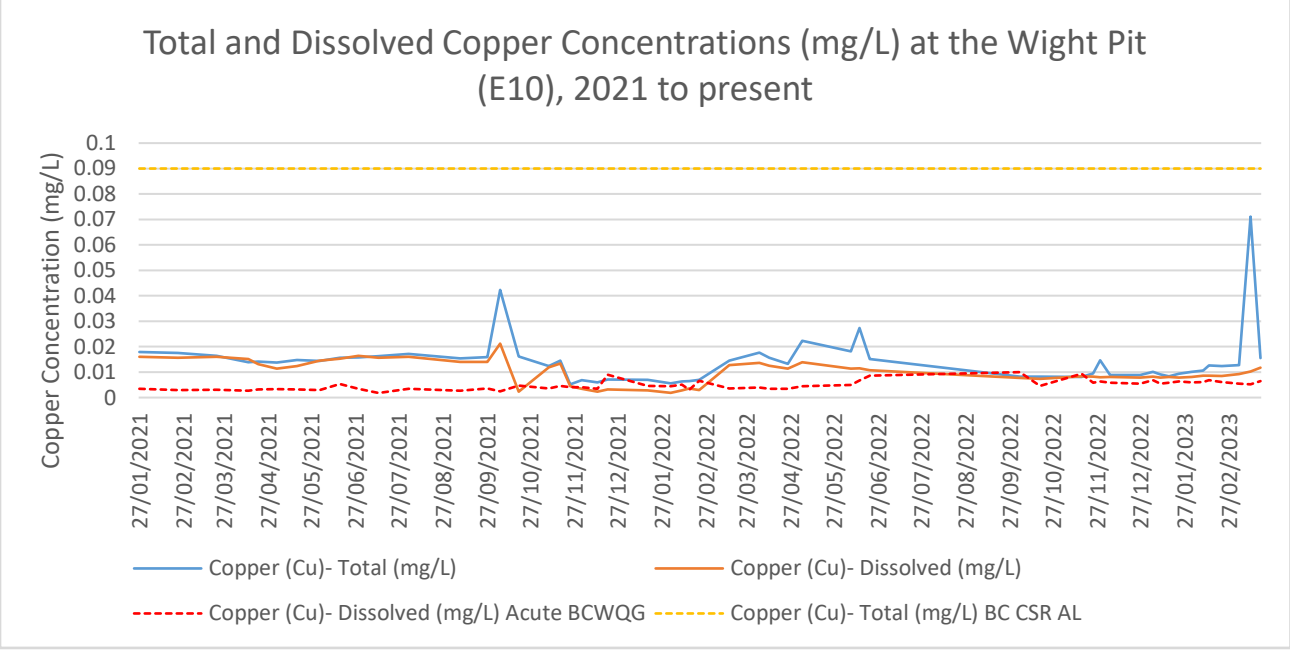

Figure 4 Copper concentrations from Wight Pit pumping (E10) from 2021 to present compared to the BC CSR AL and the acute BCWQG.

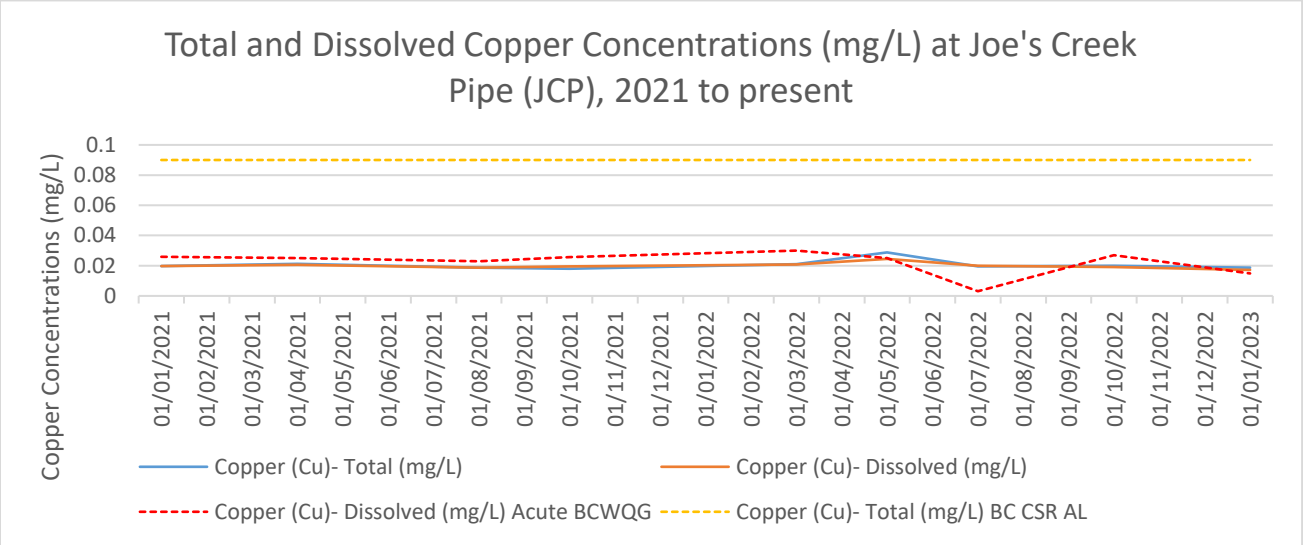

Figure 5 Copper concentrations at Joe's Creek Pipe (JCP) from 2021 to present compared to the BC CSR AL and the acute BCWQG.

Receiving Environment

Water that flowed from the Long Ditch Sump reported to the adjacent forest and then to ground. There was ~0.5-0.7 m of snow covering the ground at the time. Inspection of the site indicated the water flowed less than 300 m from the sump. No trace evidence of the discharge was observed at the nearby Polley Lake access road (Figure 2) which is located down slope of the sump. It is assumed the incident resulted in a small inundation area in the forest of less than 0.7 ha in size. Visibility in the area was severely impaired by the snow cover. No aquatic ecosystems were affected. The closest fish bearing water body is Polley Lake and it sits approximately 660 m from the Long Ditch Sump.

Physical Disturbance

No erosion was observed in the mine site infrastructure or along the flow path.

Root Cause

The underlying cause of the incident was the frozen pipeline downstream of the Long Ditch Sump. Extended sub-zero daily low temperatures were a contributing factor as was the partially closed knife gate on the contingency pipeline. The pipeline has operated as intended for ~10 years without issue with the only distinct operational change being the intermittent pumping from the Wight Pit. It appears that ice was forming inside the pipe walls for days, weeks or months leading up to March 27 when the pipeline was finally obstructed. The intermittent pumping from the Wight Pit caused water levels to rise and fall within the ditch system and within the pipeline. This may have allowed for ice buildup to occur readily within the pipe.

Future Mitigation

As part of the future mitigation strategy, MPMC will; 1) maintain on-site contingency systems and ensure the full contingency capacity is available; 2) continue routine inspections of the system; 3) continue to follow the Water Management Manual and daily check list.

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Figure 6 March 28, 2023. The Lower Long Ditch Sump showing discharge channel under snow in upper left and partially closed knife gate in upper right after incident. Note high water mark shown by ice level.

Figure 7 March 28, 2023. Lower Long Ditch Sump with knife gate opened.

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Figure 8 March 28, 2023. Lower Long Ditch Sump looking upstream.

Figure 9 March 28, 2023. Upper Long Ditch Sump inundated with primary pipeline submerged. Discharge to lower sump occurring in lower left.

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Figure 10 March 29, 2023. Upper Long Ditch Sump with primary pipeline submerged. The pipeline is frozen and not conveying water. Discharge to Lower Long Ditch Sump in upper left.

Figure 11 March 29, 2023. Upper Long Ditch Sump with primary pipeline submerged. The pipeline is frozen and not conveying water.

Figure 12 March 29, 2023. Overflow channel under snow and adjacent forest lands.

Figure 13 March 29, 2023. Path of flow from sump along pipeline and into adjacent forest.

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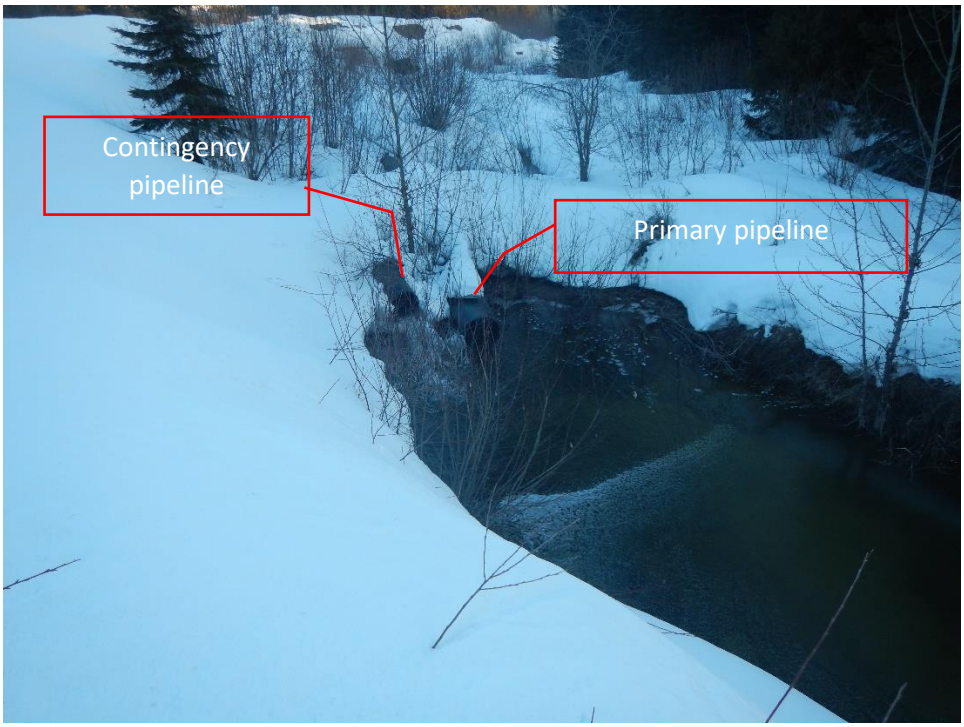

Figure 14 March 28, 2023. Contingency pipeline is engaged, and the primary pipeline is not. Reporting to downstream section of the Long Ditch.

Figure 15 March 11, 2023. Primary Long Ditch Pipeline operating as intended.

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an Imperial Metals company
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Figure 16 March 11, 2023. Primary Long Ditch Pipeline operating as intended and discharging downstream. The pipe across the ditch was used to insert steam apparatus into frozen pipe and is not part of the collection system.

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

Update to Minister/End-of-Spill Report Form

Environmental Emergency Program
SpillReports@gov.bc.ca

This report template can be completed to satisfy the requirements of either the End-of-Spill Report or the Update to Minister Report. Please specify which report you are completing in section I of this form. If any of the fields of this form are not applicable to the spill for which this form is being completed, indicate 'N/A' in the field; reports with incomplete fields will be sent back to the responsible person.

End-of-Spill Report: Section 6 of the Spill Reporting Regulation outlines the requirements for the End-of-Spill Report. Responsible persons must submit a written End-of-Spill Report to the Ministry of Environment and Climate Change Strategy within 30 days following the emergency response completion date of a spill as outlined in section 6 (1) of the Spill Reporting Regulation. Responsible persons must submit a written report to the Ministry of Environment and Climate Change Strategy as soon as practicable if either of the following two conditions are present:

1. The spill entered, or was likely to enter, a body of water as defined in the Spill Reporting Regulation
2. The quantity of the substance spilled was, or was likely to be, equal to or greater than the listed quantity for the listed substance as outlined in the Spill Reporting Regulation

Update to Minister Report: Section 5 of the Spill Reporting Regulation outlines the requirements for the Update to Minister Report. Responsible persons must submit a written report to the Ministry of Environment and Climate Change Strategy as soon as practicable if any of the following three conditions are present:

1. On request of the Minister
2. At least once every 30 days after the date that the spill began
3. At any time that the responsible person has reason to believe that information previously reported in the Initial Report has become inaccurate or incomplete

Complete this form and submit it by email to SpillReports@gov.bc.ca. For additional information, please visit the British Columbia Environmental Emergency Program Report a Spill webpage.

Dangerous Goods Incident Report (DGIR) number: 230286

Section I: Type of report
Sections 5 and 6 of Spill Reporting Regulation

This form is completed to satisfy the requirements of the:

☐ Update to Minister Report ☐ End-of-Spill Report

Section II: Contact information
Section 6 (2) (a) of the Spill Reporting Regulation

Details for person filling out the report	Name of company representative: Gabriel Holmes
	Company name: Mount Polley Mining Corporation
	Email: gabriel.holmes@mountpolley.com
	Address: PO Box 12, Likely, BC, V0L 1N0
	Telephone number: 236 317 4939

Details for responsible person Same as above ☑	Name of company representative:
	Company name:
	Email:
	Address:
	Telephone number:
Details for owner of the substance spilled Same as above ☑	Name of company representative:
	Company name:
	Email:
	Address:
	Telephone number:

Section III: Timing of the spill
Section 6 (2) (b) of the Spill Reporting Regulation

Date of spill: 2023-01-21 Time of spill: 01:20 Duration of the spill (days): <1

Date reported: 2023-01-23 Emergency response completion date[1]: 2023-01-21

Section IV: Site description
Section 6 (2) (c) (d) of the Spill Reporting Regulation

Provide a description of the spill site and the sites affected by the spill. The description of the spill site may include a description of the receiving environment, the proximity to a nearby city/town/roadway, the type of vegetation in the area, how densely populated the area is, accessibility to spill site, nearby waterways, and any other defining characteristics of the area.

The spill occurred in an active mining area within Mount Polley Mine. The spilled material reported to the frozen haul road. No vegetation or soils were present. No waterways were affected.

Latitude: Degrees 52 Minutes 32 Seconds 40.537

Longitude: Degrees 121 Minutes 38 Seconds 42.356

or

Site civic address or location: Street

City Postal Code

or

DLS or BCNTS (if applicable): Site ID number (if applicable):

[1] For the definition of the *emergency response completion date*, please refer to B.C. Reg. 187/2017 Spill Reporting Regulation

Section V: Description of the source, type, and quantity of the spill **Section 6 (2) (e) (f) of the Spill Reporting Regulation**
Description of the source of the spill (pipeline, rail, truck, facility, etc.): The spill occurred from a CAT 789 Haul Truck on the Waste Haul Road near the Cariboo Pit at Mount Polley Mine.
Type of substance spilled (common name): Recochem Ethylene Glycol Antifreeze, heavy duty, 50/50 premix
United Nations (UN) number of substance spilled (if applicable): N/A
Item number from the table in the Schedule in the Spill Reporting Regulation: 13
Quantity (in litres or kilograms) of the substance spilled – if the quantity is unknown, provide a reasonable estimate and explain why the quantity is unknown and cannot be determined: ~200L based on refilled quantity

Section VI: Description of the circumstances, cause, and impacts of the spill **Section 6 (2) (g) (i) (ii) (iii) of the Spill Reporting Regulation**
Provide a description of the activity during which the spill occurred (transportation, transfer of cargo, fuelling, cleaning, maintenance, etc.): Active production hauling
Provide a description of the incident leading to the spill (tank rupture, overfill, collision, rollover, derailment, fire, explosion, etc.): The haul truck was operating normally when the driver observed steam coming from the engine area. The driver pulled over and stopped to evaluate. It was found that antifreeze was leaking from a failed radiator hose and onto the ground. The engine was stopped and response was initiated.
Provide a description of the underlying cause of the spill (human error, external conditions, organizational or management failure, etc.): Mechanical failure. Failure of radiator hose.

Section VII: Impacts to human health, the environment, and infrastructure **Section 6 (2) (g) (iv) (v) of the Spill Reporting Regulation**
Describe any adverse effects of the spill on human health (please state 'N/A' if there were no adverse effects on human health): N/A
Number of people evacuated: N/A
Number of fatalities: N/A
Number of people injured: N/A
Describe any adverse impacts on infrastructure[2] (please state 'N/A' if there were no adverse impacts to infrastructure): N/A
Impacts to water
Was there an impact to a body of water? ◯ Yes ◯ No

[2] For the definition of *infrastructure,* refer to section 91.1 of the *Environmental Management Act 2003*

Description of impact:

N/A

Describe the body of water (stream, aquifer, fish habitat, naturally formed body of water, ditch, lake, etc.):

N/A

Name of body of water: N/A

Impacts to the environment

Was there an impact on flora (vegetation)? ◯ YES ◯ NO	If yes, list the common and species names: N/A

Provide a description of the impact on flora (oiled, removed, etc.):

N/A

Was there an impact on fauna (animals)? ◯ YES ◯ NO	If yes, list the common and species names: N/A

Provide a description of impact on fauna (include injured, dead, etc.):

N/A

Was there an impact on aquatic and/or terrestrial habitats? ◯ YES ◯ NO	If yes, list the type of habitat (riparian, breeding ground, etc.): N/A

Provide a description of impact on aquatic and terrestrial habitats, including response actions taken to restore any of the impacts listed:

N/A

Section VIII: Spill response actions **Section 6 (2) (h) of the Spill Reporting Regulation**		
Action taken to comply with section 91.2 of the *Environmental Management Act 2003*	Who took the action (company, person, contractor, etc.)	Date that the action was taken (click the arrow or enter the date using the format YYYY-MM-DD)
The spill was actioned by the Pit Shifter and the response was immediate. The spill was contained and was then cleaned up as per the spill response plan	Pit Shifter Roland Mailhot and Mount Polley Mine Operations personnel	2023-01-21
The spill was reported by mine management to the environmental department as outlined in the spill response plan.	Acting Mine Manager, John Thummerer	2023-01-22
The spill was reported to EMBC.	Environmental Coordinator, Gabriel Holmes	2023-01-23

Section IX: Waste disposal (please state 'N/A' if no waste was produced) **Section 6 (2) (i) of the Spill Reporting Regulation**		
List the type of waste	Method of disposal	Location of disposal
Contaminated spill pads	Outside services	GFL
Contaminated snow and ice	Outside services	GFL

Section X: Attached reports, maps, and photographs **Section 6 (2) (j) (k) of the Spill Reporting Regulation**	
Report of results of sampling, testing, monitoring, and/or assessing carried out during spill response actions (including reports from Qualified Professionals), if applicable	Copy attached ☑
Map of the incident site and areas surrounding the incident site (required)	Copy attached ☑
Photographs of the spill (required)	Copy attached ☑

Section XI: Agencies on scene or notified **Section 6 (2) (l) (m) of the Spill Reporting Regulation**
List the names of all agencies that were at the incident site: Mount Polley Mining Corporation

List the names of other persons or agencies that were advised about the spill:

BC Ministry of Environment representatives - Taylor Strosher, Luc Lachance, Abhirosh Chandran
Public Liaison Committee Members - all members (30) were notified including Xatsull FN and Williams Lake FN, local and regional government representatives

Section XII: Additional comments

N/A

Section XIII: Verification of information provided

I confirm that the above information is true and complete.

Name of person completing form:	Date completed (YYYY-MM-DD)
Gabriel Holmes	2023-01-23

Name of responsible person (person or company):	Date completed (YYYY-MM-DD)
Mount Polley Mining Corporation	2023-01-23

Section XIV: Approval - For internal use only

Reviewed by:	Date completed (YYYY-MM-DD)

Save Reset Form

Mount Polley Mining Corporation

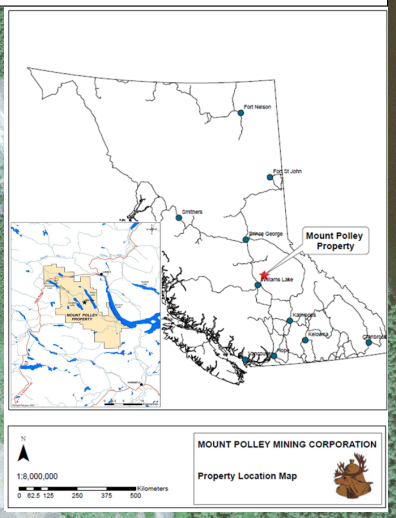
DGIR# 233425
Spill Location Map

N
W E
S

0 50 100 200 300 400
Meters

1:10,000

Date: 9/13/2023
Gabriel Holmes



Mill Site

Spill Location

Mount Polley Mining Corporation

Spill Report Form

Complete and forward to Environmental Department

DATE OF REPORT	Sept 5, 2023
DATE AND TIME OF SPILL	Sept 5, 2023 @ 2230
NAME OF PERSON REPORTING SPILL	Shane Johnston
VOLUME OF MATERIAL SPILLED (report all quantities over 20 litres) ***If greater than 100 litres report to shift boss immediately.*	40-60 L
TYPE OF PRODUCT SPILLED	Antifreeze
DESCRIPTION OF HOW SPILL OCCURRED (include location, equipment and people involved)	15-022 Haul Truck had a 3 inch Coolant Hose split on the SERD Containment Berm Construction
DESCRIPTION OF HOW SPILL WAS CLEANED UP	Glove stuck in hose to stop flow Bucket to catch the drips Spill pads placed and picked up and disposed of in proper containers took place on wet packed material packed on top and easily mopped up.
SUPERVISOR NAME	Roland Maillet
SUPERVISOR SIGNATURE	
FOLLOW UP REQUIRED?	
Environmental Department: Name: _____ Sign: _____	

Mount Polley Mining Corporation

Spill Report Form

Complete and forward to Environmental Department

DATE OF REPORT	Sept 5, 2023
DATE AND TIME OF SPILL	Sept 5, 2023 @ 2230
NAME OF PERSON REPORTING SPILL	Shane Johnston
VOLUME OF MATERIAL SPILLED (report all quantities over 20 litres) **If greater than 100 litres report to shift boss immediately.*	40-60 L
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DESCRIPTION OF HOW SPILL WAS CLEANED UP	Glove stuck in Hose to stop flow Bucket to catch the drips Spill pads placed and picked up and disposed of in proper containers on wet packed material pads on top and easily mopped up.
SUPERVISOR NAME *took plan*	Roland Maillet
SUPERVISOR SIGNATURE	
FOLLOW UP REQUIRED?	
Environmental Department: Name: _____ Sign: _____	

Permit 11678 – Total Phosphorus Exceedance at the Quesnel Lake Receiving Environment (QUL-58), June 6, 2023 – Investigation Report

Submitted to:

Ministry of Environment
Environmental Protection Division
South Interior Region – Cariboo

Prepared by:

Mount Polley Mining Corporation
Environmental Department

Box 12, Likely BC
V0L 1N0

(604) 630-2215

Date: August 14, 2023

Table of Contents

1 Background 1

2 Incident and Response Timelines 1

3 Investigation into cause 2

4 Summary of Actions Taken 6

5 Key Findings 6

6 Recommendations 6

Appendices

Appendix 1 Laboratory Reports – ALS

1 Background

On December 1, 2022 Mount Polley Mining Corporation (MPMC) received an amendment to Permit 11678 issued by the BC Ministry of Environment and Climate Change Strategy (MoE) under the BC *Environmental Management Act* (*EMA*) to discharge treated mine effluent into Quesnel Lake. Section 1.2.5 of the amended *EMA* Permit 11678 outlines the permitted characteristics of the treated discharge and this is summarized in Table 1 below.

Table 1 EMA Permit 11678 treated effluent compliance limits

Parameter	**Treatment Plant Outlet** (1)	**Edge of Quesnel Lake IDZ** (1)(2)(3)
Rainbow Trout 96hrLC50	50 % Mortality in 100% effluent	-
Daphnia Magna 48hrLC50	50 % Mortality in 100% effluent	-
pH	< 9.5 and >6.0 pH units	-
Total Suspended Solids	30 mg/L, and 15 mg/L Monthly Average	-
Total Sulfate	1,100 mg/L	218 mg/L
Total Ammonia (as N)	1.3 mg/L	0.18 mg/l as N
Total Nitrate (as N)	34.0 mg/L	3.0 mg/l as N
Total Nitrite (as N)	0.78 mg/L	0.02 mg/L as N
Total Phosphorus	90.0 µg/L	10.0 µg/L
Fluoride	17.0 mg/L	1.0 mg/L
Total Arsenic	28 µg/L	5.0 µg/L
Total Chromium	4 µg/L	1 µg/L
Total Copper	33 µg/L	2.2 µg/L (30-day rolling average)
Total Iron	1.0 mg/L	1.0 mg/L
Dissolved Iron	0.35 mg/L	0.35 mg/L
Total Manganese	3.4 mg/L	0.84 mg/L
Total Molybdenum	0.36 mg/L	0.05 mg/L
Total Silver	0.24 µg/L	0.05 µg/L
Total Selenium	75 µg/L	2 µg/L
Total Zinc	59 µg/L	7.5 µg/L
Dissolved Aluminum	0.75 mg/L	0.05 mg/|
Dissolved Cadmium	0.34 µg/L	0.13 µg/L

(1) All values are maximum values from grab samples unless otherwise specified.

(2) Only applies while discharging directly to Quesnel Lake.

(3) The "Edge of the Quesnel Lake IDZ" is a point located 100m from the Quesnel Lake outfall, represented by site QUL-58 mid and/or near bottom samples, or alternative location approved by the Director.

2 Incident and Response Timelines

On June 6, 2023, MPMC Environmental Department staff collected routine water samples at the discharge point of the Water Treatment Plant (WTP) into Quesnel Lake, identified as QUL-58, and referenced as E304876. This data was reviewed by MPMC staff on June 19, 2023 at approximately 9:00am. At this time, it was confirmed that the sample results for total phosphorus at QUL-58-AP (above plume) and QUL-58-MP (mid plume) were 0.0378 mg/L and 0.0126 mg/L, respectively, both of which exceeded the *EMA* Permit 11678 edge of Quesnel Lake Initial Dilution Zone (IDZ) limit of 0.010 mg/L. MPMC staff notified the

Director and site management, and put the WTP into recirculation mode immediately. These elevated total phosphorus concentrations initiated a Level 3 Trigger: Exceedance of Receiving Environment Trigger Levels- Monitoring and Response as per the MPMC 2022 Annual Discharge Plan (ADP), Section 5.1.2.1.

Samples were collected at QUL-58 and the background site QUL-2a (E303020) on June 19, 2023 and priority service was requested from the lab. A sample was also collected from the WTP before it was put into recirculation on June 19, 2023. The results from the samples collected on June 19, 2023 were received by email on June 21, 2023 and reviewed by MPMC. The sample results indicated total phosphorus concentrations of 0.0036 mg/L at QUL-58-AP and 0.0029 mg/L at QUL-58-MP, which are below the permit limit of 0.010 mg/L. The samples collected at QUL-2a, also yielded total phosphorus concentrations less than the permit limit. Modelled QUL-58 data was compared to the receiving environment trigger levels with no exceedances identified. The Director was notified via email on June 21, 2023 and the WTP resumed normal operation in accordance with the ADP on June 22, 2023.

Table 2 Summary of samples taken

Samples	Date Sample Taken	Date ALS Received	Date of ALS Report	Phosphorus Edge of IDZ Permit Limit Met
HAD-3	Jun 6, 2023	Jun 7, 2023	Jun 14, 2023	Yes
E19	Jun 6, 2023	Jun 7, 2023	Jun 14, 2023	Yes
QUL-58	Jun 6, 2023	Jun 7, 2023	Jun 14, 2023	No (QUL-58-AP [0.0378 mg/L], QUL-58-MP [0.0126 mg/L])
HAD-3	Jun 13, 2023	Jun 14, 2023	Jun 22, 2023	Yes
E19	Jun 13, 2023	Jun 14, 2023	Jun 22, 2023	No
HAD-3	Jun 19, 2023	Jun 20, 2023	Jun 21, 2023	Yes
E19	Jun 19, 2023	Jun 20, 2023	Jun 21, 2023	Yes
QUL-58	Jun 19, 2023	Jun 20, 2023	Jun 21, 2023	Yes

3 Investigation into cause

Sampling events with total phosphorus results above the permit limit of 0.010 mg/L are provided in Table 3 below. The IDZ permit limit of 0.010 mg/L came into effect on April 7, 2017. The British Columbia Water Quality Guidelines for total phosphorus are 0.005 mg/L to 0.015 mg/L.

Table 3 Total phosphorus results at QUL-58 above 0.010 mg/L

Date	Depth	Result (mg/L)	Permit Applicable
May 17, 2016	QUL-58-Mid	0.011	No
March 6, 2017	QUL-58-AT	0.0128	No
March 6, 2017	QUL-58-BT	0.049	No
March 6, 2017	QUL-58-B	0.015	□o
May 29, 2017	QUL-58-S	0.05	No*
May 13, 2018	QUL-58-S	0.013	No*
February 26, 2019	QUL-58-Mid	0.011	Yes
February 26, 2019	QUL-58-B	0.012	Yes
March 3, 2019	QUL-58-S	0.016	No*
July 9, 2019	QUL-58-S	0.0107	No*
July 9, 2019	QUL-58-AT	0.0134	No*
July 25, 2019	QUL-58-AT	0.0129	No*
June 9, 2020	QUL-58-S	0.0107	No*
June 29, 2020	QUL-58-AT	0.0137	No*

June 29, 2020	QUL-58-B	0.0125	Yes
June 6, 2023	QUL-58-AP	0.0378	No*
June 6, 2023	QUL-58-MP	0.0126	Yes

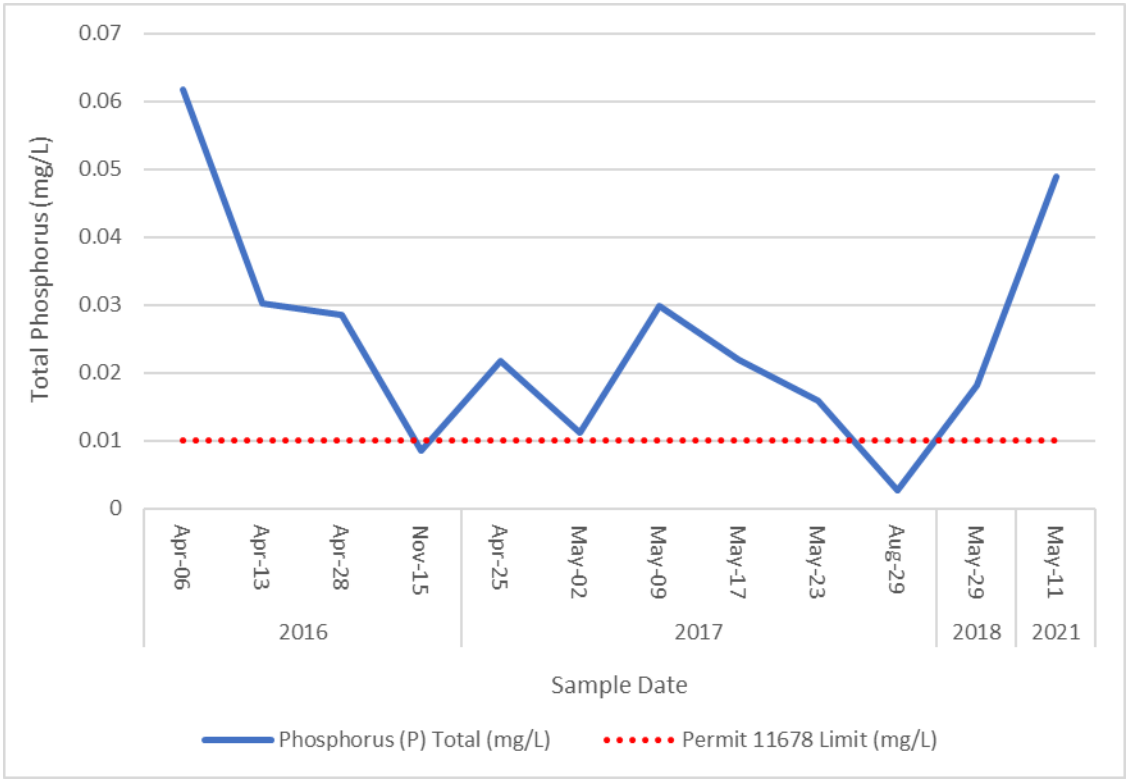
*Permit 11678 stipulates that the edge of Quesnel Lake IDZ is represented by site QUL-Mid and/or near bottom samples; therefore, the limits provided under Condition 1.2.5 Table 1 of the permit do not apply to sample sites QUL-58-S, QUL-58-AT and QUL-58-AP.

In the *Permit 11678- Total Phosphorus Exceedance at QUL-58, February 26, 2019- Follow Up Report* previously submitted to ENV, it was noted that investigations from 2016 and 2017 revealed that the elevated phosphorus in Quesnel Lake was the result of an equipment cleaning agent containing phosphate. The cleaning agent was replaced with a non-phosphate cleaner. It was also noted in the February 26, 2019 follow up report that the elevated total phosphorus concentrations in Quesnel Lake in 2018 were suspected to have been from Hazeltine and Edney Creeks.

Total phosphorus data from 2019 to 2023 supports the belief that the higher concentrations of phosphorus in Quesnel Lake are coming from Hazeltine and Edney Creeks as shown in Figure 2 below. Four of the 6 total phosphorus concentrations recorded at EDC-01 (Edney Creek outlet) in 2019 and 2020 were above the permit limit with an average of 0.0177 mg/L. The outlet of Edney Creek changed from EDC-01 to EDC-01a in 2021. Seventeen of the 29 total phosphorus concentrations recorded at EDC-01a in 2021-2023 were above the permit limit with an average of 0.0136 mg/L. The outlet of Hazeltine Creek to Quesnel Lake changed from HAC-12 to HAC-01c in 2018 and the WTP was no longer discharging into Hazeltine Creek. The maximum concentration of total phosphorus at HAC-01c in 2019 and 2020 was 0.041 mg/L in May 2020 and the average was 0.018 mg/L. The outlet of Hazeltine Creek to Quesnel Lake changed from HAC-01c to HAC-08 in 2021. Eighteen of the 28 total phosphorus concentrations recorded at HAC-08 in 2021-2023 were above the permit limit with an average of 0.0146 mg/L. The maximum concentration of total phosphorus at HAC-08 was 0.0435 mg/L in August 2022.

Historical total phosphorus data from Horsefly River from 2016 to 2021 also indicates that higher concentrations of phosphorus in Quesnel Lake are the result of tributary inputs to the lake. Ten of the 12 total phosphorus concentrations recorded at HOR-2 (Horsefly River outlet) were above the permit limit with an average of 0.025 mg/L (Figure 1).

Figure 1. Total phosphorus results from the Horsefly River from 2016-2021

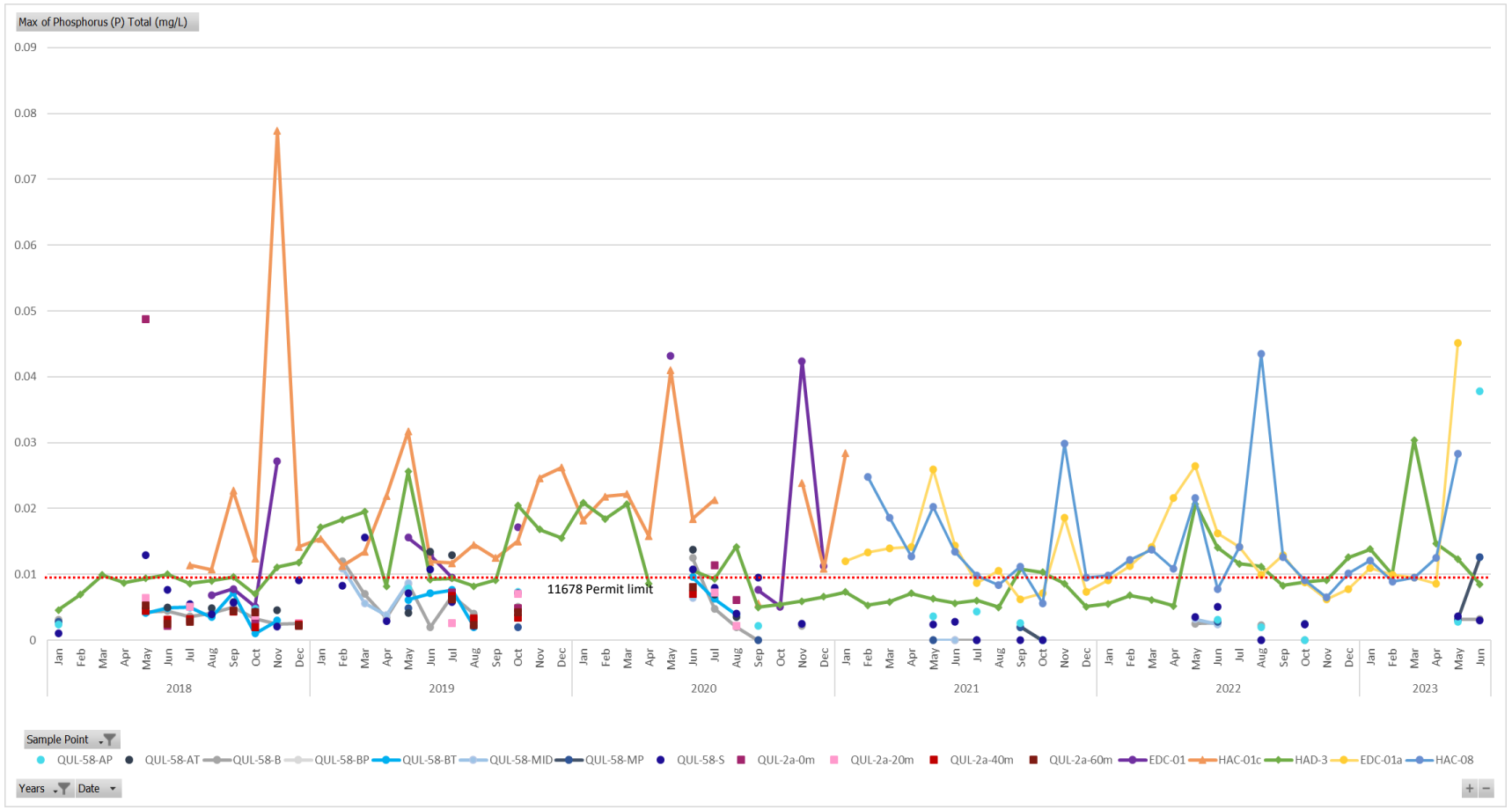


HAD-3 total phosphorus concentrations fluctuated above and below 0.010 mg/L from 2018 to 2023 with an overall maximum of 0.0305 mg/L in May 2023, and averages of 0.0093 mg/L in 2019, 0.0104 mg/L in 2020, 0.0069 mg/L in 2021, 0.010 mg/L in 2022 and 0.015 mg/L in 2023.

HAD-3 results were above 0.010 mg/L when total phosphorus at the IDZ was above the permit limit, except at the time that the July 9 and 25, 2019, June 9, 2020 and June 6, 2023 Quesnel Lake samples were collected.

MPMC will continue to monitor total phosphorus concentrations of the effluent at the discharge point and at the Quesnel Lake IDZ.

Figure 2. Total phosphorus results from QUL-58, HAD-3 and the outlets of Hazeltine and Edney Creeks from 2018-2023



4 Summary of Actions Taken

Date	Action Taken
Jun 6, 2023	HAD-3, E19 and QUL-58 samples collected.
Jun 19, 2023	QUL-58 results from the Jun 6, 2023 sample were above the permit limit for total phosphorus. The Director was notified and the WTP was put into recirculation. HAD-3, E19 and QUL-58 samples collected.
Jun 21, 2023	QUL-58 results from the Jun 19, 2023 sample were below the permit limit for total phosphorus. The Director was notified and the WTP resumed normal operation on Jun 22, 2023.

5 Key Findings

- Total phosphorus exceedances of the permit limit at QUL-58 may be the result of higher total phosphorus inputs from tributaries of the lake including Hazeltine and Edney Creeks, and the Horsefly River.

6 Recommendations

- Continue routine monitoring of the influent to, and effluent from, the WTP.
- Continue to review water quality results.
- Discuss water management with WTP operators.

Appendix 1 Laboratory Reports - ALS

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B2755**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 07-Jun-2023 11:00
PO	: 5590012190	Date Analysis Commenced	: 08-Jun-2023
C-O-C number	: M0026	Issue Date	: 16-Jun-2023 08:56
Sampler	: AN, MJ		
Site	: Mount Polley Mining Corporation		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: HAD-3	E19	----	----	----
					Client sampling date / time: 06-Jun-2023 08:55	06-Jun-2023 10:08	----	----	----
					VA23B2755-001	VA23B2755-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	97.4	97.3	----	----	----
Conductivity	----	E100/VA	2.0	µS/cm	1180	1180	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L	569	566	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.50	mg/L	596	602	----	----	----
pH	----	E108/VA	0.10	pH units	8.19	8.18	----	----	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L	881	891	----	----	----
Solids, total suspended [TSS]	----	E164/VA	1.0	mg/L	1.1	1.0	----	----	----
Turbidity	----	E121/VA	0.10	NTU	0.66	0.51	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.0141	0.0140	----	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	4.86	5.22	----	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L	0.393	0.393	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L	3.55	3.53	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L	3.56	3.54	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L	0.0098	0.0098	----	----	----
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	3.72	3.82	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	0.0060	0.0066	----	----	----
Phosphorus, total dissolved	7723-14-0	E375-T/VA	0.0020	mg/L	0.0034	0.0035	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	526	525	----	----	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	3.17	3.81	----	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0641	0.204	----	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00068	0.00067	----	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00105	0.00108	----	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.0406	0.0402	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	HAD-3	E19	----	----	----
					Client sampling date / time	06-Jun-2023 08:55	06-Jun-2023 10:08	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B2755-001	VA23B2755-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L		<0.000100	<0.000100	----	----	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L		0.124	0.126	----	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L		<0.0000850 DLM	<0.0000850 DLM	----	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L		189	193	----	----	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L		0.00023	0.00023	----	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L		0.00902	0.00885	----	----	----
Iron, total	7439-89-6	E420/VA	0.030	mg/L		0.065	0.053	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L		0.0068	0.0068	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.100	mg/L		30.2	29.3	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L		0.128	0.122	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L		0.174	0.169	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L		3.19	3.11	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L		0.0470	0.0463	----	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L		4.89	4.93	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L		30.3	30.2	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L		3.40	3.26	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, total	7440-32-6	E420/VA	0.0100	mg/L		<0.0100	<0.0100	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L		0.00254	0.00251	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L		0.00116	0.00112	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0030	mg/L		0.0081	0.133 RRV	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		0.00070	0.00069	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	HAD-3	E19	----	----	----
					Client sampling date / time	06-Jun-2023 08:55	06-Jun-2023 10:08	----	----	----
						VA23B2755-001	VA23B2755-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00101	0.00110	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.0412	0.0411	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		0.109	0.111	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000950 DLM	<0.000900 DLM	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		178	177	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		0.00017	0.00018	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00050	mg/L		0.00733	0.00675	----	----	----
Iron, dissolved	7439-89-6	E421/VA	0.030	mg/L		<0.030	<0.030	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		0.0071	0.0070	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.100	mg/L		30.3	30.0	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.111	0.108	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.183	0.177	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		3.29	3.28	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.0417	0.0430	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		4.78	4.73	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		29.6	29.9	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		3.50	3.36	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.0100	mg/L		<0.0100	<0.0100	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.00250	0.00251	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		0.00099	0.00096	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B2755**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 07-Jun-2023 11:00
PO	: 5590012190	Date Analysis Commenced	: 08-Jun-2023
C-O-C number	: M0026	Issue Date	: 16-Jun-2023 08:37
Sampler	: AN, MJ 250-790-2215 ext 2171		
Site	: Mount Polley Mining Corporation		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 979966)											
FJ2301359-010	Anonymous	Turbidity	----	E121	0.10	NTU	0.79	0.89	0.10	Diff <2x LOR	----
Physical Tests (QC Lot: 980104)											
FJ2301353-001	Anonymous	pH	----	E108	0.10	pH units	8.29	8.29	0.00%	4%	----
Physical Tests (QC Lot: 980105)											
FJ2301353-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	137	137	0.182%	20%	----
Physical Tests (QC Lot: 980106)											
FJ2301353-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	2430	2420	0.412%	10%	----
Physical Tests (QC Lot: 986953)											
KS2301941-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	314	323	2.67%	20%	----
Anions and Nutrients (QC Lot: 980107)											
FJ2301353-001	Anonymous	Fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 980108)											
FJ2301353-001	Anonymous	Chloride	16887-00-6	E235.Cl	10.0	mg/L	<10.0	<10.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 980110)											
FJ2301353-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	40.4	40.5	0.342%	20%	----
Anions and Nutrients (QC Lot: 980111)											
FJ2301353-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	0.111	0.111	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 980112)											
FJ2301353-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	1290	1290	0.287%	20%	----
Anions and Nutrients (QC Lot: 980114)											
FJ2301353-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985143)											
VA23B2755-001	HAD-3	Nitrogen, total	7727-37-9	E366	0.150	mg/L	3.72	3.78	1.78%	20%	----
Anions and Nutrients (QC Lot: 985144)											
VA23B2755-001	HAD-3	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0060	0.0062	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985145)											
VA23B2755-001	HAD-3	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0034	0.0033	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985146)											
VA23B2755-001	HAD-3	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0141	0.0136	0.0004	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 985142)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 985142) - continued											
VA23B2755-001	HAD-3	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	3.17	3.17	0.003	Diff <2x LOR	----
Total Metals (QC Lot: 978831)											
KS2301928-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0042	0.0048	0.0006	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00137	0.00134	2.19%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.00755	0.00724	4.18%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	65.1	66.3	1.88%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00791	0.00785	0.819%	20%	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.044	0.044	0.0002	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0022	0.0022	0.00005	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	16.4	16.1	1.27%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0345	0.0344	0.0628%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00233	0.00233	0.199%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	3.47	3.46	0.0934%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	11.8	11.9	0.804%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	5.83	5.76	1.31%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.323	0.331	2.24%	20%	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000011	0.000011	0.0000002	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 978749)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 978749) - continued											
VA23B2754-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0046	0.0048	0.0002	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00022	0.00022	0.000002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0122	0.0125	2.40%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000116	0.0000115	0.0000001	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	36.2	36.5	0.714%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00035	0.00036	0.000010	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0041	0.0041	0.00005	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	6.44	6.54	1.54%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00054	0.00052	0.00002	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00445	0.00433	2.64%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00067	0.00068	0.000008	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.85	1.89	2.38%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000412	0.000382	0.000029	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	8.45	8.55	1.08%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	5.42	5.43	0.176%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.181	0.174	4.33%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00741	0.00750	1.26%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00095	0.00095	0.000005	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0016	0.0014	0.0003	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 979966)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 980105)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 980106)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 985941)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 986953)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 980107)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 980108)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 980110)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 980111)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 980112)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 980114)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 985143)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 985144)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 985145)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 985146)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 985142)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 978831)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 978749)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 978749) - continued						
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 979966)									
Turbidity	----	E121	0.1	NTU	200 NTU	100.0	85.0	115	----
Physical Tests (QCLot: 980104)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 980105)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 980106)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.2	90.0	110	----
Physical Tests (QCLot: 985941)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	91.0	85.0	115	----
Physical Tests (QCLot: 986953)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.6	85.0	115	----
Anions and Nutrients (QCLot: 980107)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 980108)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 980110)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 980111)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.2	90.0	110	----
Anions and Nutrients (QCLot: 980112)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 980114)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	96.0	80.0	120	----
Anions and Nutrients (QCLot: 985143)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 985144)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.5	80.0	120	----
Anions and Nutrients (QCLot: 985145)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 985146)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.3	85.0	115	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 985142)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 978831)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.3	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	96.9	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	91.3	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	100	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	106	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.9	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	98.0	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.2	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	97.3	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	112	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	109	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	91.4	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.2	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.0	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.6	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	108	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 978749)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	106	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	108	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	98.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	105	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	105	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	109	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.4	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	100	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	105	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	105	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.3	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 980107)										
VA23B2709-001	Anonymous	Fluoride	16984-48-8	E235.F	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 980108)										
VA23B2709-001	Anonymous	Chloride	16887-00-6	E235.Cl	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 980110)										
VA23B2709-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.59 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 980111)										
VA23B2709-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.497 mg/L	0.5 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 980112)										
VA23B2709-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 980114)										
FJ2301355-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	ND mg/L	0.03 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 985143)										
VA23B2755-002	E19	Nitrogen, total	7727-37-9	E366	ND mg/L	2 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 985144)										
VA23B2755-002	E19	Phosphorus, total	7723-14-0	E372-U	0.0460 mg/L	0.05 mg/L	91.9	70.0	130	----
Anions and Nutrients (QCLot: 985145)										
VA23B2755-002	E19	Phosphorus, total dissolved	7723-14-0	E375-T	0.0459 mg/L	0.05 mg/L	91.8	70.0	130	----
Anions and Nutrients (QCLot: 985146)										
VA23B2755-002	E19	Ammonia, total (as N)	7664-41-7	E298	0.0988 mg/L	0.1 mg/L	98.8	75.0	125	----
Organic / Inorganic Carbon (QCLot: 985142)										
VA23B2755-002	E19	Carbon, dissolved organic [DOC]	----	E358-L	5.18 mg/L	5 mg/L	104	70.0	130	----
Total Metals (QCLot: 978831)										
VA23B2702-001	Anonymous	Aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.2	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		Barium, total	7440-39-3	E420	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0436 mg/L	0.04 mg/L	109	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00966 mg/L	0.01 mg/L	96.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 978831) - continued										
VA23B2702-001	Anonymous	Boron, total	7440-42-8	E420	0.107 mg/L	0.1 mg/L	107	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0199 mg/L	0.02 mg/L	99.7	70.0	130	----
		Copper, total	7440-50-8	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Iron, total	7439-89-6	E420	1.98 mg/L	2 mg/L	99.1	70.0	130	----
		Lead, total	7439-92-1	E420	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		Lithium, total	7439-93-2	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		Potassium, total	7440-09-7	E420	3.85 mg/L	4 mg/L	96.4	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		Silicon, total	7440-21-3	E420	9.71 mg/L	10 mg/L	97.1	70.0	130	----
		Silver, total	7440-22-4	E420	0.00373 mg/L	0.004 mg/L	93.2	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00387 mg/L	0.004 mg/L	96.7	70.0	130	----
		Tin, total	7440-31-5	E420	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Zinc, total	7440-66-6	E420	0.395 mg/L	0.4 mg/L	98.8	70.0	130	----
Dissolved Metals (QCLot: 978749)										
VA23B2754-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00899 mg/L	0.01 mg/L	89.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	93.6	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 978749) - continued										
VA23B2754-002	Anonymous	Chromium, dissolved	7440-47-3	E421	0.0380 mg/L	0.04 mg/L	94.9	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0185 mg/L	0.02 mg/L	92.7	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.86 mg/L	2 mg/L	92.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.97 mg/L	4 mg/L	99.3	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0371 mg/L	0.04 mg/L	92.8	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.08 mg/L	10 mg/L	90.8	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00394 mg/L	0.004 mg/L	98.6	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00368 mg/L	0.004 mg/L	92.0	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0191 mg/L	0.02 mg/L	95.3	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00388 mg/L	0.004 mg/L	96.9	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0977 mg/L	0.1 mg/L	97.7	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.376 mg/L	0.4 mg/L	94.1	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: M0026

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	
ALS Lab Work Order # (ALS use only):	B2755

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Can Dang	Sampler: MJ,AN

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

NUMBER OF CONTAINERS

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	TN/NH3	Hardness	Ra-226				SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
						F	P	F/P		P	F/P				P						
	HAD-3	6-Jun-23	8:55	Water	6	R	R	R	R	R	R										
	E19	6-Jun-23	10:08	Water	6	R	R	R	R	R	R										
					6	R	R	R	R	R	R										

Environmental Division
Vancouver
Work Order Reference
VA23B2755

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11°C	9.5°C		

SHIPMENT RELEASE (client use)

Released by: Maea Johnson	Date: June 6, 2023	Time: 15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: DJ	Date: June 07/23	Time: 11:05

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

COC Number: M0026

Page 1 of 1

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): B2755

ALS Contact: Can Dang Sampler: MJ,AN

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	TN/NH3	Hardness	Ra-226	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
							F	P	F/P		P	F/P				P			
	HAD-3	6-Jun-23	8:55	Water	6	R	R	R	R	R	R								
	E19	6-Jun-23	10:08	Water	6	R	R	R	R	R	R								
					6	R	R	R	R	R	R								

Environmental Division
Vancouver
Work Order Reference
VA23B2755

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11°C	9.5°C		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Maea Johnson	June 6, 2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DJ	June 07/23	11:05

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B2768**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 07-Jun-2023 11:00
PO	: 5590012190	Date Analysis Commenced	: 07-Jun-2023
C-O-C number	: D0098	Issue Date	: 14-Jun-2023 18:03
Sampler	: DS, KA		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	QUL-58-S	QUL-58-AP	QUL-58-MP	QUL-58-B	Field Blank
					Client sampling date / time	06-Jun-2023 10:32	06-Jun-2023 11:08	06-Jun-2023 10:58	06-Jun-2023 10:45	06-Jun-2023 11:59
						VA23B2768-001	VA23B2768-002	VA23B2768-003	VA23B2768-004	VA23B2768-005
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		49.3	49.5	49.3	49.4	<1.0
Conductivity	----	E100/VA	2.0	µS/cm		111	116	121	121	<2.0
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		50.1	51.1	52.1	53.4	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.50	mg/L		54.8	54.0	59.1	57.5	<0.50
pH	----	E108/VA	0.10	pH units		7.85	7.83	7.83	7.82	5.49
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		71	66	68	72	<10
Solids, total suspended [TSS]	----	E164/VA	1.0	mg/L		<1.0	24.8	12.7	5.8	<1.1
Turbidity	----	E121/VA	0.10	NTU		0.23	0.37	0.51	0.22	<0.10
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.034	0.041	0.042	0.044	<0.020
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		0.134	0.149	0.162	0.165	<0.0050
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		0.134	0.149	0.162	0.165	<0.0051
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L		0.193	0.227	0.225	0.218	<0.030
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L		0.0030	0.0378	0.0126	0.0032	<0.0020
Phosphorus, total dissolved	7723-14-0	E375-T/VA	0.0020	mg/L		0.0022	<0.0020	0.0023	<0.0020	<0.0020
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		6.76	7.87	9.89	10.2	<0.30
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		2.64	2.48	2.52	2.59	<0.50
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L		0.0276	0.377	0.255	0.0974	0.0061 RRV
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L		0.00012	0.00029	0.00024	0.00019	<0.00010
Barium, total	7440-39-3	E420/VA	0.00010	mg/L		0.00552	0.00991	0.00828	0.00737	<0.00010

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-58-S	QUL-58-AP	QUL-58-MP	QUL-58-B	Field Blank
					Client sampling date / time	06-Jun-2023 10:32	06-Jun-2023 11:08	06-Jun-2023 10:58	06-Jun-2023 10:45	06-Jun-2023 11:59
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B2768-001	VA23B2768-002	VA23B2768-003	VA23B2768-004	VA23B2768-005
						Result	Result	Result	Result	Result
Total Metals										
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron, total	7440-42-8	E420/VA	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L		<0.0000050	0.0000107	0.0000061	0.0000053	<0.0000050
Calcium, total	7440-70-2	E420/VA	0.050	mg/L		18.5	17.9	19.8	19.2	<0.050
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L		<0.00010	0.00022	0.00015	<0.00010	<0.00010
Copper, total	7440-50-8	E420/VA	0.00050	mg/L		0.00141	0.00717	0.00540	0.00338	<0.00050
Iron, total	7439-89-6	E420/VA	0.030	mg/L		0.036	0.395	0.262	0.098	<0.030
Lead, total	7439-92-1	E420/VA	0.000050	mg/L		0.000070	0.000158	0.000104	<0.000050	<0.000050
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L		<0.0010	0.0013	0.0012	0.0010	<0.0010
Magnesium, total	7439-95-4	E420/VA	0.100	mg/L		2.08	2.27	2.35	2.33	<0.100
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L		0.00199	0.0180	0.0129	0.00446	0.00013 RRV
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L		0.000415	0.000814	0.00138	0.00151	<0.000050
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L		<0.00050	0.00078	0.00064	<0.00050	<0.00050
Potassium, total	7440-09-7	E420/VA	0.050	mg/L		0.523	0.592	0.586	0.566	<0.050
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L		0.000114	0.000236	0.000367	0.000326	<0.000050
Silicon, total	7440-21-3	E420/VA	0.10	mg/L		2.01	2.66	2.41	2.23	<0.10
Silver, total	7440-22-4	E420/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium, total	7440-23-5	E420/VA	0.050	mg/L		1.01	1.13	1.29	1.29	<0.050
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L		0.129	0.141	0.141	0.144	<0.00020
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin, total	7440-31-5	E420/VA	0.00010	mg/L		<0.00010	0.00018	<0.00010	<0.00010	<0.00010
Titanium, total	7440-32-6	E420/VA	0.0100	mg/L		<0.0100	0.0140	<0.0100	<0.0100	<0.0100
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L		0.000169	0.000188	0.000191	0.000186	<0.000010
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L		<0.00050	0.00092	0.00066	<0.00050	<0.00050
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0030	mg/L		0.0073	0.0078	0.0137	0.0149	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	QUL-58-S	QUL-58-AP	QUL-58-MP	QUL-58-B	Field Blank
					Client sampling date / time	06-Jun-2023 10:32	06-Jun-2023 11:08	06-Jun-2023 10:58	06-Jun-2023 10:45	06-Jun-2023 11:59
						VA23B2768-001	VA23B2768-002	VA23B2768-003	VA23B2768-004	VA23B2768-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		<0.00010	<0.00010	0.00012	0.00011	----
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00515	0.00516	0.00544	0.00586	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		16.6	17.0	17.3	17.7	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
Copper, dissolved	7440-50-8	E421/VA	0.00050	mg/L		0.00072	0.00065	0.00095	0.00090	----
Iron, dissolved	7439-89-6	E421/VA	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
Magnesium, dissolved	7439-95-4	E421/VA	0.100	mg/L		2.10	2.11	2.17	2.23	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.00070	0.00020	0.00035	0.00034	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000428	0.000768	0.00143	0.00150	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		0.512	0.503	0.514	0.517	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000090	0.000172	0.000365	0.000410	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		1.84	1.84	1.84	1.84	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		0.979	1.04	1.18	1.22	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.137	0.139	0.150	0.149	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
Titanium, dissolved	7440-32-6	E421/VA	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000154	0.000159	0.000160	0.000161	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
Zinc, dissolved	7440-66-6	E421/VA	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	Field	Field	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B2768**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 07-Jun-2023 11:00
PO	: 5590012190	Date Analysis Commenced	: 07-Jun-2023
C-O-C number	: D0098	Issue Date	: 14-Jun-2023 18:03
Sampler	: DS, KA 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Brieanna Allen	Production/Validation Manager	Vancouver Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 977792)											
VA23B2759-006	Anonymous	Turbidity	----	E121	0.10	NTU	0.32	0.32	0.01	Diff <2x LOR	----
Physical Tests (QC Lot: 980762)											
VA23B2768-001	QUL-58-S	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	49.3	49.5	0.409%	20%	----
Physical Tests (QC Lot: 980763)											
VA23B2768-001	QUL-58-S	pH	----	E108	0.10	pH units	7.85	7.84	0.127%	4%	----
Physical Tests (QC Lot: 980764)											
VA23B2768-001	QUL-58-S	Conductivity	----	E100	2.0	µS/cm	111	112	0.894%	10%	----
Physical Tests (QC Lot: 985197)											
KS2302003-002	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	291	279	4.03%	20%	----
Anions and Nutrients (QC Lot: 980765)											
VA23B2754-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.316	0.328	3.65%	20%	----
Anions and Nutrients (QC Lot: 980766)											
VA23B2754-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	2.93	2.92	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 980768)											
VA23B2754-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0824	0.0816	1.01%	20%	----
Anions and Nutrients (QC Lot: 980769)											
VA23B2754-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 980770)											
VA23B2754-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	14.9	14.9	0.0890%	20%	----
Anions and Nutrients (QC Lot: 980771)											
VA23B2768-001	QUL-58-S	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985143)											
VA23B2755-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.150	mg/L	3.72	3.78	1.78%	20%	----
Anions and Nutrients (QC Lot: 985144)											
VA23B2755-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0060	0.0062	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985145)											
VA23B2755-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0034	0.0033	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 985146)											
VA23B2755-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0141	0.0136	0.0004	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 985142)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 985142) - continued											
VA23B2755-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	3.17	3.17	0.003	Diff <2x LOR	----
Total Metals (QC Lot: 977848)											
VA23B2716-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0060	mg/L	2.26	2.21	1.93%	20%	----
		Antimony, total	7440-36-0	E420	0.00020	mg/L	0.00218	0.00219	0.120%	20%	----
		Arsenic, total	7440-38-2	E420	0.00020	mg/L	0.00191	0.00171	0.00019	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00020	mg/L	0.00408	0.00421	3.28%	20%	----
		Beryllium, total	7440-41-7	E420	0.000040	mg/L	<0.000040	<0.000040	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000100	mg/L	0.000196	0.000194	0.000002	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.020	mg/L	0.118	0.119	0.0009	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000100	mg/L	0.0000195	0.0000196	0.0000001	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.100	mg/L	17.1	16.7	2.04%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00100	mg/L	0.00819	0.00798	0.00021	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000100	mg/L	0.000886	0.000861	0.000024	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0020	mg/L	0.0568	0.0576	1.31%	20%	----
		Magnesium, total	7439-95-4	E420	0.0100	mg/L	4.25	4.16	2.09%	20%	----
		Manganese, total	7439-96-5	E420	0.00020	mg/L	0.00230	0.00232	1.16%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.000747	0.000738	0.000009	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00100	mg/L	0.00192	0.00185	0.00007	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.100	mg/L	29.5	28.8	2.32%	20%	----
		Selenium, total	7782-49-2	E420	0.000100	mg/L	0.000290	0.000168	0.000122	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.20	mg/L	1.90	1.84	0.06	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.100	mg/L	404	391	3.10%	20%	----
		Strontium, total	7440-24-6	E420	0.00040	mg/L	0.206	0.208	0.824%	20%	----
		Thallium, total	7440-28-0	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00020	mg/L	0.00034	0.00035	0.000003	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0060	mg/L	0.0176	0.0168	0.0008	Diff <2x LOR	----
Dissolved Metals (QC Lot: 978751)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 978751) - continued											
FJ2301338-003	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 977792)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 980762)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 980764)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 985197)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 985941)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 980765)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 980766)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 980768)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 980769)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 980770)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 980771)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 985143)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 985144)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 985145)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 985146)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 985142)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 977848)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 978751)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 978751) - continued						
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 977792)									
Turbidity	----	E121	0.1	NTU	200 NTU	100.0	85.0	115	----
Physical Tests (QCLot: 980762)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 980763)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 980764)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.6	90.0	110	----
Physical Tests (QCLot: 985197)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.5	85.0	115	----
Physical Tests (QCLot: 985941)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	91.0	85.0	115	----
Anions and Nutrients (QCLot: 980765)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 980766)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 980768)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 980769)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.5	90.0	110	----
Anions and Nutrients (QCLot: 980770)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 980771)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.4	80.0	120	----
Anions and Nutrients (QCLot: 985143)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 985144)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.5	80.0	120	----
Anions and Nutrients (QCLot: 985145)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 985146)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.3	85.0	115	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 985142)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 977848)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	91.6	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	107	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.5	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	109	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	104	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.2	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	111	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	88.4	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.9	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.1	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.8	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 978751)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	96.2	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.4	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.0	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	94.1	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.7	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.6	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	94.8	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	94.4	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.6	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.7	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.2	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.2	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	92.9	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	101	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.4	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.8	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	94.3	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.5	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	113	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.4	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	99.2	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.2	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.0	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.1	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	96.2	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	92.4	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 980765)										
VA23B2754-002	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 980766)										
VA23B2754-002	Anonymous	Chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 980768)										
VA23B2754-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.57 mg/L	2.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 980769)										
VA23B2754-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.495 mg/L	0.5 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 980770)										
VA23B2754-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 980771)										
VA23B2768-002	QUL-58-AP	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0293 mg/L	0.03 mg/L	97.8	70.0	130	----
Anions and Nutrients (QCLot: 985143)										
VA23B2755-002	Anonymous	Nitrogen, total	7727-37-9	E366	ND mg/L	2 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 985144)										
VA23B2755-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0460 mg/L	0.05 mg/L	91.9	70.0	130	----
Anions and Nutrients (QCLot: 985145)										
VA23B2755-002	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0459 mg/L	0.05 mg/L	91.8	70.0	130	----
Anions and Nutrients (QCLot: 985146)										
VA23B2755-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0988 mg/L	0.1 mg/L	98.8	75.0	125	----
Organic / Inorganic Carbon (QCLot: 985142)										
VA23B2755-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.18 mg/L	5 mg/L	104	70.0	130	----
Total Metals (QCLot: 977848)										
VA23B2754-001	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00906 mg/L	0.01 mg/L	90.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 977848) - continued										
VA23B2754-001	Anonymous	Boron, total	7440-42-8	E420	0.097 mg/L	0.1 mg/L	96.7	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0397 mg/L	0.04 mg/L	99.4	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		Copper, total	7440-50-8	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0185 mg/L	0.02 mg/L	92.3	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0924 mg/L	0.1 mg/L	92.4	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		Silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		Silver, total	7440-22-4	E420	0.00370 mg/L	0.004 mg/L	92.4	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00371 mg/L	0.004 mg/L	92.8	70.0	130	----
		Tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		Titanium, total	7440-32-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Zinc, total	7440-66-6	E420	0.379 mg/L	0.4 mg/L	94.7	70.0	130	----
Dissolved Metals (QCLot: 978751)										
VA23B2759-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.200 mg/L	0.2 mg/L	99.8	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00869 mg/L	0.01 mg/L	86.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	95.6	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 978751) - continued										
VA23B2759-001	Anonymous	Chromium, dissolved	7440-47-3	E421	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.98 mg/L	2 mg/L	98.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0950 mg/L	0.1 mg/L	95.0	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.95 mg/L	4 mg/L	98.8	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0422 mg/L	0.04 mg/L	106	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.75 mg/L	10 mg/L	97.5	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00384 mg/L	0.004 mg/L	95.9	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00358 mg/L	0.004 mg/L	89.6	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00369 mg/L	0.004 mg/L	92.3	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.395 mg/L	0.4 mg/L	98.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: D0098

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver

Work Order Reference VA23B2768

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Mount Polley Mining Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Gabriel Holmes	Merge QC/QCI Reports with COA: ☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	PO BOX 12	Email 1 or Fax: On File	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Likely, BC	Email 2:	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.
Postal Code:	V0L 1N0	Email 3:	Additional fees may apply to rush requests on weekends, statutor
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	Date and Time Required for all E&P TATs: dd-
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.
Company:		Email 1 or Fax: On File	
Contact:	On File	Email 2: gabriel.holmes@mountpolley.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Can Dang	Sampler: KA, DS

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals (F)	TN, NH3 (P)	DOC (F/P)	TSS (Whole Bottle)	Total Metals (Preserved) (P)	Dissolved Metals (F/P)	Hardness	Total Mercury	TN-NH3				SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	QUL-58-S	6-Jun-23	10:32	Water	6	R	R	R	R	R	R											
	QUL-58-AP	6-Jun-23	11:08	Water	6	R	R	R	R	R	R											
	QUL-58-MP	6-Jun-23	10:58	Water	6	R	R	R	R	R	R											
	QUL-58-B	6-Jun-23	10:45	Water	6	R	R	R	R	R	R											
	Field Blank	6-Jun-23	11:59	Water	5	R	R		R	R	R			R								

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11°C	9.5		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Dave Stanley	6/6/2023	Time: 15:30	Received by:	Date:	Time:	Received by: DX	Date: June 07/23	Time: 11:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B3381**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 14-Jun-2023 12:00
PO	: 5590012190	Date Analysis Commenced	: 15-Jun-2023
C-O-C number	: T0016	Issue Date	: 22-Jun-2023 15:29
Sampler	: KA		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA Vancouver - Environmental	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: HAD-3	E19	----	----	----
						Client sampling date / time: 13-Jun-2023 10:48	13-Jun-2023 11:07	----	----	----
						VA23B3381-001	VA23B3381-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	A	1.0	mg/L	100	99.3	----	----	----
Conductivity	----	E100/VA	A	2.0	µS/cm	1220	1170	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA		0.50	mg/L	614	614	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA		0.50	mg/L	610	610	----	----	----
pH	----	E108/VA	A	0.10	pH units	8.16	8.09	----	----	----
Solids, total dissolved [TDS]	----	E162/VA	A	10	mg/L	1080	1030	----	----	----
Solids, total suspended [TSS]	----	E164/VA	A	1.0	mg/L	2.0	<1.0	----	----	----
Turbidity	----	E121/VA	A	0.10	NTU	0.48	1.01	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	A	0.0050	mg/L	0.0274	0.0602	----	----	----
Chloride	16887-00-6	E235.Cl/VA	A	0.50	mg/L	4.92	4.80	----	----	----
Fluoride	16984-48-8	E235.F/VA	A	0.020	mg/L	0.444	0.442	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	A	0.0050	mg/L	3.99	3.99	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA		0.0050	mg/L	4.01	4.04	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	A	0.0010	mg/L	0.0175	0.0500	----	----	----
Nitrogen, total	7727-37-9	E366/VA	A	0.030	mg/L	4.31	4.17	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	A	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	A	0.0020	mg/L	0.0061	0.0159	----	----	----
Phosphorus, total dissolved	7723-14-0	E375-T/VA	A	0.0020	mg/L	0.0029	0.0039	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	A	0.30	mg/L	580	580	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	A	0.50	mg/L	2.67	3.48	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/VA	A	0.0030	mg/L	0.0761	0.0906	----	----	----
Antimony, total	7440-36-0	E420/VA	A	0.00010	mg/L	0.00062	0.00068	----	----	----
Arsenic, total	7440-38-2	E420/VA	A	0.00010	mg/L	0.00111	0.00076	----	----	----
Barium, total	7440-39-3	E420/VA	A	0.00010	mg/L	0.0439	0.0421	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	HAD-3	E19	----	----	----
					Client sampling date / time	13-Jun-2023 10:48	13-Jun-2023 11:07	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B3381-001	VA23B3381-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
Beryllium, total	7440-41-7	E420/VA	A	0.000100	mg/L	<0.000100	<0.000100	----	----	----
Bismuth, total	7440-69-9	E420/VA	A	0.000050	mg/L	<0.000050	<0.000050	----	----	----
Boron, total	7440-42-8	E420/VA	A	0.010	mg/L	0.112	0.113	----	----	----
Cadmium, total	7440-43-9	E420/VA	A	0.0000050	mg/L	<0.0000950 DLM	<0.0000650 DLM	----	----	----
Calcium, total	7440-70-2	E420/VA	A	0.050	mg/L	190	191	----	----	----
Chromium, total	7440-47-3	E420/VA	A	0.00050	mg/L	<0.00050	0.00079	----	----	----
Cobalt, total	7440-48-4	E420/VA	A	0.00010	mg/L	0.00018	0.00015	----	----	----
Copper, total	7440-50-8	E420/VA	A	0.00050	mg/L	0.00882	0.00433	----	----	----
Iron, total	7439-89-6	E420/VA	A	0.030	mg/L	<0.030	<0.030	----	----	----
Lead, total	7439-92-1	E420/VA	A	0.000050	mg/L	<0.000050	0.000076	----	----	----
Lithium, total	7439-93-2	E420/VA	A	0.0010	mg/L	0.0072	0.0067	----	----	----
Magnesium, total	7439-95-4	E420/VA	A	0.100	mg/L	32.8	32.3	----	----	----
Manganese, total	7439-96-5	E420/VA	A	0.00010	mg/L	0.102	0.0992	----	----	----
Molybdenum, total	7439-98-7	E420/VA	A	0.000050	mg/L	0.164	0.164	----	----	----
Nickel, total	7440-02-0	E420/VA	A	0.00050	mg/L	<0.00050	<0.00050	----	----	----
Potassium, total	7440-09-7	E420/VA	A	0.050	mg/L	3.19	3.08	----	----	----
Selenium, total	7782-49-2	E420/VA	A	0.000050	mg/L	0.0503	0.0512	----	----	----
Silicon, total	7440-21-3	E420/VA	A	0.10	mg/L	5.02	4.76	----	----	----
Silver, total	7440-22-4	E420/VA	A	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Sodium, total	7440-23-5	E420/VA	A	0.050	mg/L	30.8	29.8	----	----	----
Strontium, total	7440-24-6	E420/VA	A	0.00020	mg/L	3.77	3.62	----	----	----
Thallium, total	7440-28-0	E420/VA	A	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Tin, total	7440-31-5	E420/VA	A	0.00010	mg/L	<0.00010	0.00121	----	----	----
Titanium, total	7440-32-6	E420/VA	A	0.0100	mg/L	<0.0100	<0.0100	----	----	----
Uranium, total	7440-61-1	E420/VA	A	0.000010	mg/L	0.00238	0.00243	----	----	----
Vanadium, total	7440-62-2	E420/VA	A	0.00050	mg/L	0.00110	0.00070	----	----	----
Zinc, total	7440-66-6	E420/VA	A	0.0030	mg/L	<0.0030	0.0329	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	A	0.0030	mg/L	0.0617	0.0404	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	A	0.00010	mg/L	0.00063	0.00058	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID	HAD-3	E19	----	----	----
						Client sampling date / time	13-Jun-2023 10:48	13-Jun-2023 11:07	----	----	----
							VA23B3381-001	VA23B3381-002	--------	--------	--------
							Result	Result	----	----	----
Dissolved Metals											
Arsenic, dissolved	7440-38-2	E421/VA	A	0.00010	mg/L		0.00105	0.00066	----	----	----
Barium, dissolved	7440-39-3	E421/VA	A	0.00010	mg/L		0.0443	0.0422	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	A	0.000100	mg/L		<0.000100	<0.000100	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	A	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, dissolved	7440-42-8	E421/VA	A	0.010	mg/L		0.108	0.109	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	A	0.0000050	mg/L		0.0000744	<0.0000200 DLM	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	A	0.050	mg/L		193	192	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	A	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	A	0.00010	mg/L		0.00016	0.00017	----	----	----
Copper, dissolved	7440-50-8	E421/VA	A	0.00050	mg/L		0.00777	0.00170	----	----	----
Iron, dissolved	7439-89-6	E421/VA	A	0.030	mg/L		<0.030	0.205 DTC	----	----	----
Lead, dissolved	7439-92-1	E421/VA	A	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	A	0.0010	mg/L		0.0068	0.0066	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	A	0.100	mg/L		32.0	32.6	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	A	0.00010	mg/L		0.0951	0.123	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	A	0.000050	mg/L		0.163	0.160	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	A	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	A	0.050	mg/L		3.10	3.10	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	A	0.000050	mg/L		0.0514	0.0512	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	A	0.050	mg/L		4.80	4.62	----	----	----
Silver, dissolved	7440-22-4	E421/VA	A	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	A	0.050	mg/L		29.2	28.7	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	A	0.00020	mg/L		3.77	3.73	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	A	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Tin, dissolved	7440-31-5	E421/VA	A	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	A	0.0100	mg/L		<0.0100	<0.0100	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	A	0.000010	mg/L		0.00241	0.00238	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	A	0.00050	mg/L		0.00103	<0.00050	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	A	0.0030	mg/L		<0.0030	0.0576 DTC	----	----	----
Dissolved metals filtration location	----	EP421/VA		-	-		Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B3381**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 14-Jun-2023 12:00
PO	: 5590012190	Date Analysis Commenced	: 15-Jun-2023
C-O-C number	: T0016	Issue Date	: 22-Jun-2023 15:26
Sampler	: KA 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 992565)											
KS2302061-003	Anonymous	pH	----	E108	0.10	pH units	7.61	7.59	0.263%	4%	----
Physical Tests (QC Lot: 992566)											
KS2302061-003	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	37.9	37.7	0.529%	20%	----
Physical Tests (QC Lot: 992567)											
KS2302061-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	78.2	76.9	1.68%	10%	----
Physical Tests (QC Lot: 993076)											
VA23B3349-007	Anonymous	Turbidity	----	E121	0.10	NTU	0.12	0.12	0	Diff <2x LOR	----
Physical Tests (QC Lot: 997426)											
KS2302092-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	2560	2600	1.88%	20%	----
Physical Tests (QC Lot: 998871)											
VA23B3380-005	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	189	201	12	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 992568)											
KS2302061-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 992569)											
KS2302061-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 992571)											
KS2302061-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 992572)											
KS2302061-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 992573)											
KS2302061-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	1.39	1.38	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 992575)											
KS2302061-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 997391)											
VA23B3377-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.150	mg/L	3.27	3.33	1.72%	20%	----
Anions and Nutrients (QC Lot: 997392)											
VA23B3377-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0084	0.0082	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 997393)											
VA23B3377-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0024	0.0021	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 997394)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 997394) - continued											
VA23B3377-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.115	0.114	0.825%	20%	----
Organic / Inorganic Carbon (QC Lot: 997390)											
VA23B3377-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	5.06	5.19	2.48%	20%	----
Total Metals (QC Lot: 989692)											
VA23B3377-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.112	0.106	5.38%	20%	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00171	0.00176	2.82%	20%	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00284	0.00289	1.58%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0642	0.0648	1.05%	20%	----
		Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.130	0.132	1.01%	20%	----
		Cadmium, total	7440-43-9	E420	0.0000400	mg/L	<0.0000400	<0.0000400	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	102	102	0.495%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00265	0.00242	0.00022	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.030	mg/L	0.035	0.032	0.003	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0113	0.0112	0.812%	20%	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	11.1	11.0	1.26%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00902	0.00888	1.55%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.170	0.177	4.24%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	14.3	13.8	3.72%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.0294	0.0296	0.574%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	5.21	5.25	0.765%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	88.9	89.0	0.0744%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	1.19	1.20	0.466%	20%	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000623	0.000644	3.29%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00308	0.00298	0.00010	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 989692) - continued											
VA23B3377-001	Anonymous	Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 989704)											
VA23B3381-001	HAD-3	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0617	0.0616	0.131%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00063	0.00063	0.0000001	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00105	0.00098	7.14%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0443	0.0447	0.864%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.108	0.106	1.86%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000744	0.0000685	8.38%	20%	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	193	192	0.560%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00016	0.00017	0.00001	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00777	0.00784	0.815%	20%	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0068	0.0066	0.0002	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	32.0	32.2	0.702%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0951	0.0952	0.0710%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.163	0.168	3.18%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	3.10	3.11	0.365%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.0514	0.0504	1.98%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.80	4.69	2.29%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	29.2	29.0	0.650%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	3.77	3.81	0.934%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00241	0.00245	1.54%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00103	0.00102	0.000005	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 992566)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 992567)						
Conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 993076)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 997425)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 997426)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 998871)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 992568)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 992569)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 992571)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 992572)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 992573)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 992575)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 997391)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 997392)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 997393)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 997394)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 997390)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 989692)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 989704)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 989704) - continued						
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 992565)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 992566)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	109	85.0	115	----
Physical Tests (QCLot: 992567)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 993076)									
Turbidity	----	E121	0.1	NTU	200 NTU	99.5	85.0	115	----
Physical Tests (QCLot: 997425)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	92.3	85.0	115	----
Physical Tests (QCLot: 997426)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Physical Tests (QCLot: 998871)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 992568)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 992569)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 992571)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 992572)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.9	90.0	110	----
Anions and Nutrients (QCLot: 992573)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 992575)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	98.1	80.0	120	----
Anions and Nutrients (QCLot: 997391)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 997392)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 997393)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	93.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 997394)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.8	85.0	115	----
Organic / Inorganic Carbon (QCLot: 997390)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 989692)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	97.0	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	96.7	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.4	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.6	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.8	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.9	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	106	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	103	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	96.3	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.4	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.0	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	109	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	94.8	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.4	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	97.5	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 989692) - continued									
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.1	80.0	120	----
Dissolved Metals (QCLot: 989704)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	97.3	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	107	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	99.4	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	97.7	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	110	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.2	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	103	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.3	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	106	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	111	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.8	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	111	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	116	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.1	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.7	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 992568)										
KS2302061-002	Anonymous	Fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 992569)										
KS2302061-002	Anonymous	Chloride	16887-00-6	E235.Cl	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 992571)										
KS2302061-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.59 mg/L	2.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 992572)										
KS2302061-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.504 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 992573)										
KS2302061-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 992575)										
KS2302061-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0318 mg/L	0.03 mg/L	106	70.0	130	----
Anions and Nutrients (QCLot: 997391)										
VA23B3377-003	Anonymous	Nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 997392)										
VA23B3377-003	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0467 mg/L	0.05 mg/L	93.4	70.0	130	----
Anions and Nutrients (QCLot: 997393)										
VA23B3377-003	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0478 mg/L	0.05 mg/L	95.5	70.0	130	----
Anions and Nutrients (QCLot: 997394)										
VA23B3377-003	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.102 mg/L	0.1 mg/L	102	75.0	125	----
Organic / Inorganic Carbon (QCLot: 997390)										
VA23B3377-003	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 989692)										
VA23B3377-002	Anonymous	Aluminum, total	7429-90-5	E420	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		Barium, total	7440-39-3	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0420 mg/L	0.04 mg/L	105	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 989692) - continued										
VA23B3377-002	Anonymous	Bismuth, total	7440-69-9	E420	0.00982 mg/L	0.01 mg/L	98.2	70.0	130	----
		Boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00422 mg/L	0.004 mg/L	106	70.0	130	----
		Calcium, total	7440-70-2	E420	4.06 mg/L	4 mg/L	101	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Copper, total	7440-50-8	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		Iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.6	70.0	130	----
		Lead, total	7439-92-1	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		Lithium, total	7439-93-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Magnesium, total	7439-95-4	E420	1.02 mg/L	1 mg/L	102	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		Potassium, total	7440-09-7	E420	4.17 mg/L	4 mg/L	104	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		Silicon, total	7440-21-3	E420	10.1 mg/L	10 mg/L	101	70.0	130	----
		Silver, total	7440-22-4	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		Sodium, total	7440-23-5	E420	2.15 mg/L	2 mg/L	107	70.0	130	----
		Strontium, total	7440-24-6	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00394 mg/L	0.004 mg/L	98.5	70.0	130	----
		Tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Zinc, total	7440-66-6	E420	0.435 mg/L	0.4 mg/L	109	70.0	130	----
Dissolved Metals (QCLot: 989704)										
VA23B3381-002	E19	Aluminum, dissolved	7429-90-5	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00912 mg/L	0.01 mg/L	91.2	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 989704) - continued										
VA23B3381-002	E19	Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.5	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0938 mg/L	0.1 mg/L	93.8	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.92 mg/L	4 mg/L	97.9	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.64 mg/L	10 mg/L	96.4	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00354 mg/L	0.004 mg/L	88.5	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00377 mg/L	0.004 mg/L	94.2	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00406 mg/L	0.004 mg/L	102	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.393 mg/L	0.4 mg/L	98.2	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: T0016

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): B3381

ALS Contact: Can Dang Sampler: KA

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	TN/NH3	Hardness					SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
							P	F/P	P	F/P		P	F/P									
	HAD-3	13-Jun-23	10:48	Water	6	R	R	R	R	R	R											
	E19	13-Jun-23	11:07	Water	6	R	R	R	R	R	R											

Environmental Division Vancouver
Work Order Reference
VA23B3381

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

selecting from drop-down below
ly)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				5	6	8	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
KENNETH ADUSEI	13/6/2023	15:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
CW	June 14	1290

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B3865**	Page	: 1 of 10
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Jun-2023 13:35
PO	: 5590012190	Date Analysis Commenced	: 20-Jun-2023
C-O-C number	: F0569	Issue Date	: 21-Jun-2023 17:21
Sampler	: AN, GH		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	QUL-58-S	QUL-58-AP	QUL-58-MP	QUL-58-B	QUL-2a-0m
					Client sampling date / time	19-Jun-2023 11:07	19-Jun-2023 11:45	19-Jun-2023 11:35	19-Jun-2023 11:19	19-Jun-2023 12:05
						VA23B3865-001	VA23B3865-002	VA23B3865-003	VA23B3865-004	VA23B3865-005
						Result	Result	Result	Result	Result
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		49.3	49.1	50.0	50.0	49.5
Conductivity	----	E100/VA	2.0	µS/cm		113	112	114	121	111
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		52.0	52.1	52.1	55.0	51.0
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.50	mg/L		51.8	51.6	51.6	55.5	52.2
pH	----	E108/VA	0.10	pH units		7.89	7.88	7.87	7.86	7.92
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L		90	90	87	92	83
Solids, total suspended [TSS]	----	E164/VA	1.0	mg/L		<1.0	<1.2	<1.0	<1.0	<1.0
Turbidity	----	E121/VA	0.10	NTU		0.59	0.37	0.41	0.55	0.42
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L		0.0064	<0.0050	<0.0050	<0.0050	<0.0050
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L		0.037	0.036	0.036	0.039	0.036
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L		0.126	0.132	0.146	0.164	0.118
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L		0.126	0.132	0.146	0.164	0.118
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L		0.188	0.194	0.207	0.226	0.188
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L		0.0030	0.0036	0.0029	0.0031	0.0029
Phosphorus, total dissolved	7723-14-0	E375-T/VA	0.0020	mg/L		<0.0020	<0.0020	0.0024	<0.0020	0.0020
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L		6.35	6.25	7.00	9.90	6.28
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		2.10	1.97	2.38	2.02	2.03
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L		0.0183	0.0164	0.0188	0.0231	0.0152
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L		0.00012	0.00011	0.00013	0.00014	0.00013
Barium, total	7440-39-3	E420/VA	0.00010	mg/L		0.00547	0.00549	0.00553	0.00568	0.00542

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-58-S	QUL-58-AP	QUL-58-MP	QUL-58-B	QUL-2a-0m
					Client sampling date / time	19-Jun-2023 11:07	19-Jun-2023 11:45	19-Jun-2023 11:35	19-Jun-2023 11:19	19-Jun-2023 12:05
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B3865-001	VA23B3865-002	VA23B3865-003	VA23B3865-004	VA23B3865-005
						Result	Result	Result	Result	Result
Total Metals										
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron, total	7440-42-8	E420/VA	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium, total	7440-70-2	E420/VA	0.050	mg/L		17.4	17.3	17.2	18.5	17.5
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper, total	7440-50-8	E420/VA	0.00050	mg/L		0.00072	0.00059	0.00087	0.00096	0.00062
Iron, total	7439-89-6	E420/VA	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
Lead, total	7439-92-1	E420/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium, total	7439-95-4	E420/VA	0.100	mg/L		2.04	2.04	2.10	2.26	2.07
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L		0.00138	0.00139	0.00162	0.00155	0.00133
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L		0.000377	0.000370	0.000621	0.00157	0.000381
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium, total	7440-09-7	E420/VA	0.050	mg/L		0.538	0.533	0.545	0.556	0.537
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L		0.000102	0.000119	0.000197	0.000436	0.000128
Silicon, total	7440-21-3	E420/VA	0.10	mg/L		1.89	1.84	1.93	1.97	1.89
Silver, total	7440-22-4	E420/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium, total	7440-23-5	E420/VA	0.050	mg/L		0.990	0.981	1.04	1.21	0.993
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L		0.137	0.134	0.137	0.156	0.137
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin, total	7440-31-5	E420/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium, total	7440-32-6	E420/VA	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L		0.000151	0.000156	0.000157	0.000169	0.000151
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0030	mg/L		0.0072	0.0075	0.0076	0.0134	0.0073
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	QUL-58-S	QUL-58-AP	QUL-58-MP	QUL-58-B	QUL-2a-0m
					Client sampling date / time	19-Jun-2023 11:07	19-Jun-2023 11:45	19-Jun-2023 11:35	19-Jun-2023 11:19	19-Jun-2023 12:05
						VA23B3865-001	VA23B3865-002	VA23B3865-003	VA23B3865-004	VA23B3865-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		<0.00010	0.00010	<0.00010	0.00010	0.00011
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00504	0.00519	0.00523	0.00563	0.00521
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		17.3	17.3	17.2	18.0	17.0
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper, dissolved	7440-50-8	E421/VA	0.00050	mg/L		0.00087	0.00054	0.00061	0.00092	<0.00050
Iron, dissolved	7439-89-6	E421/VA	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium, dissolved	7439-95-4	E421/VA	0.100	mg/L		2.14	2.17	2.23	2.43	2.08
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.00029	0.00016	0.00016	0.00043	0.00024
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000391	0.000364	0.000588	0.00152	0.000379
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	0.00050
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		0.540	0.552	0.557	0.577	0.540
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000115	0.000107	0.000180	0.000309	0.000099
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		2.04	2.10	2.13	2.14	1.96
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		1.05	1.05	1.13	1.35	1.03
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.140	0.136	0.140	0.155	0.136
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium, dissolved	7440-32-6	E421/VA	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000160	0.000151	0.000154	0.000160	0.000158
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc, dissolved	7440-66-6	E421/VA	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	QUL-2a-20m	QUL-2a-40m	QUL-2a-60m	----	----
				Client sampling date / time	19-Jun-2023 12:10	19-Jun-2023 12:15	19-Jun-2023 12:20	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3865-006	VA23B3865-007	VA23B3865-008	--------	--------
					Result	Result	Result	----	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	49.4	49.5	49.5	----	----
Conductivity	----	E100/VA	2.0	µS/cm	110	111	113	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L	51.5	52.1	51.0	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.50	mg/L	51.4	52.3	52.0	----	----
pH	----	E108/VA	0.10	pH units	7.89	7.88	7.88	----	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L	84	82	83	----	----
Solids, total suspended [TSS]	----	E164/VA	1.0	mg/L	<1.0	<1.0	<1.0	----	----
Turbidity	----	E121/VA	0.10	NTU	0.33	0.30	0.30	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	<0.0050	<0.0050	<0.0050	----	----
Chloride	16887-00-6	E235.Cl/VA	0.50	mg/L	<0.50	<0.50	<0.50	----	----
Fluoride	16984-48-8	E235.F/VA	0.020	mg/L	0.036	0.037	0.036	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	0.0050	mg/L	0.131	0.140	0.141	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA	0.0050	mg/L	0.131	0.140	0.141	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
Nitrogen, total	7727-37-9	E366/VA	0.030	mg/L	0.188	0.192	0.192	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	0.0029	0.0033	0.0031	----	----
Phosphorus, total dissolved	7723-14-0	E375-T/VA	0.0020	mg/L	<0.0020	<0.0020	<0.0020	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	0.30	mg/L	6.16	6.24	6.41	----	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.12	1.80	2.04	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0158	0.0156	0.0190	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00013	0.00013	0.00011	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.00520	0.00528	0.00530	----	----
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	<0.000100	<0.000100	<0.000100	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-2a-20m	QUL-2a-40m	QUL-2a-60m	----	----
					Client sampling date / time	19-Jun-2023 12:10	19-Jun-2023 12:15	19-Jun-2023 12:20	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B3865-006	VA23B3865-007	VA23B3865-008	--------	--------
						Result	Result	Result	----	----
Total Metals										
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L		<0.010	<0.010	<0.010	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L		0.0000058	<0.0000050	<0.0000050	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L		17.2	17.5	17.4	----	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L		0.00056	0.00052	0.00065	----	----
Iron, total	7439-89-6	E420/VA	0.030	mg/L		<0.030	<0.030	<0.030	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
Magnesium, total	7439-95-4	E420/VA	0.100	mg/L		2.06	2.10	2.09	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L		0.00128	0.00140	0.00164	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L		0.000358	0.000362	0.000424	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L		0.548	0.544	0.534	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L		0.000115	0.000101	0.000104	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L		1.95	1.98	1.98	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L		0.978	1.01	1.01	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L		0.132	0.139	0.139	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Titanium, total	7440-32-6	E420/VA	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L		0.000154	0.000154	0.000158	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L		<0.0030	<0.0030	<0.0030	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	0.0030	mg/L		0.0074	0.0068	0.0067	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.00010	mg/L		0.00010	0.00011	0.00011	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-2a-20m	QUL-2a-40m	QUL-2a-60m	----	----
					Client sampling date / time	19-Jun-2023 12:10	19-Jun-2023 12:15	19-Jun-2023 12:20	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B3865-006	VA23B3865-007	VA23B3865-008	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
Barium, dissolved	7440-39-3	E421/VA	0.00010	mg/L		0.00526	0.00495	0.00524	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Boron, dissolved	7440-42-8	E421/VA	0.010	mg/L		<0.010	<0.010	<0.010	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		17.2	17.5	17.0	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Copper, dissolved	7440-50-8	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Iron, dissolved	7439-89-6	E421/VA	0.030	mg/L		<0.030	<0.030	<0.030	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Lithium, dissolved	7439-93-2	E421/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.100	mg/L		2.08	2.04	2.09	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.00010	mg/L		0.00012	0.00016	0.00016	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.000050	mg/L		0.000350	0.000341	0.000410	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Potassium, dissolved	7440-09-7	E421/VA	0.050	mg/L		0.545	0.524	0.529	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.000050	mg/L		0.000085	0.000072	0.000088	----	----
Silicon, dissolved	7440-21-3	E421/VA	0.050	mg/L		1.92	1.96	1.97	----	----
Silver, dissolved	7440-22-4	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Sodium, dissolved	7440-23-5	E421/VA	0.050	mg/L		1.00	0.990	1.02	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.00020	mg/L		0.142	0.134	0.140	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
Tin, dissolved	7440-31-5	E421/VA	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.000010	mg/L		0.000159	0.000159	0.000156	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
Zinc, dissolved	7440-66-6	E421/VA	0.0030	mg/L		<0.0030	<0.0030	<0.0030	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	Field	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B3865**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Jun-2023 13:35
PO	: 5590012190	Date Analysis Commenced	: 20-Jun-2023
C-O-C number	: F0569	Issue Date	: 21-Jun-2023 17:21
Sampler	: AN, GH 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1000620)											
VA23B3792-001	Anonymous	Turbidity	----	E121	0.10	NTU	3.15	3.49	10.2%	15%	----
Physical Tests (QC Lot: 999554)											
VA23B3865-001	QUL-58-S	Solids, total dissolved [TDS]	----	E162	13	mg/L	90	82	8	Diff <2x LOR	----
Physical Tests (QC Lot: 999594)											
VA23B3865-003	QUL-58-MP	pH	----	E108	0.10	pH units	7.87	7.87	0.00%	4%	----
Physical Tests (QC Lot: 999595)											
VA23B3865-003	QUL-58-MP	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	50.0	49.6	0.811%	20%	----
Physical Tests (QC Lot: 999596)											
VA23B3865-003	QUL-58-MP	Conductivity	----	E100	2.0	µS/cm	114	114	0.0876%	10%	----
Anions and Nutrients (QC Lot: 999569)											
VA23B3865-001	QUL-58-S	Nitrogen, total	7727-37-9	E366	0.030	mg/L	0.188	0.187	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999570)											
VA23B3865-001	QUL-58-S	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0030	0.0030	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999571)											
VA23B3865-001	QUL-58-S	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999572)											
VA23B3865-001	QUL-58-S	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0064	<0.0050	0.0014	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999597)											
VA23B3865-001	QUL-58-S	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.037	0.036	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999598)											
VA23B3865-001	QUL-58-S	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999599)											
VA23B3865-001	QUL-58-S	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.126	0.125	0.800%	20%	----
Anions and Nutrients (QC Lot: 999600)											
VA23B3865-001	QUL-58-S	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999601)											
VA23B3865-001	QUL-58-S	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	6.35	6.33	0.322%	20%	----
Anions and Nutrients (QC Lot: 999604)											
VA23B3865-001	QUL-58-S	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 999568)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 999568) - continued											
VA23B3865-001	QUL-58-S	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.10	2.19	0.08	Diff <2x LOR	----
Total Metals (QC Lot: 999550)											
VA23B3865-001	QUL-58-S	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0183	0.0184	0.0001	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00012	0.0000004	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.00547	0.00553	1.03%	20%	----
		Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	17.4	17.4	0.330%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00072	0.00075	0.00003	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	2.04	2.05	0.557%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00138	0.00138	0.0122%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000377	0.000408	0.000031	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	0.538	0.540	0.414%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000102	0.000091	0.000011	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	1.89	1.93	2.25%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	0.990	0.989	0.129%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.137	0.136	1.00%	20%	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000151	0.000156	2.79%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 999645)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 999645) - continued											
VA23B3865-001	QUL-58-S	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0072	0.0077	0.0004	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.00010	0.0000006	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00504	0.00506	0.347%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	17.3	17.0	2.21%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00087	0.00088	0.000006	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	2.14	2.18	1.78%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00029	0.00032	0.00002	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000391	0.000412	0.000021	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.540	0.546	0.940%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000115	0.000066	0.000049	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.04	2.05	0.211%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	1.05	1.07	2.05%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.140	0.135	4.32%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000160	0.000146	9.42%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1000620)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 999554)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 999555)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 999595)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 999596)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 999569)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 999570)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 999571)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 999572)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 999597)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 999598)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 999599)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 999600)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 999601)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 999604)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 999568)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 999550)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 999645)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 999645) - continued						
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1000620)									
Turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 999554)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Physical Tests (QCLot: 999555)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	86.8	85.0	115	----
Physical Tests (QCLot: 999594)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 999595)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 999596)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.4	90.0	110	----
Anions and Nutrients (QCLot: 999569)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 999570)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 999571)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 999572)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 999597)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 999598)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 999599)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 999600)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 999601)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 999604)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	107	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Organic / Inorganic Carbon (QCLot: 999568)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 999550)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.8	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.1	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.0	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.1	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.9	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	111	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.0	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.5	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.5	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.6	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.2	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 999645)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.9	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	101	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.0	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	109	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	100	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.2	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	111	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.8	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.2	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 999569)										
VA23B3865-002	QUL-58-AP	Nitrogen, total	7727-37-9	E366	0.405 mg/L	0.4 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 999570)										
VA23B3865-002	QUL-58-AP	Phosphorus, total	7723-14-0	E372-U	0.0460 mg/L	0.05 mg/L	92.0	70.0	130	----
Anions and Nutrients (QCLot: 999571)										
VA23B3865-002	QUL-58-AP	Phosphorus, total dissolved	7723-14-0	E375-T	0.0463 mg/L	0.05 mg/L	92.6	70.0	130	----
Anions and Nutrients (QCLot: 999572)										
VA23B3865-002	QUL-58-AP	Ammonia, total (as N)	7664-41-7	E298	0.0962 mg/L	0.1 mg/L	96.2	75.0	125	----
Anions and Nutrients (QCLot: 999597)										
VA23B3865-002	QUL-58-AP	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 999598)										
VA23B3865-002	QUL-58-AP	Chloride	16887-00-6	E235.Cl	98.9 mg/L	100 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 999599)										
VA23B3865-002	QUL-58-AP	Nitrate (as N)	14797-55-8	E235.NO3-L	2.48 mg/L	2.5 mg/L	99.1	75.0	125	----
Anions and Nutrients (QCLot: 999600)										
VA23B3865-002	QUL-58-AP	Nitrite (as N)	14797-65-0	E235.NO2-L	0.490 mg/L	0.5 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 999601)										
VA23B3865-002	QUL-58-AP	Sulfate (as SO4)	14808-79-8	E235.SO4	99.1 mg/L	100 mg/L	99.1	75.0	125	----
Anions and Nutrients (QCLot: 999604)										
VA23B3865-002	QUL-58-AP	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0354 mg/L	0.03 mg/L	118	70.0	130	----
Organic / Inorganic Carbon (QCLot: 999568)										
VA23B3865-002	QUL-58-AP	Carbon, dissolved organic [DOC]	----	E358-L	5.09 mg/L	5 mg/L	102	70.0	130	----
Total Metals (QCLot: 999550)										
VA23B3865-002	QUL-58-AP	Aluminum, total	7429-90-5	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		Barium, total	7440-39-3	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00951 mg/L	0.01 mg/L	95.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 999550) - continued										
VA23B3865-002	QUL-58-AP	Boron, total	7440-42-8	E420	0.109 mg/L	0.1 mg/L	109	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Copper, total	7440-50-8	E420	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		Iron, total	7439-89-6	E420	2.00 mg/L	2 mg/L	100	70.0	130	----
		Lead, total	7439-92-1	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Lithium, total	7439-93-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		Potassium, total	7440-09-7	E420	4.40 mg/L	4 mg/L	110	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		Silicon, total	7440-21-3	E420	9.78 mg/L	10 mg/L	97.8	70.0	130	----
		Silver, total	7440-22-4	E420	0.00402 mg/L	0.004 mg/L	100	70.0	130	----
		Sodium, total	7440-23-5	E420	2.01 mg/L	2 mg/L	101	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		Tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00366 mg/L	0.004 mg/L	91.4	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Zinc, total	7440-66-6	E420	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
Dissolved Metals (QCLot: 999645)										
VA23B3865-002	QUL-58-AP	Aluminum, dissolved	7429-90-5	E421	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00924 mg/L	0.01 mg/L	92.4	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00392 mg/L	0.004 mg/L	97.9	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 999645) - continued										
VA23B3865-002	QUL-58-AP	Chromium, dissolved	7440-47-3	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	4.23 mg/L	4 mg/L	106	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.6 mg/L	10 mg/L	106	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00386 mg/L	0.004 mg/L	96.5	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	2.06 mg/L	2 mg/L	103	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0356 mg/L	0.04 mg/L	89.0	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0985 mg/L	0.1 mg/L	98.5	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: F0569

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ____ ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2: gabriel.holmes@mountpolley.com

Turnaround Time (TAT) Requested

☐ Routine [R] If received by 3pm M-F - no surcharges apply
☐ 4 day [P4] If received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] If received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] If received by 3pm M-F - 50% rush surcharge minimum
☑ 1 day [E] If received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] If received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA19-MPMC100-01	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:	5590012190	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	B3865	ALS Contact: Can Dang	Sampler: GH, AN

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	Hardness	Total Mercury	TN-NH3	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
						F		F	P	F/P		P	F/P						
	QUL-58-S	19-Jun-23	11:07	Water	6	E	E	E	E	E	E								
	QUL-58-AP	19-Jun-23	11:45	Water	6	E	E	E	E	E	E								
	QUL-58-MP	19-Jun-23	11:35	Water	6	E	E	E	E	E	E								
	QUL-58-B	19-Jun-23	11:19	Water	6	E	E	E	E	E	E								
	QUL-2a-0m	19-Jun-23	12:05	Water	6	E	E	E	E	E	E								
	QUL-2a-20m	19-Jun-23	12:10	Water	6	E	E	E	E	E	E								
	QUL-2a-40m	19-Jun-23	12:15	Water	6	E	E	E	E	E	E								
	QUL-2a-60m	19-Jun-23	12:20	Water	6	E	E	E	E	E	E								

Environmental Division
Vancouver
Work Order Reference
VA23B3865

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human consumption/ use?
☐ YES ☐ NO

n by selecting from drop-down below
: only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4	6		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Gabriel Holmes	19/6/2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: JUN 20 2023	Time: 1335

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B3867**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Jun-2023 13:35
PO	: 5590012190	Date Analysis Commenced	: 20-Jun-2023
C-O-C number	: F0568	Issue Date	: 21-Jun-2023 17:21
Sampler	: GH		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA Vancouver - Environmental	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: HAD-3	E19	----	----	----
						Client sampling date / time: 19-Jun-2023 09:07	19-Jun-2023 09:19	----	----	----
						VA23B3867-001	VA23B3867-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	A	1.0	mg/L	96.6	96.6	----	----	----
Conductivity	----	E100/VA	A	2.0	µS/cm	1260	1250	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/VA		0.50	mg/L	628	629	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA		0.50	mg/L	633	649	----	----	----
pH	----	E108/VA	A	0.10	pH units	8.11	8.16	----	----	----
Solids, total dissolved [TDS]	----	E162/VA	A	10	mg/L	1100	1070	----	----	----
Solids, total suspended [TSS]	----	E164/VA	A	1.0	mg/L	<1.0	1.8	----	----	----
Turbidity	----	E121/VA	A	0.10	NTU	0.68	0.84	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	A	0.0050	mg/L	0.0168	0.0164	----	----	----
Chloride	16887-00-6	E235.Cl/VA	A	0.50	mg/L	5.32	4.72	----	----	----
Fluoride	16984-48-8	E235.F/VA	A	0.020	mg/L	0.484	0.493	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/VA	A	0.0050	mg/L	3.32	3.32	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/VA		0.0050	mg/L	3.33	3.33	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/VA	A	0.0010	mg/L	0.0106	0.0109	----	----	----
Nitrogen, total	7727-37-9	E366/VA	A	0.030	mg/L	3.67	3.59	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	A	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	A	0.0020	mg/L	0.0085	0.0079	----	----	----
Phosphorus, total dissolved	7723-14-0	E375-T/VA	A	0.0020	mg/L	0.0033	0.0049	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/VA	A	0.30	mg/L	588	589	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	A	0.50	mg/L	2.55	2.58	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/VA	A	0.0030	mg/L	0.283	0.0398	----	----	----
Antimony, total	7440-36-0	E420/VA	A	0.00010	mg/L	0.00063	0.00066	----	----	----
Arsenic, total	7440-38-2	E420/VA	A	0.00010	mg/L	0.00099	0.00098	----	----	----
Barium, total	7440-39-3	E420/VA	A	0.00010	mg/L	0.0436	0.0450	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	HAD-3	E19	----	----	----
					Client sampling date / time	19-Jun-2023 09:07	19-Jun-2023 09:19	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B3867-001	VA23B3867-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
Beryllium, total	7440-41-7	E420/VA	A	0.000100	mg/L	<0.000100	<0.000100	----	----	----
Bismuth, total	7440-69-9	E420/VA	A	0.000050	mg/L	<0.000050	<0.000050	----	----	----
Boron, total	7440-42-8	E420/VA	A	0.010	mg/L	0.130	0.135	----	----	----
Cadmium, total	7440-43-9	E420/VA	A	0.0000050	mg/L	<0.0000900 DLM	<0.0000850 DLM	----	----	----
Calcium, total	7440-70-2	E420/VA	A	0.050	mg/L	204	210	----	----	----
Chromium, total	7440-47-3	E420/VA	A	0.00050	mg/L	<0.00050	<0.00050	----	----	----
Cobalt, total	7440-48-4	E420/VA	A	0.00010	mg/L	0.00016	0.00016	----	----	----
Copper, total	7440-50-8	E420/VA	A	0.00050	mg/L	0.00715	0.00723	----	----	----
Iron, total	7439-89-6	E420/VA	A	0.030	mg/L	<0.030	0.045	----	----	----
Lead, total	7439-92-1	E420/VA	A	0.000050	mg/L	<0.000050	<0.000050	----	----	----
Lithium, total	7439-93-2	E420/VA	A	0.0010	mg/L	0.0076	0.0079	----	----	----
Magnesium, total	7439-95-4	E420/VA	A	0.100	mg/L	30.1	30.3	----	----	----
Manganese, total	7439-96-5	E420/VA	A	0.00010	mg/L	0.0865	0.0876	----	----	----
Molybdenum, total	7439-98-7	E420/VA	A	0.000050	mg/L	0.170	0.173	----	----	----
Nickel, total	7440-02-0	E420/VA	A	0.00050	mg/L	<0.00050	<0.00050	----	----	----
Potassium, total	7440-09-7	E420/VA	A	0.050	mg/L	3.02	2.99	----	----	----
Selenium, total	7782-49-2	E420/VA	A	0.000050	mg/L	0.0455	0.0460	----	----	----
Silicon, total	7440-21-3	E420/VA	A	0.10	mg/L	5.20	5.15	----	----	----
Silver, total	7440-22-4	E420/VA	A	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Sodium, total	7440-23-5	E420/VA	A	0.050	mg/L	27.6	27.4	----	----	----
Strontium, total	7440-24-6	E420/VA	A	0.00020	mg/L	5.11	5.32	----	----	----
Thallium, total	7440-28-0	E420/VA	A	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Tin, total	7440-31-5	E420/VA	A	0.00010	mg/L	<0.00010	<0.00010	----	----	----
Titanium, total	7440-32-6	E420/VA	A	0.0100	mg/L	<0.0100	<0.0100	----	----	----
Uranium, total	7440-61-1	E420/VA	A	0.000010	mg/L	0.00241	0.00257	----	----	----
Vanadium, total	7440-62-2	E420/VA	A	0.00050	mg/L	0.00100	0.00103	----	----	----
Zinc, total	7440-66-6	E420/VA	A	0.0030	mg/L	0.0048	<0.0030	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	A	0.0030	mg/L	0.173	0.0066	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	A	0.00010	mg/L	0.00063	0.00063	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	HAD-3	E19	----	----	----
					Client sampling date / time	19-Jun-2023 09:07	19-Jun-2023 09:19	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B3867-001	VA23B3867-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
Arsenic, dissolved	7440-38-2	E421/VA	A	0.00010	mg/L	0.00090	0.00092	----	----	----
Barium, dissolved	7440-39-3	E421/VA	A	0.00010	mg/L	0.0440	0.0449	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	A	0.000100	mg/L	<0.000100	<0.000100	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	A	0.000050	mg/L	<0.000100 DLA	<0.000100 DLA	----	----	----
Boron, dissolved	7440-42-8	E421/VA	A	0.010	mg/L	0.117	0.120	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	A	0.0000050	mg/L	<0.000100 DLM	<0.0000900 DLM	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	A	0.050	mg/L	202	201	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	A	0.00050	mg/L	<0.00050	<0.00050	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	A	0.00010	mg/L	<0.00020 DLA	<0.00020 DLA	----	----	----
Copper, dissolved	7440-50-8	E421/VA	A	0.00050	mg/L	0.00550	0.00658	----	----	----
Iron, dissolved	7439-89-6	E421/VA	A	0.030	mg/L	<0.030	<0.030	----	----	----
Lead, dissolved	7439-92-1	E421/VA	A	0.000050	mg/L	<0.000100 DLA	<0.000100 DLA	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	A	0.0010	mg/L	0.0076	0.0076	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	A	0.100	mg/L	30.0	30.9	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	A	0.00010	mg/L	0.0826	0.0857	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	A	0.000050	mg/L	0.163	0.168	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	A	0.00050	mg/L	<0.00100 DLA	<0.00100 DLA	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	A	0.050	mg/L	2.97	2.96	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	A	0.000050	mg/L	0.0430	0.0436	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	A	0.050	mg/L	5.08	5.10	----	----	----
Silver, dissolved	7440-22-4	E421/VA	A	0.000010	mg/L	<0.000020 DLA	<0.000020 DLA	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	A	0.050	mg/L	27.7	28.2	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	A	0.00020	mg/L	5.09	5.20	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	A	0.000010	mg/L	<0.000020 DLA	<0.000020 DLA	----	----	----
Tin, dissolved	7440-31-5	E421/VA	A	0.00010	mg/L	<0.00020 DLA	<0.00020 DLA	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	A	0.0100	mg/L	<0.0100	<0.0100	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	A	0.000010	mg/L	0.00250	0.00258	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	A	0.00050	mg/L	<0.00100 DLA	<0.00100 DLA	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	A	0.0030	mg/L	<0.0030	<0.0030	----	----	----
Dissolved metals filtration location	----	EP421/VA		-	-	Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: **VA23B3867**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 20-Jun-2023 13:35
PO	: 5590012190	Date Analysis Commenced	: 20-Jun-2023
C-O-C number	: F0568	Issue Date	: 21-Jun-2023 17:22
Sampler	: GH 250-790-2215 ext 2171		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kate Dimitrova	Analsyt	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1000620)											
VA23B3792-001	Anonymous	Turbidity	----	E121	0.10	NTU	3.15	3.49	10.2%	15%	----
Physical Tests (QC Lot: 999554)											
VA23B3865-001	Anonymous	Solids, total dissolved [TDS]	----	E162	13	mg/L	90	82	8	Diff <2x LOR	----
Physical Tests (QC Lot: 999594)											
VA23B3865-003	Anonymous	pH	----	E108	0.10	pH units	7.87	7.87	0.00%	4%	----
Physical Tests (QC Lot: 999595)											
VA23B3865-003	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	50.0	49.6	0.811%	20%	----
Physical Tests (QC Lot: 999596)											
VA23B3865-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	114	114	0.0876%	10%	----
Anions and Nutrients (QC Lot: 999569)											
VA23B3865-001	Anonymous	Nitrogen, total	7727-37-9	E366	0.030	mg/L	0.188	0.187	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999570)											
VA23B3865-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0030	0.0030	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999571)											
VA23B3865-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999572)											
VA23B3865-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0064	<0.0050	0.0014	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999597)											
VA23B3865-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.037	0.036	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999598)											
VA23B3865-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999599)											
VA23B3865-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.126	0.125	0.800%	20%	----
Anions and Nutrients (QC Lot: 999600)											
VA23B3865-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 999601)											
VA23B3865-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	6.35	6.33	0.322%	20%	----
Anions and Nutrients (QC Lot: 999604)											
VA23B3865-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 999568)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 999568) - continued											
VA23B3865-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.10	2.19	0.08	Diff <2x LOR	----
Total Metals (QC Lot: 999550)											
VA23B3865-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0183	0.0184	0.0001	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00012	0.0000004	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.00547	0.00553	1.03%	20%	----
		Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	17.4	17.4	0.330%	20%	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00072	0.00075	0.00003	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	2.04	2.05	0.557%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00138	0.00138	0.0122%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000377	0.000408	0.000031	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	0.538	0.540	0.414%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000102	0.000091	0.000011	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	1.89	1.93	2.25%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	0.990	0.989	0.129%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.137	0.136	1.00%	20%	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000151	0.000156	2.79%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 999645)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 999645) - continued											
VA23B3865-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0072	0.0077	0.0004	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	0.00010	0.0000006	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00504	0.00506	0.347%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	17.3	17.0	2.21%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00087	0.00088	0.000006	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	2.14	2.18	1.78%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00029	0.00032	0.00002	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000391	0.000412	0.000021	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.540	0.546	0.940%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000115	0.000066	0.000049	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.04	2.05	0.211%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	1.05	1.07	2.05%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.140	0.135	4.32%	20%	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000160	0.000146	9.42%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1000620)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 999554)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 999555)						
Solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 999595)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 999596)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 999569)						
Nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 999570)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 999571)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 999572)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 999597)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 999598)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 999599)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 999600)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 999601)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 999604)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Organic / Inorganic Carbon (QCLot: 999568)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 999550)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 999645)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 999645) - continued						
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1000620)									
Turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 999554)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	102	85.0	115	----
Physical Tests (QCLot: 999555)									
Solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	86.8	85.0	115	----
Physical Tests (QCLot: 999594)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 999595)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 999596)									
Conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.4	90.0	110	----
Anions and Nutrients (QCLot: 999569)									
Nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 999570)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 999571)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.8	80.0	120	----
Anions and Nutrients (QCLot: 999572)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 999597)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 999598)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 999599)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 999600)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 999601)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 999604)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	107	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Organic / Inorganic Carbon (QCLot: 999568)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 999550)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.8	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.1	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.0	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.1	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.9	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	111	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	94.0	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.5	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	91.5	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.6	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.2	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 999645)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.9	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	101	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.0	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	109	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	100	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.2	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	111	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.8	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.1	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.5	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.2	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 999569)										
VA23B3865-002	Anonymous	Nitrogen, total	7727-37-9	E366	0.405 mg/L	0.4 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 999570)										
VA23B3865-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0460 mg/L	0.05 mg/L	92.0	70.0	130	----
Anions and Nutrients (QCLot: 999571)										
VA23B3865-002	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0463 mg/L	0.05 mg/L	92.6	70.0	130	----
Anions and Nutrients (QCLot: 999572)										
VA23B3865-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0962 mg/L	0.1 mg/L	96.2	75.0	125	----
Anions and Nutrients (QCLot: 999597)										
VA23B3865-002	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 999598)										
VA23B3865-002	Anonymous	Chloride	16887-00-6	E235.Cl	98.9 mg/L	100 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 999599)										
VA23B3865-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.48 mg/L	2.5 mg/L	99.1	75.0	125	----
Anions and Nutrients (QCLot: 999600)										
VA23B3865-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.490 mg/L	0.5 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 999601)										
VA23B3865-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	99.1 mg/L	100 mg/L	99.1	75.0	125	----
Anions and Nutrients (QCLot: 999604)										
VA23B3865-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0354 mg/L	0.03 mg/L	118	70.0	130	----
Organic / Inorganic Carbon (QCLot: 999568)										
VA23B3865-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.09 mg/L	5 mg/L	102	70.0	130	----
Total Metals (QCLot: 999550)										
VA23B3865-002	Anonymous	Aluminum, total	7429-90-5	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		Barium, total	7440-39-3	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00951 mg/L	0.01 mg/L	95.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 999550) - continued										
VA23B3865-002	Anonymous	Boron, total	7440-42-8	E420	0.109 mg/L	0.1 mg/L	109	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Copper, total	7440-50-8	E420	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		Iron, total	7439-89-6	E420	2.00 mg/L	2 mg/L	100	70.0	130	----
		Lead, total	7439-92-1	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Lithium, total	7439-93-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		Potassium, total	7440-09-7	E420	4.40 mg/L	4 mg/L	110	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		Silicon, total	7440-21-3	E420	9.78 mg/L	10 mg/L	97.8	70.0	130	----
		Silver, total	7440-22-4	E420	0.00402 mg/L	0.004 mg/L	100	70.0	130	----
		Sodium, total	7440-23-5	E420	2.01 mg/L	2 mg/L	101	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		Tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00366 mg/L	0.004 mg/L	91.4	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Zinc, total	7440-66-6	E420	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
Dissolved Metals (QCLot: 999645)										
VA23B3865-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00924 mg/L	0.01 mg/L	92.4	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00392 mg/L	0.004 mg/L	97.9	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 999645) - continued										
VA23B3865-002	Anonymous	Chromium, dissolved	7440-47-3	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	4.23 mg/L	4 mg/L	106	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	10.6 mg/L	10 mg/L	106	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00386 mg/L	0.004 mg/L	96.5	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	2.06 mg/L	2 mg/L	103	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0356 mg/L	0.04 mg/L	89.0	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0985 mg/L	0.1 mg/L	98.5	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: F0568

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Gabriel Holmes
Phone:	
	Company address below will appear on the final report
Street:	PO BOX 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	On File

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: On File

Email 2:

Turnaround Time (TAT) Requested

- ☐ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☑ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge.

Additional fees may apply to rush requests on weekends, statutory holidays and for non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	VA19-MPMC100-01
Job #:	
PO / AFE:	5590012190
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): B3867

ALS Contact: Can Dang **Sampler:** GH

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients-1	Total Metals	Dissolved Metals	TN, NH3	DOC	TSS (Whole Bottle)	Total Metals (Preserved)	Dissolved Metals (F/P)	TN/NH3	Hardness					SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
							P	F/P	P	F/P		P	F/P									
	HAD-3	19-Jun-23	9:07	Water	6	E	E	E	E	E	E											
	E19	19-Jun-23	9:19	Water	6	E	E	E	E	E	E											

Environmental Division Vancouver

Work Order Reference VA23B3867

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

ation by selecting from drop-down below — COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
						4	6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Gabriel Holmes	19/6/2023	Time: 15:30	Received by:	Date:	Time:	Received by: JC	Date: JUN 20 2023	Time: 1335

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Appendix S

Compliance Inspection Findings

(Electronic format only)

Ministry Inspection Reports

Date	Inspection #	Order #	Due Date	Status	Request #	Due Date	Status	Warning #	Due Date	Status	Advisories #	Response Date	Responsible for Resoonse	
12-Jan-23	201588	201588-S1-O1	25-Jan-23	**Closed**									Mine Ops	Overhanging frost layers at the face.Inspector had discussion with mine ops general foreman.
		201588-S1-O2	02-Feb-23	**Closed**									Mine Ops	Traffic control signage is required leaving the Springer Pit to connect to the main haulage road.
		201588-S1-O3	02-Feb-23	**Closed**									Mine Ops	Roll out berm required at the potential run out zone that connects to the haulage road.
		201588-S1-O4	02-Feb-23	**Closed**									Site Services	Large overhang of ice on the warehouse admin building.
		201588-S2-O5	02-Feb-23	**Closed**									Mine Maintenance	Drill press needs to be anchored to the floor.
		201588-S2-O6	02-Feb-23	**Closed**									Mine Maintenance	Waste materials containing solvents, grease, paints, or other flammable substances shall be stored in appropriate covered containers while awaiting disposal.
								201588-S2-W1	02-Feb-23	**Closed**			Mine Maintenance	Grinder found with guarding removed.
								201588-S2-W2	02-Feb-23	**Closed**			Mine Maintenance	Safety chains not in place at acetylene storage.
					201588-S2-R1	02-Feb-23	**Closed**						Jim Hjelden	The Ministry is requesting a copy of MP lock out procedure.
					201588-S2-R2	02-Feb-23	**Closed**						Richard Tuohey	The Ministry is requesting a copy of MP traffic control procedure.
28-Mar-23	204284	204284-S1-O1	24-Apr-23	**Closed**									Darcy Hannas	Guarding missing on new filter press.
28-Mar-23	204147				204147-S1-R1	12-Apr-23	**Closed**						Ed McManus	The Ministry is requesting an up-to-date electrical single-line diagram of the mines electrical distribution system for review.
					204147-S2-R2	12-Apr-23	**Closed**						Ed McManus	The Ministry is requesting the ground-grid Ground Potential Rise test procedure for review.
27-Apr-23	205631	205631-S2-O1	15-Jun-23	**Closed**									Environment	DSI recommendation 2021DSI-01 indicates that MPMC has not followed the EoR's recommendations datine to 2020 - a contravention of Permit M-200 clause C.1.(c)
											205631-S1-A1	**17-May-23**	Environment/TSF	MP is to consult with EoR and determine the TSF pond QPO values the would trigger a Reportable Incident - the trigger levels should be included in the next update to the OMS, TARP, and EPRP.
27-Apr-23	205650	205650-S1-O1	05-Jun-23	**Closed**									Mill Maintenance	Install swing gates in accordance with ANSA14.3-1992.
		205650-S1-O2	15-May-23	**Closed**									Site Services	Hydrocarbon spills at light and heavy vehicle fuel docks.
		205650-S1-O3	15-May-23	**Closed**									Site Services	Housekeeping at heavy vehicle fuel dock.
16-May-23	206519										206519-S1-A1	**N/A**	N/A	No Orders Issued, report signed and returned.
12-Jun-23	208361	208361-S1-O1	27-Jun-23	**Closed**									James Grondines	Toyota Forklift inside warehouse has the wrong size fire extinguisher.
		208361-S1-O2	05-Jul-23	**Closed**									James Grondines	Monthly checks are not being completed on the fire extinguisher installed inside the warehouse.
		208361-S1-O3	27-Jun-23	**Closed**									James Grondines	Used hazardous waste oil bins in Yard 1 laydown were not labeled.
		208361-S1-O4	04-Jun-23	**Closed**									James Grondines	One hazardous waste oil bin fork slots were broken creating a potential tip over and spill hazard.
		208361-S1-O5	27-Jun-23	**Closed**									James Grondines	Compressed gas cylinders (propane tanks) were laying on the ground and not in proper storage area.
		208361-S1-O6	27-Jun-23	**Closed**									Site Services	There is a hydrocarbon spill to be cleaned up in yard #2
		208361-S1-O7	27-Jun-23	**Closed**									All Depts.	Many pieces of Mobile equipment over 7000kg during the inspection were found not equipped with wheel chocks.
								208361-S1-W1	**N/A**				James Grondines	Fibre Webbing Slings found that are in service were frayed and damaged.
								208361-S1-W2	**N/A**				Mine Maintenance	Mechanics found working on a piece of equipment did not have locks with tags in place
19-Jun-23	208476	208476-S1-O1	17-Jul-23	**Closed**									Mill Maintenance	Outside of the crusher operator room, Inspector Bolen noted a ladder that that appeared to lead up to a working platform that was more than 1 m above floor grade. This working platform appeared to lack standard guardrails. This is a contravention to the HSRC Section 4.1.8(1)
		208476-S1-O2	17-Jul-23	**Closed**									Mill Operations	In the lower level of the crusher building, Inspector Bolen noted a crane logbook that was not being examined, dated and signed, at least weekly, by the supervisor to ensure the required entries have been made. This is a contravention to the HSRC Section 4.18.6(3).
		208476-S1-O3	17-Jul-23	**Closed**									Mill Operations	In the motor storage warehouse outside of the new lunchroom in the shop, Inspector Bolen noted that this area was extremely cluttered and that there was no path to provide a quick and unimpeded access to the emergency exit. This is a contravention to the HSRC Section 4.1.4(3a)
		208476-S1-O4	24-Jul-23	**Closed**									Mill Maintenance	In the crusher building, Inspector Bolen noted vehicle support stands that did not appear to have the rated load capacity marked on them. This is a contravention to the HSRC Section 4.12.12
05-Jul-23	209195	209195-S1-O1	05-Jul-23	**Closed**									General Manager	Develop a safe working plan to upright an overturned water truck.
27-Jul-23	210956				210956-S1-R1	**Closed**							Safety	Copy of the record of thermal stress training/discussion that was provided to crews
					210956-S2-R2	**Closed**							Mine Maintenance	Description of how waste oil/water in the shop floor drain/catchment is managed so as to prevent environment contamination.
		210956-S4-O1	29-Nov-23	**Closed**									Mine Maintenance	Blind side camera on shovel not operational.
		210956-S6-O2	29-Nov-23	**Closed**									Mine Maintenance	Effective housekeeping program for air conditioning unit.
		210956-S7-O7	29-Nov-23	**Closed**									Mine Maintenance	Repair drill A/C.
04-Oct-23	215253	215253-S1-O1	10-Nov-23	**Closed**									Mill Maintenance	Guarding around bull gears on mills.
		215253-S1-O2	10-Nov-23	**Closed**									Electrical	MCC rack loader past annual inspection date.
		215253-S1-O3	27-Oct-23	**Closed**									Mill Ops	Housekeeping around mill area.
		215253-S1-O4	27-Oct-23	**Closed**									Mill Ops	Crane logbook missing supervisor signature.
		215253-S1-O5	12-Dec-23	**Closed**									Mill Maintenance	Bump-stops on vertical doors.
		215253-S1-O6	10-Nov-23	**Closed**									Mill Maintenance	Head and tail pulleys require guarding improvements.
		215253-S1-O7	20-Oct-23	**Closed**									Mill Ops	Decanted liquid with no label - mag plant.
		215253-S1-O8	10-Nov-23	**Closed**									Mill Ops	Monorail does display safe working load - mag plant.
								215253-S1-W1	10-Nov-23	**Closed**				Lifting device with no established load rating.
								215253-S1-W2	27-Oct-23	**Closed**			Mine Maintenance	Angle grinder with modified guard - weld shop.
18-Oct-23	216375	216375-S1-O1	15-Nov-23	**Closed**									Safety	Monthly fire extinguisher inspections - mine rescue and administration
											216375-S1-A1	15-Nov-23	Safety	ERP annual testing - **CLOSED**
22-Nov-23	218014	218014-S1-O1	15-Dec-23	**Closed**									Site Wide	Implement an effective housekeeping program. Fire extinguisher beside door in the tool crib area with debris on/near the landing below.
		218014-S1-O2	15-Dec-23	**Closed**									Mill Operations	Portable eye wash stations.
		218014-S1-O3	15-Dec-23	**Closed**									Site Wide	Implement an effective housekeeping program. Life ring on a walkway, not hung up.
								218014-S1W1	N/A	**Closed**			Mill Maintenance	Sling with signs of damamge - removed during tour.
								218014-S2-W2	N/A	**Closed**			Mill Maintenance	Shelf in front of electrical panel. Removed on the same day as the tour, photos were sent to EMLI.
								218014-S2-W3	N/A	**Closed**			Mill Maintenance	Tagout barrier missing from D-bank. Deficiency was rectified at the time of inspection.
		218014-S2-O4		**Closed**									Site Wide	Implement an effective housekeeping program.
		218014-S2-O5		**Closed**									Site Wide	Implement an effective housekeeping program. Steel platform uneven with floor creates a tripping hazard.
22-Nov-23	218024	218024-S1-O1										01-Apr-24	Safety	Workplace monitoring program.
		218024-S1-O2										05-Jan-24	Safety	Interim exposure plan - mag plant.
		218024-S1-O3										05-Jan-24	Safety	Hearing conservation program.
		218024-S1-O4										05-Jan-24	Safety	Worker observed not wearing HPD. assumed to be not wearing respiratory protection (reso pro not required when using portable hand grinder).
12-Dec-23	219135	219135-S1-O1	26-Jan-24	**Closed**								26-Jan-24	Electrical	Fire stop in mag plant.

Ministry Inspection Reports

Date	Inspection #	Order #	Due Date	Status	Request #	Due Date	Status	Warning #	Due Date	Status	Advisories #	Response Date	Responsible for Response	Description
05-Oct-22	197466	197466-S1-O1	31-Mar-24	Open									Safety	Written MSD prevention program and an action plan for implementation.
22-Nov-23	218024	218024-S1-O1	01-Apr-24	Open									Safety	Current WMP and results of the program shall be available to the inpsector
04-Jan-24	219127	219127-S1-O1	2024-01-25	**Closed**								24-Jan-24	Mine Operations	Berms
		219127-S1-O2	2024-01-10	**Closed**								15-Feb-24	Safety	PPE
		219127-S1-O3	2024-01-31	**Closed**								24-Jan-24	Mine Operations	Flammable Cabinets
								219127-S1-W1	2024-01-31	**Closed**		2024-01-05	Mine Operations	Collision Barrier
12-Dec-23	219135	219135-S1-O1	26-Jan-24	**Closed**									Mill Maintenance	Fire stop to be added to electrical room
21-Feb-24	221028	221028-S1-O1	01-Apr-24	Open									Mill Maintenance	Secure shelf in pump rebuild area
		221028-S1-O2	01-Apr-24	Open									Supply Chain	Access/egress in warehouse 1
		221028-S1-O3	01-Apr-24	Open									Mine Maintenance	Contractor service truck (Clauson Equipment Services Ltd) requires NDT testing on the crane
		221028-S1-O4	01-Apr-24	Open									Mill Operations	Replace single-walled fuel tank with double-walled or provide a containment for single-walled tank in con shed. Placard required
21-Feb-24	221033	221033-S1-O1	12-Mar-24	Open									Mill Maintenance	Repair cable on hydraulic motor for thickner and stop/start station in basement
											221033-S1-A1	Open	Mill Maintenance	Marking of electrical distribution area

Date	Permit	Type	Requirement/Description	Compliance	Findings/Details	Response/Action	Status
16-May-23	M-200	Geotechnical Inspection #206904	Order 206904-S1-O1	Out	The previous DSR report was submitted in 2017. A new DSR report was required by March 31 2023. A new DSR report has not been submitted. This is a contravention of HSRC 10.4.5 and HSRC 10.5.4.	MPMC retained Tetra Tech to produce the 2022 DSR as per the code. The report was finalized and was submitted to EMLI.	Complete
24-May-23	M-200	Geotechnical Inspection #206622	Advisory 1	N/A	The Mill Site Sump is located on the Mill Site and includes a dam approximately 4 m in height. MPM is planning to decommission the dam. Potential Permitting requirements for the decommissioning of the structure were discussed. EMLI recommends that MPM complete a self assessment to determine if the activity is substantial and if a notice of departure from approval is required (per 10.1.18 of the Code).	Manager's Response from June 23, 2023: Mount Polley Mine submitted a self assessment on June 6, 2023. An NoD letter was received from Sean Shaw, and the work was determined to be "non-substantial" and can proceed.	Complete
24-May-23	M-200	Geotechnical Inspection #206622	Advisory 2	N/A	During the review of the "2022 Pit Slope and Waste Rock Dump Slope Stability Review" report, EMLI noted that the Northeast Dump and Bell Dump were not addressed in the report. Per Condition B.4.(d)(i), MPM must ensure that the 2023 annual report documenting the review of waste dump design and stability performance includes all dumps within the MPM Permitted Mine Area by March 31, including the Northeast Dump and Bell Dump.	Include Northeast Dump and Bell Dump in 2023 annual reporting.	Incomplete
24-May-23	M-200	Geotechnical Inspection #206622	Advisory 3	N/A	SERDS Co-Disposal Facility: Tailings excavated from SPP are being placed in SERDS Co-disposal Facility. MPM is exploring options for reconfiguring the design of the tailings cells. EMLI recommends that MPM complete a self assessment to determine if the activity is substantial and if a notice of departure from approval is required per 10.1.18 of the Code.	Complete a self assessment to determine if reconfiguring the design of the tailings cells is substantial and a notice of departure from approval is required.	Incomplete
24-May-23	M-200	Geotechnical Inspection #206622	Advisory 4	N/A	The Wight Pit is currently being used for water storage. MPM advised EMLI that the underground workings are submerged under water at the base of the Wight Pit. EMLI recommends that if MPM is not planning to carry out underground work in the near future, consideration be given to requesting that permit conditions associated with underground mining be removed from the Permit as a Permit Amendment.	Manager's Response from June 23, 2023: Mount Polley Mine is currently evaluating its mine plan as it relates to underground mining. As part of this evaluation, MPM is considering potential underground mining options and as such does not intend to apply for a permit amendment associated with the removal of conditions associated with the underground at this time.	Complete
24-May-23	M-200	Geotechnical Inspection #206622	Order 1	Out	B.2(d)(i) The Permittee must ensure an annual review and inspection of the underground workings is undertaken, and observations and recommendations made during the review and inspection are summarized in a report. The Permittee must submit this report to the Chief Inspector by March 31 of the year following the review and inspection. The report required in Permit Condition B.2.(d)(i) was not submitted for the 2022 calendar year.	Manager's Response from June 23, 2023: The underground workings are accessed via a portal in the Wight Pit that has been flooded and inaccessible since 2019, making it unsafe to access the workings for inspection. MPM plans to apply for a variance requesting that it be exempt from Permit Condition B.2.(d)(i) while the pit remains unsafe to access the underground working in order to avoid administrative non-compliances with M-200. As stated in response to Advisory 4, MPM is currently reviewing its mine plan as it relates to underground mining and does not intend to apply for a permit amendment to remove the underground conditions from M-200 at this time.	Complete
24-May-23	M-200	Geotechnical Inspection #206622	Order 2	Out	S.10.4.4(d)- The 2022 "Annual Mine Managers Summary Report to the Chief Inspector" did not include a schedule for completion all DSI recommendations, or a commitment to complete the work as per the schedule provided in the DSI. Per Section 10.4.4(d) of the Code, the Mine Manager is to provide a schedule for completion all DSI recommendations.	Manager's Response from June 23, 2023: MPMC will resubmit the Annual Mine Manager's Summary report with a schedule for completion and commitment to complete all DSI recommendations.	Complete- amended report from Jun 20, 2023 submitted with Manager's Response on June 23, 2023
24-May-23	M-200	Geotechnical Inspection #206622	Order 3	Out	S.10.4.2(1)(c)- The 2022 report of activities of the Independent Tailings Review Board established under 10.4.2 (1) (c) of the Code did not include signed acknowledgement by the members of the Board, confirming that the report is a true and accurate representation of the Reviewers. Per Section 10.4.4(c)(iv) of the Code, the Mine Manager is to provide signed acknowledgement by the members of the Independent Tailings Review Board, confirming that the document "Mount Polley Mine Independent Tailings Review Board - Annual Report 2022," is a true and accurate representation of the Reviewers.	Manager's Response from June 23, 2023: MPMC will submit a signed acknowledgement letter by the IERP.	Complete- signed letter submitted with Manager's Response on June 23, 2023
26-Jul-23	M-200	Reclamation Inspection #210491	Advisory 210491-S1-A1	N/A	MPMC indicated that biosolids stockpile remains in place and that the material is still viable for use. The materials in the current stockpile are planned for use on the TSF. MPMC is considering bringing in additional biosolids material and placing it in a new stockpile on the ERDS. MPMC adived that the importation of any new materials and creation of new stockpile may require approval from EMLI as per the recently publishd Guidance on Approval of Imported Materials on a Mine Site.	MPMC will receive EMLI approval prior to importation of new materials.	N/A
26-Jul-23	M-200	Reclamation Inspection #210491	Request 210491-S1-R1	N/A	MPMC submitted a compliance status report as part of the 2022 Annual Reclamation Report. The report included a summary of recent inspections and associated orders. During the inspection, EMLI requested to view a copy of the mines compliance tracking table with all conditions of the M-200 permit. The table was presented upon request. MPMC indicated that they are currently in the process of updating the tracking table to reflect a few additional permit conditions associated with recent amendments. MPMC indicated that there are several permit conditions that they are concerned about and requested EMLI provide clarification. In addition, the mine indicated that the present system of reusing permit condition numbers in permit amendments makes it difficult for the mine to track permit conditions. MPMC enquired whether EMLI has considered the use of unique permit condition numbering. Once update of the tracking table is complete, EMLI requests that the tracking table be shared with EMLI and that any permit conditions of concern be flagged for review.	MPMC is currently updating and reviewing the tracking table. MPMC will submit the table to EMLI in the Manager's response for this inspection	Complete.
26-Jul-23	M-200	Reclamation Inspection #210491	Advisory 210491-S2-A2	N/A	EMLI enquired about the monitoring of vegetation metal uptake at the mine site. Mr. MPMC indicated that monitoring programs have occurred in the past, the last program having occurred in 2017. MPMC is reminded that monitoring of metal uptake is a requirements of the M-200 permit, linked to condition C.13(n) and C.14 (Ecological Risk Assessment). MPMC is advised that monitoring of metal uptake should continue over the life of the mine.	MPMC will follow the M-200 permit requirement and re-initiate the metal uptake monitoring	Incomplete but will resume in 2024 in accordance with workplans

26-Jul-23	M-200	Reclamation Inspection #210491	Advisory 210491-S3-A3	N/A	Soil stockpiles were incidentally observed on the drive to the Wight Pit and to and from the TSF. EMLI noted that stockpiled materials are windrowed adjacent to road, the tailings pipeline and at the foot of some dumps, including the North East Zone (NEZ) Dump. None of the soil stockpiles observed were identified with signage and EMLI observed that one stockpile had been disturbed during recent upgrade of the tailings pipeline. It was discussed that other than the environmental department, who has a good understanding of where the soil resources are located, that other site personnel are not aware of the location or value of these materials. EMLI expressed concern over the location of soil stockpiles at the foot of the NEZ dump, noting that if operational staff are not aware of the presence of soil resources, that the materials could be buried and lost during dump resloping.MPMC indicated that the main operational soil stockpiles are signed, but the smaller ones are not. MPMC is reminded that Condition C.8(g) requires that soil stockpiles are clearly marked to ensure they are protected during construction and mine operations. Additional signage is needed to ensure that all soil resources are appropriately identified at the mine site.	MPMC has ordered additional signage for all soil stockpiles and will be put in place once received	Incomplete, 30 signs are mounted on posts but have yet to be distributed. Distribution will occur once the snow is gone
26-Jul-23	M-200	Reclamation Inspection #210491	Advisory 210491-S4-A4	N/A	On the drive to the North Bell Dump, EMLI viewed the mill stockpile. At the time of inspection, the stockpile water vaporizer, installed to control dust, was not in use and issues with fugitive dust were observed. MPMC indicated that water trucks are used on a daily basis to control dust and that a dust suppressant has been applied to the Bootjack Road (mine access).	MPMC will follow the Fugitive Dust Management Plan. Spray bars are active on the conveyor belts which provide dust control on the mill stockpiles.	Complete
30-Aug-23	M-200	Geoscience Inspection #213574	None	N/A	The inspection provided an overview of geoscience related projects and activities at Mount Polley Mine	No response/action required.	N/A

Appendix T

Reclamation Research Report

(Electronic format only)

Mount Polley Mining Corporation

an Imperial Metals company
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Reclamation Research Program

PREPARED FOR:

BC Ministry of Energy and Mines and Low Carbon Innovation

PREPARED BY:

Mount Polley Mining Corporation

Environmental Department

Box 12, Likely BC, V0L 1N0

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18 May 2021

Document Review and Revisions

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R1	Editorial	May 12th, 2021	Anastasia Ivanusic, DWB
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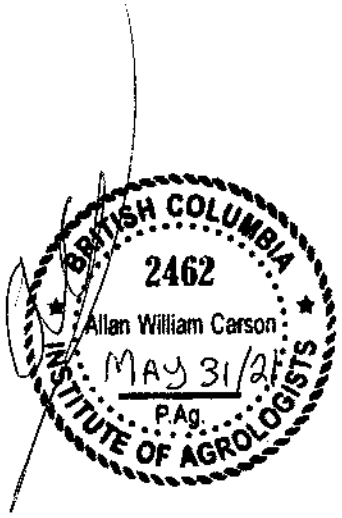

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Appendix A – Summary of Progressive Reclamation

LIST OF ACRONYMS AND ABBREVIATIONS

ABR	Anaerobic Biological Reactor
ABR-IN	Pond Inflow
ABR-OUT	Pond Outflow
BAT	Best Available Technology
BC	British Columbia
BC WQG	British Columbia Water Quality Guideline
BEC	Biogeoclimatic Zone
BCR	Bio-chemical Reactor
CEMP	Comprehensive Environmental Monitoring Plan
COCs	Constituents of Concern
Cu:Mo	Copper:Molybdenum
CWD	Coarse Woody Debris
CWTS	Constructed Wetlands Treatment System
DWB	DWB Consulting Services Ltd.
ESC	Erosion and Sediment Control
FN	First Nations
ICH	Interior Cedar-Hemlock
MDL	Method Detection Limit
MELI	Ministry of Energy, Mines and Low Carbon Innovation
MESCP	Main Embankment Seepage Collection Pond
mk	Moist Cool
MPMC	Mount Polley Mining Corporation
MOTI	Ministry of Transportation and Infrastructure
MTD	Main Toe Drain
NBD	North Bell Dump
NEZ	Northeast Zone
NW	Temporary North West
OMRR	Organic Matter Recycling Regulation
PAG	Potentially Acid Generating
PBR	Packed Bed Reactor
PCOCs	Potential Constituents of Concern
PFZ	Pesticide Free Zone
RCP	Mine Reclamation and Closure Plan
RDS	Rock Disposal Site
SERD	South East Rock Dump
SRF	Saturated Rock Fill
SSF	Saturated Sand Filter
TAR	Technical Assessment Report
TEM/BEC	Terrestrial Ecosystem Mapping Biogeoclimatic Ecosystem Classification
TMT	Trimercaptotriazine
TP	Test Plot
TSF	Tailings Storage Facility
UTM	Universal Transverse Mercator
WHR	Waste Haul Road
WMP	Water Management Plan

LIST OF UNITS

°C	degrees Celsius
cm	centimetres
dT	dry tonnes
ha	hectare(s)
kg	kilogram(s)
km	kilometer(s)
m	metre(s)
masl	metres above sea level
m^3	cubic metre(s)
m^3/ha	cubic meter per hectare
mm	millimeter(s)
mg/L	milligrams per litre
%	percent

1 INTRODUCTION

The following describes the Reclamation Research Program (the Program) for the Mount Polley Mining Corporation (MPMC) at the Mount Polley Mine (the Facility), which is located approximately 100 km northeast of the city of Williams Lake, British Columbia (BC), near the town of Likely, BC.

1.1 OBJECTIVE

The main objective of the Program, along with progressive reclamation, is to meet and/or inform the objectives of the Mine Reclamation and Closure Plan (RCP). These activities, and their relationship to the RCP, are identified in Figure 1-1.

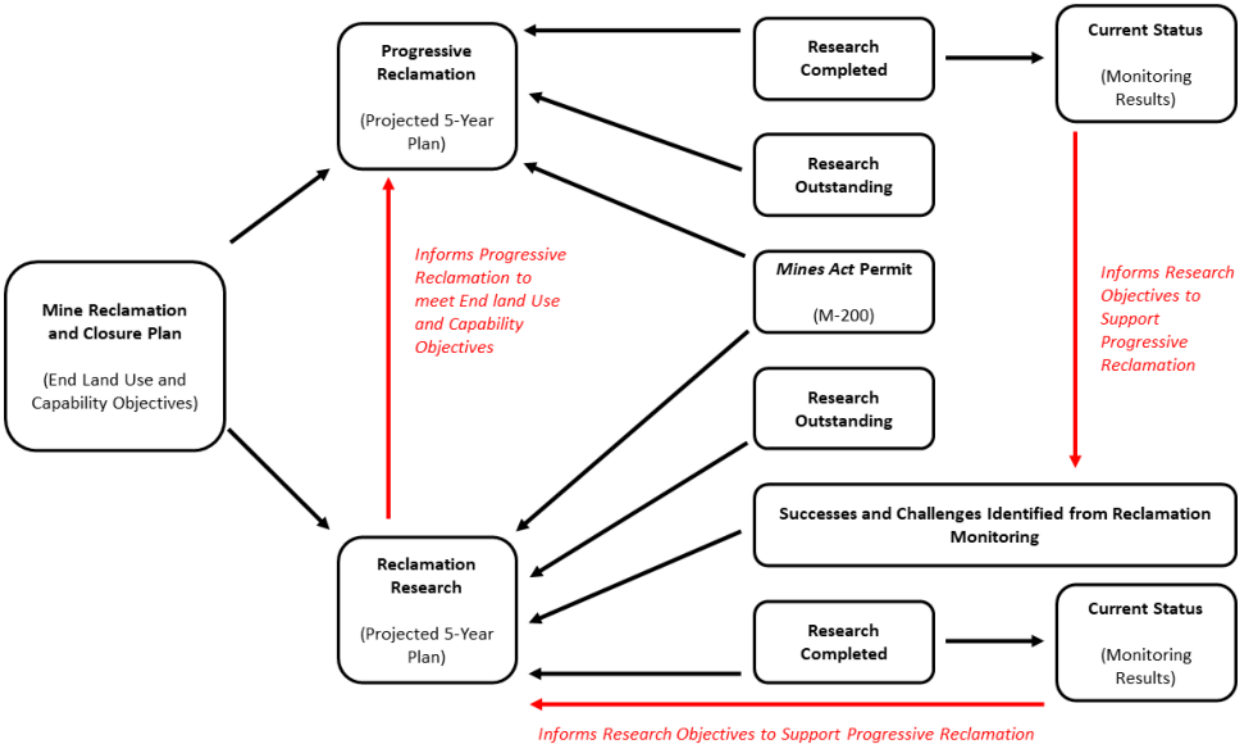


Figure 1-1. Diagram Illustrating Mine Reclamation Activities and their Relationships.

Further to the main objective, the purpose of the Program is to:

- Summarize progressive reclamation completed at the Facility to date;
- Summarize reclamation research completed at the Facility to date and identify where research requirements identified in the *Mines Act* Permit are being met;
- Identify reclamation research gaps (outstanding) based on the requirements identified in the *Mines Act* Permit No. M-200;

- Demonstrate where and how reclamation research aims to inform progressive reclamation practices that will meet the end land use and capability objectives;
- Provide a projected 5-year plan for addressing research gaps identified, and
- Provide a plan for monitoring existing ongoing and future research projects.

1.2 PERMIT REQUIREMENTS

Reclamation activities at the Facility are regulated by the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) *Mines Act* Permit M-200 (Amendment date December 10, 2020) (the Permit).

As per Section D.14 of the Permit, the Facility is required to conduct reclamation research throughout the lifetime of the Facility. A Reclamation Research Program (the Program), outlining a plan that aims to satisfy the requirements outlined in this section of the Permit, must be prepared and submitted to the Chief Inspector by May 31 2021. A detailed summary of the Program will be provided within the Annual Reclamation Report and the Mine Plan and Reclamation Program Updates.

The ongoing reclamation research program requirements identified in the Permit along with reference to applicable sections of this document, and sections of the RCP, are summarized in Table 1-1.

Table 1-1 Permit M-200 Section D.14 Reclamation Research Requirements (a-m), Reference to Applicable Sections of the Program in the Current Document and the RCP, and Completion Status of Conditions.

Permit Condition Number	Condition	Applicable		Permit Condition Status (Initiated, Planned/Ongoing, Completed)
		Section(s) of Research Program	Section(s) of the RCP[1]	
a	The Permittee shall submit to the Chief Inspector by May 31, 2021, a Reclamation Research Program that includes details for achieving the research requirements outlined in this permit with a schedule for implementation and description for how results will be utilized and reported.	N/A	N/A	Completed
b	The Permittee shall ensure a detailed summary of all research being conducted under this section is provided in the Annual Reclamation Report and the Mine Plan and Reclamation Program Updates, including description of activities, results, and outcomes.	N/A	N/A	Initiated/Ongoing
c	The Permittee shall conduct research to inform closure water management strategies and identify post-closure maintenance and contingency requirements.	6.1.4, 7.1, 8.0	1.1.4, 2.4, 3.0, 4.3.6, 4.3.7, 4.3.8, 5.2, 6.9, 7.3, 7.4	Initiated/Planned
d	The Permittee shall conduct research to determine the viability of revegetation with native plant species, including culturally important species.	6.1.1, 6.2.2, 6.2.3, 7.2, 7.3, 8.0	3.0, 5.5, 5.6, 7.5	Initiated/Ongoing
e	The Permittee shall conduct research intended to develop an end land use plan for the post-closure landscape represented in the mine disturbance footprint that is based on pre-mining ecosystems and habitats. Where a discrepancy in the comparative areas represented by ecosystem types is identified, the Permittee shall develop mitigation options.	Table 6-13	3.0 and 5.3 and Appendix B	Completed
f	The Permittee shall, at a minimum 60 days prior to the start of construction, complete mitigation planning procedures for pre-mining habitats (terrestrial and aquatic) identified in the permit boundary (Figure 1-1) that are predicted to be lost or substantially changed (physically or functionally) due to direct mining activities or subsidence. Contingency plans shall be developed as part of this mitigation planning process that can be implemented in the event	9.0	5.4.2, 5.5.2, 5.9, 6.4.2	Refer to Section 5.9 of the RCP for details;

	that on-site mitigation options are deemed to not be feasible based on ongoing monitoring and research results.			
g	The Permittee shall conduct research intended to inform design of and to test potential mitigation options for restoring ecosystems and habitats that are predicted to be affected by mining activities.	6.0, 7.0, 8.0	3.0, 4.3, 5.0, 6.0, 7.0	Initiated/Ongoing
h	The Permittee shall establish test plots that will be used to evaluate the reclamation approaches and prescriptions applied to confirm that ecological trajectories consistent with the land use and capability targets are being achieved.	6.0, 7.0, 8.0	3.0, 4.3, 5.0, 6.0, 7.0	Initiated/Ongoing
i	The Permittee shall conduct research to inform the development of a soil replacement plan that is designed to achieve land capability and end land use objectives. If a shortfall of soil volumes is anticipated, the Permittee shall develop contingency plans, including the identification of potential sources of borrow material for use in reclamation. The Permittee must collect information on potential borrows including location, size, and soil characterization.	6.1.1, 6.1.2, 6.2.4, 6.2.5, 7.4, 7.5, 8.0	1.4.3, 3.0, 4.3.3, 5.4	Initiated/Ongoing
j	The Permittee shall conduct research to inform reclamation prescriptions for the TSF, such that it will meet end land use and land capability objectives.	6.2.6, 7.6, 8.0	1.2.2, 4.3.4, 5.1.4, (TSF specific); 2.4, 3.0, 4.3, 5.0, 6.9, 7.0	Planned
k	The Permittee shall conduct research to assess decompaction methodologies to ensure that the severity of compaction that exists prior to commencing reclamation activities is effectively addressed in a manner intended to achieve end land use objectives and erosion control.	6.2.7, 7.7, 8.0	1.4.3, 3.0, 5.4, 6.0, 7.5.1	Planned
l	The Permittee shall conduct geomorphic landform and run-off modeling assessments in order to identify opportunities to shape landforms in a manner that optimizes surface water pathways and soil moisture regimes, reduces infiltration through spoil materials, and enhances erosion control and habitat function and connectivity.	6.1.5	1.4.2, 2.4, 3.0, 4.3.5, 5.1, 5.2, 6.0, 7.2, 7.4	Completed
m	The Permittee shall develop and implement a monitoring program designed to evaluate the success of revegetation, habitat restoration, soil development, and erosion control. The Permittee shall include in this program ecosystem-specific sampling parameters and performance criteria, which the Permittee shall base on pre-mining ecosystem benchmarks.	8.0	3.0, 7.0	Ongoing/Planned

n	The Permittee shall develop and implement a monitoring program for evaluating metal uptake in exposed terrestrial and aquatic ecosystems, which specifies sampling requirements and performance criteria. Where harmful levels are found, the Permittee shall take any corrective action necessary to mitigate to ensure levels are safe for plant and animal life.	8.0	3.0, 4.3.3, 7.5.2	Planned
o	The Permittee shall undertake study programs to evaluate the cumulative effects of fertilization on total nutrient loading and impacts to receiving waters.	6.2.9, 7.9, 8.0	3.0	Initiated/Planned

[1]*Mine Reclamation and Closure Plan (RCP), Dated January 2017 (MPMC, 2017).*

2 FACILITY DESCRIPTION

As shown in Figure 1-2, the Facility can be separated into:

- The Tailings Storage Facility (TSF) and surrounding areas;
- The crusher and mill processing site; and
- The operations areas (i.e., open pits, waste rock dumps, stockpiles, roads, etc.) and surrounding areas.

The Facility has been in Care and Maintenance since May 31, 2019. Care and Maintenance operations are focused on general site maintenance, predominantly ensuring that all pumps, sumps and water management systems are functioning properly. Eleven full time employees work in 4 shifts including day shifts and night shifts.

All environmental monitoring and samplings as per all permits and Comprehensive Environmental Monitoring Plan (CEMP) will be followed during this temporary care and maintenance period.

2.1 TSF AND SURROUNDING AREAS

The TSF consists of tailings material and a single embankment made up of three dams: the Main Embankment, the Perimeter Embankment, and the South Embankment. During the TSF dam failure which occurred on August 4, 2014, water (both supernatant and interstitial) was released from the TSF, resulting in much of the tailings within the TSF being exposed to the elements (i.e., no longer submerged).

The breach of the Facility TSF resulted in the deposition of tailings between Polley Lake and Hazeltine Creek (known as the Polley Flats). Polley Flats covers an approximately 900 m long section of Hazeltine Creek south of Polley Lake. Prior to the breach, the area immediately south of Polley Lake included a wetland. The materials deposited in the Polley Flats are observed to include the following:

- Tailings (sandy silt or silty sand, and clay-textured material);
- Dam construction materials (gravel, rock fill and glacial till);
- Organic matter transported by the tailings flow (including trees and wood debris); and
- Re-worked organic and inorganic materials from the wetland.

Note that this Program only address areas covered within the M-200 Permit and does not include areas disturbed by the tailings breach.

2.2 CRUSHER AND MILL PROCESSING SITE

The crusher and mill area includes the crusher and mill building, the coarse ore pile, the tertiary pile, the fine ore (mill feed) pile, and the pebble pile (Figure 1-2). No crushing operations are conducted during Care and Maintenance period.

2.3 PITS AND SURROUNDING AREAS

No mining activities are being conducted during Care and Maintenance period. Open pits include Cariboo and Springer Pits and waste rock dumps include the Temporary North West (NW) Potentially Acid Generating (PAG) Stockpile, North East Zone (NEZ) Rock Dump and the South East Rock Dump (SERD).

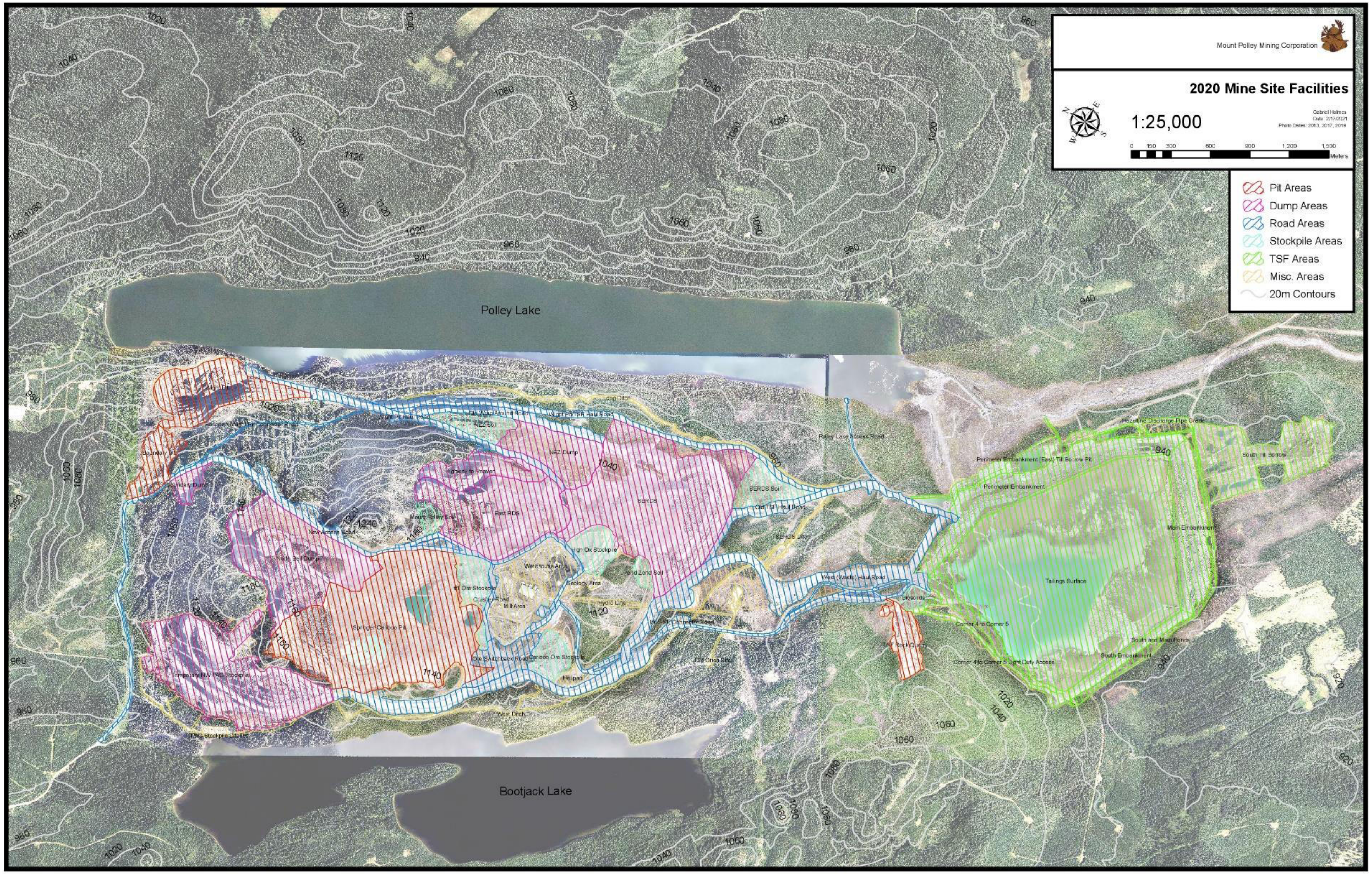


Figure 1-2. Mine Site Facilities.

2.4 METEOROLOGY

The Facility has two meteorological monitoring stations on site that have been operating since 2012 (see Figure 1). The first station (Station #1) is located southwest of the Polley Mountain summit, at an elevation of 1,171 metres above sea level (masl) near the Mill Site. The second station (Station #2) is located northwest of the TSF, along the access road to the old rock quarry. Station #2 is located atop a topographical rise at an elevation of 964 masl. The two stations are approximately 3.5 km apart, with an elevation difference of approximately 200 m. These stations monitor and record rainfall, temperature, relative humidity, wind speed, wind direction, and solar radiation every 5 minutes. From 1995 to 2012, a single meteorological station located beside the crusher building, northwest of the TSF, was in operation which monitored rainfall and temperature only.

3 BEST AVAILABLE TECHNOLOGY

Good engineering practice typically requires a project to follow the requisite engineering design process for the selection and progressive refinement of options. The project progresses from a pre-concept phase for the identification of multiple treatment options, through concept, pre-feasibility and feasibility phases to project execution. Generally, the engineering studies performed for each of the aforementioned project phases are supported by test work that progresses from proof-of-concept and detailed bench-scale testing to pilot-scale and demonstration-scale test work. A generic model for such a project development framework is provided in Figure 1-3 below. This framework also approximates the sequence of steps outlined in BC ENV's Best Available Technology (BAT) policy (BC ENV 2015).

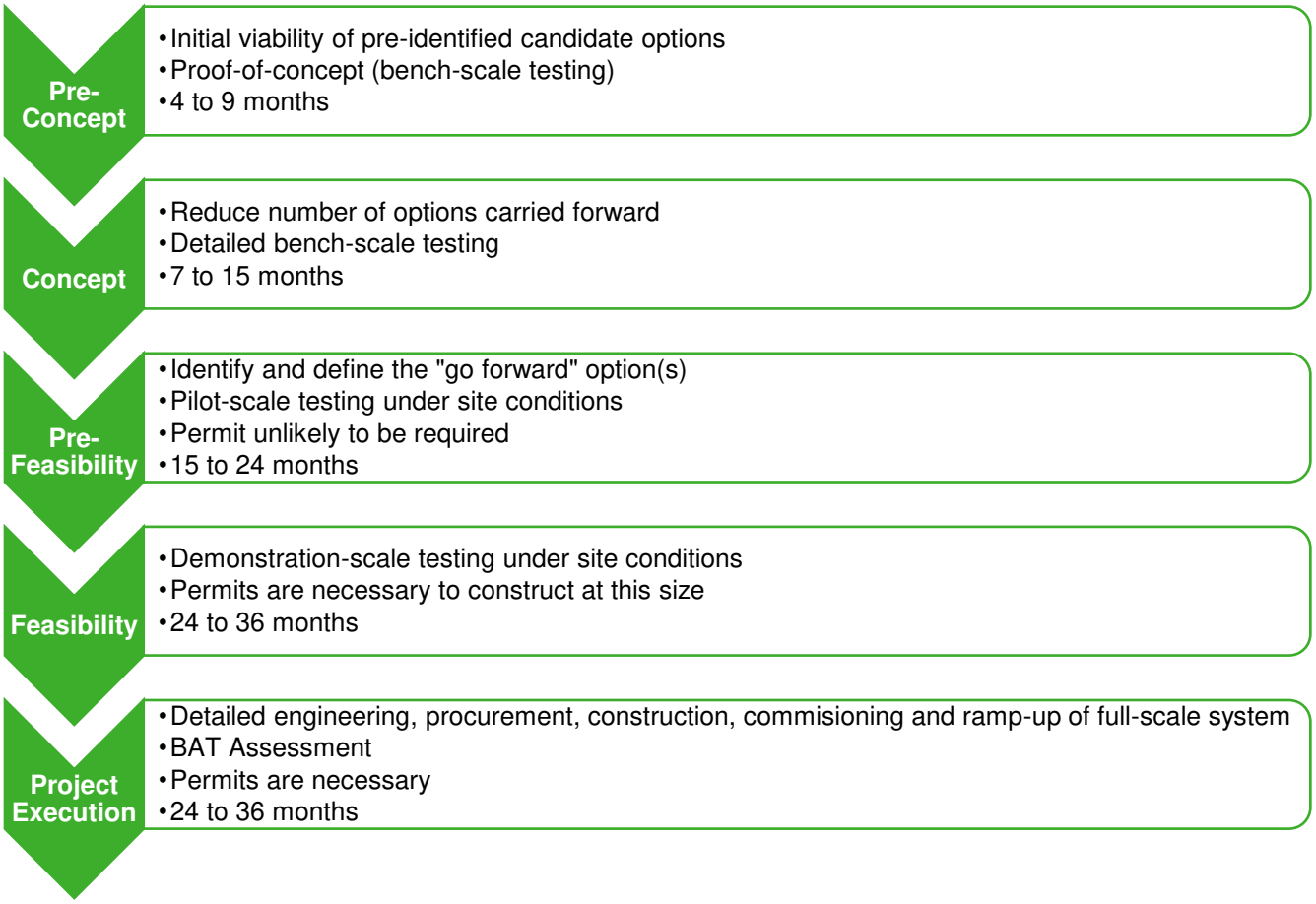


Figure 1-2. Project Development Framework.

A decision-making process will be completed at the end of each phase of the BAT policy to determine if the next subsequent phase will be pursued for that particular research project. There is potential for a project to be put on hold whilst other technologies or concepts are reviewed using this BAT policy.

4 LAND USE CAPABILITY CRITERIA AND END LAND USE PLAN

4.1 LAND CAPABILITY CRITERIA

MPMC plans to re-establish a sustainable, diverse, functional landscape that, on a property average basis, is greater than or equal to the capability that existed prior to mining. By restoring functional, locally common ecosystems to the reclaimed landscape, similar land uses will be available as were present prior to disturbance at the Facility. This will involve mimicking natural systems wherever possible by:

- Creating natural looking, irregular landforms;
- Restoring effective drainage patterns;

- Replacing soil to the depth that mimics natural conditions based on elevation, slope, and aspect (i.e., biogeoclimatic zone (BEC) site series); and
- Revegetating each area of the site with locally common, native vegetation appropriate to the target site series (See Table 4-1), that can be expected to thrive on each polygon.

This, in turn, will result in equivalent land capability.

By planning for multiple end land use objectives occurring in the same areas, the result is a more holistic approach to reclamation planning and prescription development. The entire process can also be quantitatively assessed by measuring reclaimed areas and comparing them to pre-existing ecosystem conditions or relative local benchmarks, if pre-existing ecosystem community data is not available.

Success criteria may include parameters such as:

- Landform stability;
- Erosion control;
- Visual and functional integration into the surrounding environment;
- Establishment of self-sustaining native vegetation consistent with target site series;
- Vegetation quality; and
- Presence of culturally important and rare or listed species.

The general approach for measuring reclamation success is described in Section **Error! Reference source not found.** of the RCP (MPMC 2017). In this Program, Section 8.0 outlines a specific progressive reclamation and reclamation research monitoring plan that provides detailed criteria and measures that will aid in the identification of successful reclamation.

4.2 END LAND USE PLAN

The End Land Use Plan for the Mine, presented in Table 4-1, shows how ecosystems are grouped into ecosystem categories. End land use objectives are then assigned for each ecosystem and they are defined across a range of structural stages.

The End Land Use Plan is a long-term plan that is designed to adapt to the changing conditions in vegetation communities for the different ecosystems that are targeted. The end land use objectives are predicted for structural stages such as mature and old growth forests. The structural and compositional characteristics of these stages occur up to 250 years post-closure in some ecosystems. While it will be difficult to remove all uncertainty when working with such timelines, the long-term ecological trajectories that will guide the end land use objectives into the future can be evaluated.

Figure 4-11 shows how the target ecosystems are planned to be distributed over the closure landscape. These ecosystems were distributed using GIS to divide the landscape into polygons that are separated by slope, aspect, elevation, slope position, and substrate type. **Error! Reference source not found.** shows the predicted distribution of vegetation types on the closure landscape as compared to pre-disturbance conditions.

Table 4-1. End Land Uses by Site Series and Structural Stage.

End Land Use	TEM/BEC Site Series	Structural Stage 1 to 3 (Sparse – Shrub/Herb)	Structural Stage 4 to 5 (Young Forest)	Structural Stage 6 (Mature Forest)	Structural Stage 7 (Old Growth Forest)
Dry Forest	ICHmk3_02 ICHmk3_03	Recreation FN Cultural Use Wildlife Habitat (Winter Range - Ungulate) Wildlife Habitat (Birds, Small Mammals) Wildlife Habitat (Black Bear) Livestock Grazing	Recreation FN Cultural Use Wildlife Habitat (Winter Range - Ungulate) Wildlife Habitat (Birds) Wildlife Habitat (Lynx)	Commercial Forestry Recreation FN Cultural Use Wildlife Habitat (Winter Range - Ungulate) Wildlife Habitat (Birds) Wildlife Habitat (Cavity Dependent)	Commercial Forestry Recreation FN Cultural Use Wildlife Habitat (Winter Range - Ungulate) Wildlife Habitat (Birds) Wildlife Habitat (Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat
Mesic Forest	ICHmk3_01 ICHmk3_04 ICHmk3_05	Recreation FN Cultural Use Wildlife Habitat (Summer Range - Ungulate) Wildlife Habitat (Birds, Small Mammals) Wildlife Habitat (Black Bear) Livestock Grazing	Recreation FN Cultural Use Wildlife Habitat (Summer Range - Ungulate) Wildlife Habitat (Birds) Wildlife Habitat (Lynx)	Commercial Forestry Recreation FN Cultural Use Wildlife Habitat (Summer Range - Ungulate) Wildlife Habitat (Birds) Wildlife Habitat (Cavity Dependent)	Commercial Forestry Recreation FN Cultural Use Wildlife Habitat (Summer Range - Ungulate) Wildlife Habitat (Birds) Wildlife Habitat (Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat
Wet Forest	ICHmk3_06 ICHmk3_07	Recreation FN Cultural Use Wildlife Habitat (Winter Range - Moose) Wildlife Habitat (Birds, amphibians) High Biodiversity Value Rare and Listed Plant Habitat	Recreation FN Cultural Use Wildlife Habitat (Winter Range - Moose) Wildlife Habitat (Birds, amphibians) Wildlife Habitat (Lynx) High Biodiversity Value Rare and Listed Plant Habitat	Commercial Forestry Recreation FN Cultural Use Wildlife Habitat (Winter Range - Moose) Wildlife Habitat (Birds, amphibians) Wildlife Habitat (Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat	Commercial Forestry Recreation FN Cultural Use Wildlife Habitat (Winter Range - Moose) Wildlife Habitat (Birds, amphibians) Wildlife Habitat (Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat
Grassland/ Brushland	Non-Forested	Recreation FN Cultural Use Wildlife Winter Range (Ungulate Focus) Wildlife Habitat (Birds, Small Mammals) Wildlife Habitat (Black Bear) Livestock Grazing	n/a	n/a	n/a
Rocky Talus Cliffs	Rocky Outcrop	Recreation FN Cultural Use Wildlife Habitat (Birds, Small Mammals) Wildlife Habitat (Escape Terrain) Rare and Listed Plant Habitat	n/a	n/a	n/a

Acronyms and Abbreviations: TEM/BEC: Terrestrial Ecosystem Mapping Biogeoclimatic Ecosystem Classification; ICH: Interior Cedar-Hemlock; mk: Moist Cool; FN: First Nations.

Figure 4-1. Target Revegetation at Closure, Extracted from the RCP.

Table 4-2. Predicted Change in Vegetation Site Series from Pre-disturbance to Closure.

Site Series	Description	Predisturbance		Closure		Difference	
	Area (ha)	%	Area (ha)	%	Area (ha)	Area (ha)	%
ICHmk3_00	Non-forested wetland	27	2	7	1	-20	-74
ICHmk3_01	CwSxw - Falsebox - Knight's plume	468	38	331	27	-137	-29
ICHmk3_02	FdCw - Wavy-leaved moss	1	<1	30	2	29	2,900
ICHmk3_03	CwSxw - Soopolallie	<1	<1	6	<1	<1	<1
ICHmk3_04	CwSxw - Oak fern - Cat's-tail moss	2	<1	135	11	133	6,650
ICHmk3_05	SxwCw - Oak fern	68	19	119	10	51	75
ICHmk3_06	CwHw - Devil's club - Lady fern	234	19	381	31	147	63
ICHmk3_07	CwSxw - Devil's club - Horsetail	68	5	11	1	-57	-83
Non-Forested	Grassland / Shrubland	25	2	106	9	81	324
Rocky Outcrop	Exposed Rocky Slopes	41	3	22	2	-19	-46
Water	Lakes and Rivers	0	0	99	8	99	100
Disturbed	Clearcuts / Burns / Development	312	25	0	0	-312	-100
TOTAL		1,246	100	1,246	100	0	0

Note: Numbers may not add exactly due to rounding.
Acronyms and Abbreviations: ICH: Interior Cedar-Hemlock; mk: moist cool; ha: hectare

5 SUMMARY OF PROGRESSIVE RECLAMATION

Progressive reclamation activities were first initiated at Mount Polley Mine in 1998 and have been utilized, throughout the life of the mine, as large-scale research projects, with outcomes influencing future reclamation plans and prescriptions. Table 5-1 provides a summary of all areas that have been progressively reclaimed to date and highlights the total areas that have been re-contoured, have had fertilizer or biosolids applied, and have been seeded and/or planted. These areas are shown in Figure 5-1. Note that the figure and tables do not include areas that were seeded for sediment retention and prevention of invasive species establishment, but may be disturbed again in the future.

Table 5-1. Summary of Completed Progressive Reclamation at Mount Polley Mine.

Area	Parcel	Re-contoured (ha)	Soil/Glacial Till Applied (ha)	Seeded (ha)	Fertilizer/Biosolids (ha)	Tree-Planted (ha)
		Total	Total	Total	Total	Total
NEZ Dump	2a, 2b1, 2b2	5.13	5.13	5.13	5.13	5.13
	Beside 2a/2b	2.47	0	0	0	0
NBD	Parcels 1 - 10	9.45	11.59	11.59	11.59	11.59
	South Triangle	1.3	1.3	1.3	1.3	1.3
	Phase 1	2.21	2.21	2.21	2.21	2.21
	Phase 2	2.87	2.87	2.87	2.87	2.87
	Metro Van Research 1	2.81	2.81	1.87	2.34	2.34
	Wrap Around Toe	0	2.2	2.2	0	0
	Beside Research 1	4.76	1.99	0	0	0
	Metro Van Research 2	2	2	1.33	1.66	2
	Beside Research 2	2.73	0	0	0	0
	Beside BJ FSR	0.9	0	0	0	0
Boundary Zone	Dump	4.7	4.7	0	0	4.7
East RDS	Above Access Road	3.42	4.06	4.06	0	2.75
	Highway to Heaven	11.53	9.47	6.58	0	9.47
	Tree Plots	2.31	2.31	2.31	1.2	2.31
WHR	Above WHR	1.81	1.81	1.81	0	0
	Below Helipad	1.53	1.53	1.53	1.53	1.53
South Till Borrow		23.25	0	14.75	12	0

Acronyms and Abbreviations: WHR: Waste Haul Road. NEZ: North East Zone; NBD: North Bell Dump; RDS: Rock Disposal Site.

Reclamation on the East Rock Disposal Site (RDS) commenced as part of a research trial in 1998-2000, and larger scale research projects were implemented on the Northeast Zone (NEZ) Dump in 2010 and on the North Bell Dump (NBD) in 2013-2014 (in partnership with Metro Vancouver).

Progressive reclamation of the NBD, Boundary Dump, Highway to Heaven, East RDS, Waste Haul Road (WHR), and Helipad parcels has been initiated in recent years, and vegetation assessments were carried out in 2015.

Detailed prescriptions for progressive reclamation activities completed are provided in Appendix A. A summary of the research components included in these activities are provided in Section 6.1 of this report.

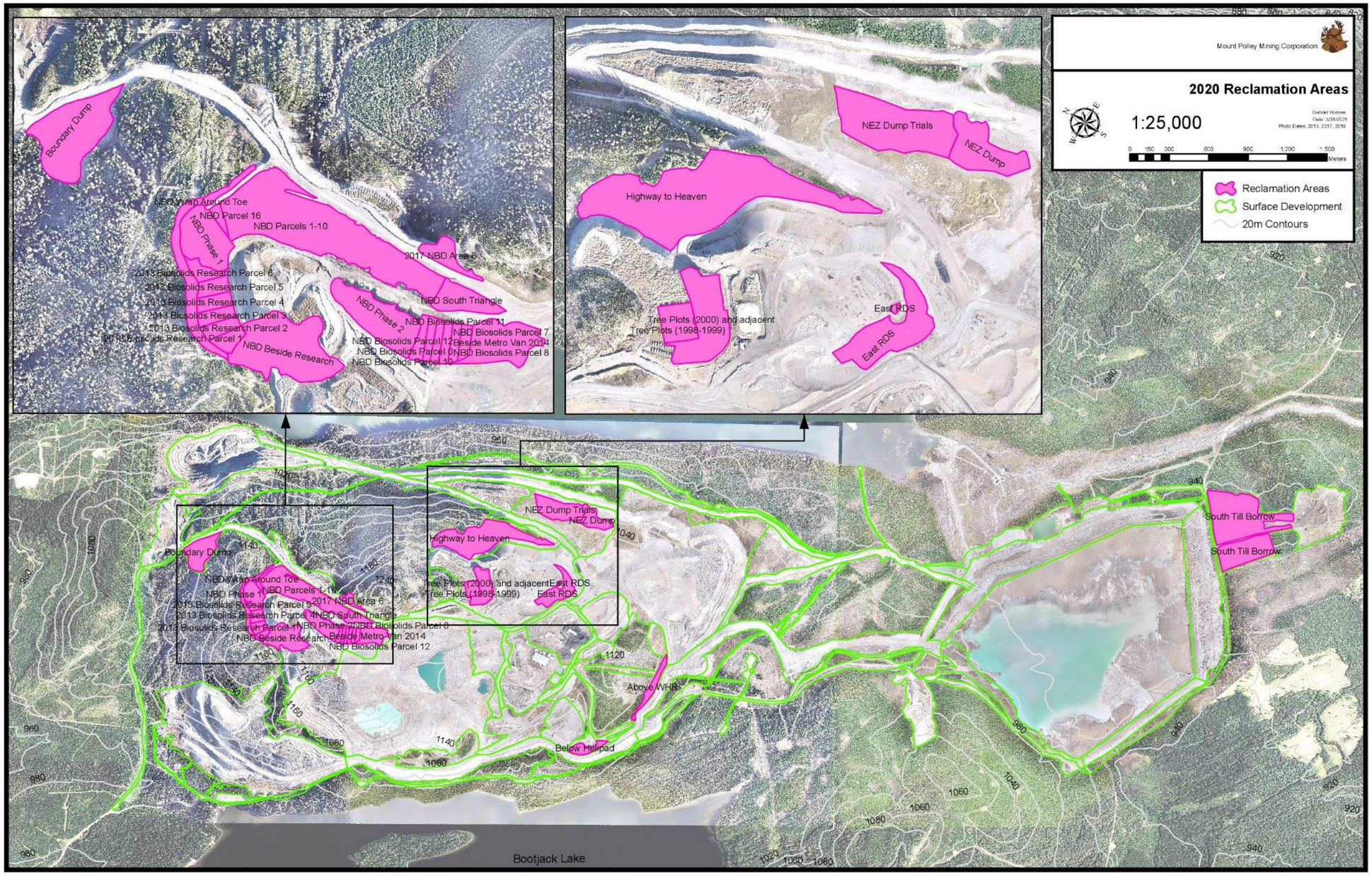


Figure 5-1. Progressive Reclamation Areas at Mount Polley Mine.

5.1 LESSONS LEARNED

Lessons learned from the implementation and monitoring of progressive reclamation activities provide guidance for future reclamation activities. Reclamation treatments that have been shown to be successful are likely be continued as further areas are reclaimed. In contrast, treatments that have shown to unsuccessful, or have had unintended results, can either be discontinued, or re-evaluated through design and implementation of research that may test potential alternative treatments. The sections below provide a summary of successful and unsuccessful progressive reclamation treatments.

5.1.1 *Successful Treatments*

The following treatments implemented during reclamation activities have been shown as those that lead to the most successful outcomes:

- Timely establishment of overstory vegetation (e.g., trees and shrubs composing of >25 % of total vegetation cover within 5-10 years) has been shown to reduce the establishment of, and over time outcompete, invasive and non-native species;
- Establishment of trees and shrubs has been the most successful when species are prescribed based on their adaptation to site-specific conditions; specifically, hot, dry conditions on south and west facing slopes or very wet conditions (riparian and wetlands);
- A minimum soil depth for successful establishment of tree and shrub seedlings has been identified as 25-30 cm with performance (survival and productivity) increasing up to depths of 65 cm;
- The use of tea bag fertilizers for planted tree and shrub seedlings has shown to increase the survival of some tree species (i.e., Douglas-fir and Lodgepole pine), but do not appear increase seedling productivity;
- Seeding of grasses and forb species at low application rates (e.g., 20-40 kg/ha), and utilizing mixes that include a diversity of native species, results in the establishment of ground cover that provides adequate erosion control, but does not appear to compete with tree and shrub seedlings or inhibit the natural establishment of native species (e.g., raspberry, elderberry, cottonwood, and willow);
- Direct placement of stripped soil is the most effective way to maintain soil nutrients, soil biota and the native plant seed bank. Natural establishment of native species from direct placement can often fully, or partially, negate the need for seeding to establish vegetation cover;
- Vegetation establishment has been shown to be more successful on reclamation areas where surface soil preparation has included:
    - surface roughening (i.e., ripping and mounding);
    - surface application and/or incorporation of coarse woody debris (CWD) (e.g., 20-40 m^3/ha), and

- Light application and incorporation of biosolids (e.g., 50-75 dT/ha).

- Semi-passive and passive water treatments (e.g., Annual Anaerobic Biological Reactor) have shown to be effective at improving water quality parameters by lowering the concentrations of trace metals and nutrients, especially sulphate, nitrate, selenium, and molybdenum.

5.1.2 *Unsuccessful Treatments*

The following treatments implemented during reclamation activities have been shown as those that lead to the least successful outcomes:

- Seeding at high application rates has been shown to develop vegetation cover that is competitive with tree and shrub seedlings and can prevent the natural dispersal of native seed from reaching the soil surface, potentially resulting in a creation of a successionally stagnant plant community;

- Delayed establishment of vegetation cover on reclaimed areas (i.e., one growing season or more) can increase the likelihood of invasive and non-native plant introduction to the site;

- Vegetation establishment is the least successful on reclaimed areas where no stockpiled soils are applied (e.g., planted or seeded directly into glacial till, tailings, or waste rock); and

- Heavy applications of biosolids or tailings (as soil amendments) to areas reclaimed with stockpiled soils, or use of these materials as growth mediums alone, can result in poor vegetation establishment due to potential toxic soil conditions (e.g., high ammonia or copper concentrations).

6 SUMMARY OF RECLAMATION RESEARCH

6.1 COMPLETED OR ONGOING

An overview of ongoing or completed reclamation research at MPMC is provided Table 6-1. Detailed summaries of each research project, including treatments applied, results and discussion and recommendations and provided in Sections 6.11, 6.12 and 6.13. Much of the completed or ongoing research has been as part of progressive reclamation activities (i.e., most progressive reclamation activities were treated as larger research projects). For locations of the research projects, refer to Figure 5-1.

Table 6-1 Summary of Reclamation Research Completed to Date.

Permit Condition	Permit Condition Status (Incomplete, Partially Completed or Completed)	Projects	Date of initiation	Description	Location	End Land Use	Informs progressive Reclamation
a	Incomplete	N/A	N/A	N/A	N/A	N/A	N/A
b	Partly Completed	See Sections 6.0, 7.0, 8.0					All ongoing and future research at the Facility is conducted to continuously improve reclamation strategies that aim to satisfy end land use objectives.
c	Partially Completed	Water Management Plan	2017	Strategies for water management at mine closure	Permitted Mine Area	**Structural Stage 7 (Old Growth Forest)** Commercial Forestry Recreation FN Use Wildlife Habitat (Winter Range – Ungulate, Birds, Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat	
		Water Management Plan	2020	Strategies for water management at mine closure	Permitted Mine Area		
		Bio-chemical Reactor	2016	Passive water treatment	NW Sump		
		Packed Bed Reactor	2019	Passive water treatment	NW Sump		
		Pit Lake Treatment	2017	Passive water treatment	Cariboo Pit NW Sump		
		Saturated Rock Fill	2020				
		Saturated Sand Filter	Not initiated	N/A	N/A		
		Anaerobic Biological Reactor	2009	Semi-passive water treatment	Toe of TSF		
		Constructed Wetlands Treatment System	2018	Passive water treatment	Not specified		
		Active Treatment	2020	Active water treatment with TMT	Within the Actiflo water treatment system		
d	Partially Completed	Metro Vancouver Research Parcels 1-6 and 7-12	2012	Soil amendment & revegetation research trials	NBD		
		South Triangle	2011				
		Phase 1 and Phase 2	2012				
		Parcel 1-10	2011				
		Beside Research	2012				
		Wrap Around Toe	2012				
		East RDS	1998-2012		East RDS		
e	Completed	Baseline Environmental Setting and Land Capacity	1995	Assessment of pre-mine conditions for soils, vegetation, wildlife, fish, aquatic resources and historic land uses	Mine site		
f	Incomplete	N/A	N/A	N/A	N/A		

Permit Condition	Permit Condition Status (Incomplete, Partially Completed or Completed)	Projects	Date of initiation	Description	Location	End Land Use	Informs progressive Reclamation
g	Partially Completed	Projects identified under requirement (c), (d), (i), (j), (k), (l), (m), (n), (o)	1998-2012	Includes water management strategies, revegetation strategies and metal uptake in vegetation, soil management including decompaction, TSF management, and fertilization effects	All areas of the mine.		
h	Partially Completed	Projects identified under requirement (c), (d), (i), (j), (k), (l), (m), (n), and (o).	1998-2012	Includes water management strategies, revegetation strategies and metal uptake in vegetation, soil management including decompaction, TSF management, and fertilization effects.	NBD, NEZ Dump, East RDS, Springer Cariboo Pit, Mill Site, TSF, and Polley Flats.		
i	Partially Completed	Metro Vancouver Research Parcels 1-6 and 7-12	2012	Soil Amendments	NBD		
		South Triangle	2011				
		Phase 1 and Phase 2	2012				
		Parcel 1-10	2011				
		Beside Research	2012				
		Wrap Around Toe	2012				
		East RDS	1998-2012		East RDS		
j	Incomplete	N/A	N/A	N/A	N/A	**Structural Stage 1 to 3 (Sparse-Shrub/Herb)** Recreation FN Cultural Use Wildlife Winter Range (Ungulate Focus) Wildlife Habitat (Birds, Small Mammals, Black Bear) Livestock Grazing	
k	Incomplete	N/A	N/A	N/A	N/A	**Structural Stage 7 (Old Growth Forest)** Commercial Forestry Recreation FN Use Wildlife Habitat (Winter Range – Ungulate,	
l	Partially Completed	Geomorphic Slope Design Guidance	2018	Guidance for grading and landforms to create a more natural restorative closure land surface	Permitted Mine Area		
m	Incomplete	N/A	N/A	N/A	N/A		

Permit Condition	Permit Condition Status (Incomplete, Partially Completed or Completed)	Projects	Date of initiation	Description	Location	End Land Use	Informs progressive Reclamation
n	Partially Completed	Metal Uptake in Vegetation 1989-2015	1989-2015	Determining metal uptake in vegetation.	Springer Cariboo Pit, Mill Site, TSF, East RDS Plots, NBD Parcels 1-10, NEZ Dump	Birds, Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat	
o	Partially Completed	Metro Vancouver Research Parcels 1-6 and 7-12	2012	Fertilizer was applied but the CEMP does not include a schedule for monitoring receiving waters pre- and post-fertilization.	NBD, East RDS, NEZ Dump, WHR, South Borrow Till		
		South Triangle	2011				
		Phase 1 and Phase 2	2012				
		East RDS	1998-2012				
		NEZ (2a, 2b, 2b2)	2010				
		WHR	unknown				
		South Borrow Till	unknown				

Acronyms and Abbreviations: NBD: North Bell Dump; RDS: Rock Disposal Site; NEZ: North East Zone; TSF: Tailings Storage Facility; RCP: Mine Reclamation and Closure Plan; WHR: Waste Haul Road; FN: First Nations.

6.1.1 *Soil Amendments & Revegetation: Research Requirements (i), (g), (h), (i), (o)*

6.1.1.1 NBD Soil Amendment Applications

The NBD Research includes the Metro Vancouver Research Parcels 1-6 and 7-12, the South Triangle, Phase 1 and Phase 2, Parcels 1-10, Beside Research, and Wrap Around Toe.

6.1.1.1.1 Metro Vancouver Research Parcels 1-6 and 7-12

Description: The purpose of the Metro Vancouver research trials at the NBD was to determine the effectiveness of utilizing biosolids as a soil amendment for reclaiming areas that need to be reforested. Additionally, the trial was designed to test different grass and forb seed mixtures to assess their ability to protect the site from erosion and invasive plant species while not competing with the establishment of tree and shrub seedlings. There were 12 test parcels divided into two groups, parcels 1-6 on the North side of the dump and 7-12 on the South side of the dump (McDougall, 2014). Table 6-2 provides the details of the trial treatments.

Soil testing was done on the biosolids due to concerns identified in previous trials (in the 1990s) that they would increase ammonia and ammonium rates. It was determined that while ammonia and ammonium rates were slightly higher than compared to soils without biosolids, the higher concentrations had a negligible effect on plant health (Onyejekwe, 2015).

Treatments:

Table 6-2. Trial Plot Prescriptions in the North Bell Dump.

Parcel	Soil Application[1]	Ground Cover[2]	Tree/Shrubs (stems per ha = sph)
1 and 7	Till	None	• Lodgepole Pine and Douglas-fir:7 0/30 at 1600 sph • Black cottonwood: 200 sph • Paper birch: 50 sph • Trembling aspen: 50 sph • Sitka alder: 200 sph • Saskatoon: 50 sph • Prickly rose: 50 sph • Scoulers willow: 50 sph
2 and 8	Till + Biosolids	Forb mixture • 35 g fireweed = 75 g/ha • 500 g lupine = 1 kg/ha • 52.9 g; Dryas drummondii = 113 g/ha • 2.3 kg mix of june grass, yarrow, pearly everlasting = 4.9 kg/ha	
3 and 9	Till + Biosolids	Fireweed (35 g) = 75 g/ha	
4 and 10	Till + Biosolids	none	
5 and 11	Till + Biosolids	Grass mixture @ 5 kg/ha	
6 and 12	Till + Biosolids	Grass mixture @10 kg/ha	

[1]Glacial till was applied to a depth of 20 cm; biosolids were applied at a rate of 110 dt/ha
[2]Grass mixture consisted of junegrass, tickle grass, mountain brome, native red fescue, Rocky Mountain fescue, blue wild rye, bluebunch wheatgrass, lupine, and fireweed. Forb mixture consisted of junegrass, white yarrow, pearly everlasting, lupine, fireweed, and yellow mountain avens

Results and Discussion: The most significant difference between the two parcel groups was that parcels 7-12 had less invasive plant species throughout. It was suspected that the higher amount of invasive plants observed in parcels 1-6, was due to the timing of seeding. Seeding has

usually been done in the fall and has had the greatest success, but due to heavy snowfall in the fall of 2013, seeding of parcels 1-6 was postponed until June of 2014. As a result, the invasive species in the stockpiles of glacial till may have had time to become well established before the native seed mixture was applied and began to germinate.

The results of both of these trials demonstrated the need for application of both soil and biosolids for successful establishment of grass, shrubs, and trees. The survival rate of trees and shrubs was relatively consistent across the parcels with the exception of the control parcels (1 and 7) which had no biosolids applied. The controls had only 2% ground cover and the shortest and least vigorous seedlings. Seeding with a mix of native grasses resulted in the highest percentage of cover (up to 90%) as compared to seeding with a forbs mixture or just fireweed (10-20% cover). Birch, saskatoon, and black huckleberry had the lowest survival rates on all sites. The limiting factors for growth on all sites were nutrient deficiency, drought, and harsh winters due to lack of cover. These factors are expected to decrease the vigour of the plants rather than cause widespread mortality. Of the forb's seeded, yarrow was the most established and vigorous. In parcels 7-12, some of the biosolids were not mixed in well and caused some minor damage to the tips of the foliage.

Recommendations: Future reclamation projects should include incorporations of both glacial till and biosolids to achieve the best results. Mixing of the two materials should be done thoroughly to avoid potential harmful effects to planted or seed vegetation from ammonia and ammonium concentrations in the biosolids. All sites should have continued monitoring.

Initiation Date: 2012

Most Recent Monitoring Date: 2015

Supportive Documents:

Title	Author	Year
2014 Biosolids Research Parcels – North Bell Dump Parcels 1-6	Gabriel Holmes	2014
2013/2014 Biosolids Research Parcels – North Bell Dump Parcels 7012	Metro Vancouver	2015
Mount Polley North Bell Dump Tree Trial – 2014 Progress Report	Metro Vancouver	2014
Mount Polley North Bell Dump Tree Trial Area 2 Site Assessment- June 2015	R. McDougall	2015
Mount Polley North Bell Dump Tree Trial	Cindy Onyejekwe	March 2015
Mount Polley North Bell Dump Tree Trial Design and Establishment Report	Ruth McDougall	August 2014

6.1.1.1.2 South Triangle

Description: The South Triangle consists of 1.3 hectares of land on the South end of the NBD. In 2012 this area was recontoured and a 30 cm layer of soil was applied.

Treatment: The area was hydroseeded with a native grass seed mixture at 35 kg/ha. In 2013, Sitka alder seedlings were planted at a rate of 800 stems per hectare (sph) and black cottonwood at 1000 sph. In 2014, lodgepole pine was planted at 1400 sph and Douglas-fir at 600 sph. Additionally, soopolallie seedlings were planted in 2014 in a 100-stem trial plot (RCP, Table 4-2).

Results and Discussion: There were some limiting growth factors in the first few years on this site, including nutrient deficient soils, drought, and high exposure to wind and sun on the slope. By the fall of 2014 very little ground cover had established and consisted mostly of scattered grasses. Of the shrubs planted, alder had established the best and was the most vigorous. Conifer survival was excellent but overall conifer performance was moderate. (GH, 2014).

Recommendations: It was recommended that the site be assessed again in 2015 to see how the tree seedlings survived their first winter.

Initiation Date: 2011

Most Recent Monitoring Date: 2014

Supportive Documents:

Title	Author	Year
Mine Closure Plan (RCP) Table 4-2	MPMC	2017
MPMC Survival Survey Summary	Gabriel Holmes	September 2014

6.1.1.1.3 Phase 1 and Phase 2

Description: In 2012 a mix of biosolids and overburden was applied to three one-hectare areas around NBD. The objective of this work was to evaluate the use of biosolids as an amendment to soil for use in reclamation. The biosolids: overburden mix ratio was 1:3. The purpose of the mixture was to ensure that the resulting soils met the standards of the Organic Matter Recycling Regulation (OMRR). The Regulation monitors the intake of contaminated soil, toxicity to soil invertebrates and plants, livestock ingesting soil fodder, and major microbial functional impairment (Sylvis, 2012).

Treatment: Phase 1, established in 2012, covered a total area of 2.21 ha. Glacial till was applied to a depth of 20 cm and biosolids were applied at a rate of 138 dt/ha. The area was then hand seeded with a mixture of native grasses and forbs at a rate of 35 kg/ha. Following seeding, the area was planted with black cottonwood, paper birch, trembling aspen, Sitka alder, saskatoon, prickly rose and Scoulers willow. Two tree species, lodgepole pine and Douglas-fir, were also planted at a planting density of 1190 sph and 510 sph, respectively (RCP, Table 4-2).

Phase 2 was also established in 2012. It covered a total area of 2.87 ha. Glacial till was applied to a depth of 20 cm and biosolids were applied at a rate of 135 dt/ha. The area was then hand seeded with a mixture of native grasses and lupine at 35 kg/ha. Then it was planted with black cottonwood, paper birch, trembling aspen, Sitka alder, saskatoon, prickly rose and Scoulers willow. Two tree species, lodgepole pine and Douglas-fir, were also planted at a density of 1190 sph and 510 sph respectively (RCP, Table 4-2).

Both Phase 1 and Phase 2 experienced high conifer seedling mortality shortly after planting due to drought. Drought conditions were found to be persistent as a result of high grass competition on relatively shallow soils resulting in low moisture retention capability.

Recommendations: Addition planting of early successional shrub and trees seedlings should be completed at both of these sites in the future.

Supportive Documents:

Title	Author	Year
Mine Closure Plan (RCP) Table 4-2	MPMC	2017
Mount Polley 2012 Biosolids Reclamation Program	Sylvis	June 2012

6.1.1.1.4 Parcels 1-10

Description: Parcels 1-10 were established in 2011. They covered approximately 11 ha with soil at a depth of 20 cm, biosolids at a rate of 122 dry tons/ha and some CWD.

Treatment: The parcels were hydroseeded with a mixture of wood fibre mulch and native grasses at 30kg/ha with the exception of parcel 10 which was hand seeded at 35 kg/ha. The parcels were planted with a mix of shrubs, deciduous trees and coniferous trees (Table 6-3). The shrubs and deciduous trees were planted in 2013 and the conifers in 2014.

Table 6-3. Deciduous and Coniferous Seedlings Planted in Parcels 1-10 in the North Bell Dump in 2013 and 2014, respectively.

Seedling Species	Seeding per Hectare
Black cottonwood	60
Paper birch	34
Trembling aspen	34
Sitka alder	172
Saskatoon	34
Prickly rose	34
Scoulers willow	79
Soopolallie	100 stem trial plot
Lodgepole pine	1075
Douglas-fir	451
Western red cedar	54
Hybrid spruce	54

In 2013 survival rates were identified as poor for shrub and deciduous species and replanting was done in 2014.

Results and Discussion: Not available

Recommendations: Consider planting additional early successional shrub and tree seedlings in the future.

Initiation Date: 2011

Most Recent Monitoring Date: 2014

Supportive Documents:

Title	Author	Year
Mine Closure Plan (RCP) Table 4-2	MPMC	2017

6.1.1.1.5 Beside Research

Description: This is a 2 ha area located next to Metro Vancouver's research trial plots 1-7.

Treatments: In 2012, direct placement of stripped soil materials was applied to the surface at a thickness of 20 cm, with some CWD mixed throughout it. The area was left to monitor for natural growth from the directly placed soils considering the potential for an intact residual natural seed bank.

Results and Discussion: Not Available

Recommendations: A seeding application of native grasses and forb's should be added if needed. Consider planting additional early successional shrub and tree seedlings in the future.

Initiation Date: 2012

Most Recent Monitoring Date: 2013

Supportive Documents:

Title	Author	Year
Mine Closure Plan (RCP) Table 4-2	MPMC	2017

6.1.1.1.6 Wrap Around Toe

Description: This is a 1.8 ha area at the north end of the NBD where the disturbed land meets with the naturally forested land.

Treatments: In 2012 the area was recontoured and glacial till was applied to the surface at 6 cm deep. The area was hand seeded with a mix of native grasses (no information on the contents of the mixture) at 15 kg/ha (RCP, Table 4-2)

Results and Discussion: Not Available

Recommendations: Monitor the natural establishment of vegetation.

Initiation Date: 2012

Most Recent Monitoring Date: 2013

Supportive Documents:

Title	Author	Year
Mine Closure Plan (RCP) Table 4-2	MPMC	2017

North Bell Dump Wrap Around Toe	Gabriel Holmes	2013

6.1.1.2 East RDS Tree Plots est. 1998, 1999 & 2000

Description: In 1998, a reclamation research project was initiated for testing the methods, materials and protocols for achieving end-land-use objectives for rock disposal sites. Additional test plots were added in 1999 and 2000. Test plots were established to evaluate the following variables:

- Depth of topsoil required to establish a suitable growth medium;
- Essential ecosystem components to re-establish a forested ecosystem;
- Requirements, if any, of soil amendments;
- Suitability of tailing as a growth medium;
- Suitability of recolonization of disturbed areas by native species;
- Metal uptake by vegetation; and
- Suitability of tree species for reclamation objectives.

Treatments: In April of 1998, nine test plots (8 treatments and 1 control), approximately 195 m^2, were established that had variable soil treatments (Table 6-5; Test Plots A-Ia). Each block was separated from adjacent blocks by 3 m of non-treated area. Monitoring of planted seedlings was conducted in each test plot in the fall of 1998 and included observations of plant vigor, total height, leader height, stem diameter and mortality. Protective tubing (Vexar tubing) was installed around planted seedlings in the trials to prevent them from being browsed.

In 1999, the reclamation research program was expanded from the 1998 study to include five additional plots (Table 6-5; Test Plots Ib-M). These plots were prepared (soil ripped, topsoil placed, seedlings planted) in May and June of 1999. Each new block was separated from adjacent blocks by 3 m of non-treated area. In June and July, protective tubing was removed from the 1998 seedlings, biosolids were broadcasted over the 1998 plots, and the 1999 plots were grass seeded. In the fall of 1999, all plots were monitored for tree growth and survival.

In 2000, 13 additional plots were added to the reclamation research program (Table 6-4; Test Plots N-Z). These additional plots were established northeast (12 plots) and adjacent to (1 plot) the 1998 plots. Contouring of the additional plots and topsoil and biosolid placement was completed in May and June of 2000. Trees were planted and the plots were seeded (hydroseeded or dry seeded) in June and July of 2000. In the fall of 2000 all plots (1998, 1999 & 2000) were monitored for tree growth and survival including total height, leader height, stem diameter, plant vigour and mortality.

Table 6-4. Test Plots Established in 1998 (A-Ia), 1999 (Ib-M), and 2000 (N-Z) in the East Rock Disposal Site.

Test Plot	Soil Treatment	Year Planted	Notes
A	Control	1998	
B	15 cm of soil	1998	
C	15 cm of soil and 1 RTI tea bag/tree	1998	
D	15 cm soil and 75 dT/ha biosolids	1998	
E	15 cm soil and 150 dT/ha biosolids	1998	
F	25 cm soil	1998	
G	15 cm soil and native grasses	1998	Custom Seed Mix (1 kg/block)
H	40 cm soil	1998	
Ia	65 cm soil	1998	
Ib	65 cm soil and domestic grasses	1999	
J	15 cm soil and domestic grasses	1999	
K	25 cm soil and domestic grasses	1999	
L	40 cm soil and domestic grasses	1999	
M	20 cm soil, 20 cm tailings, 75 T/ha biosolids	1999	
N	30 cm soil, 50 dT/ha biosolids, domestic grass seed (20 kg/ha)	2000	
O	15 cm soil, 50 dT/ha biosolids, domestic grass seed (20 kg/ha)	2000	
P	No soil, 50 dT/ha biosolids, domestic grass seed (20 kg/ha)	2000	
Q	No soil, 50 dT/ha biosolids, hydroseeded with domestic grass (20 kg/ha)	2000	
R	15 cm soil, 50 dT/ha biosolids, hydroseeded with domestic grass (20 kg/ha)	2000	
S	30 cm soil, 50 dT/ha biosolids, hydroseeded with domestic grass	2000	
T	30 cm soil, hydroseeded domestic grass (20 kg/ha)	2000	
U	15 cm soil, hydroseeded domestic grass (20 kg/ha)	2000	
V	No soil, hydroseeded domestic grass (20 kg/ha)	2000	
W	No soil, seeded domestic grass	2000	
X	15 cm soil, seeded domestic grass	2000	
Y	30 cm soil, seeded domestic grass	2000	
Z	20 cm soil, 20 cm dump fines, seeded domestic grass	2000	

Note: All plots planted with 2000 st/ha, with a species target mixture, were 70% Lodgepole pine and 30% Douglas-fir.

A report from 2014 reviewed tree growth and survival, in plots established in 1998, 1999 and 2000, including productivity and mortality rates as they relate to soil depth, soil amelioration, and revegetation.

In 2015 rooting depth, root density of a fir and a pine, and assessments of the surface soil layer were assessed on 16 of the tree trial plots.

Results and Discussion: Tree monitoring and measurements were conducted in each test plot in the fall of 1998 which included observations of seedling vigor, total height, leader height, stem diameter and mortality. Results suggest 1) mortality was high within plots that lacked soil additions, 2) soil depths did not have an observable difference on growth variables, and 3) seedling growth was higher in plots with increased soil depth and fertilization.

In the fall of 1999, the plots were monitored for tree growth and survival. Results indicate that a positive response in tree growth (i.e., tree height, leader growth, caliper) was seen with fertilization and increasing soil depth in the 1998 plots. It is suggested that 15 cm of soil is sufficient to establish tree seedlings. Tree mortality was high in areas with no soil additions (control areas). No differentiation was observed in tree growth between 40-60 cm of soil depth or with biosolids treatments. Results from the 1999 plots suggest that tree growth increases with increased soil depth and with a mixture of soil, tailings, and biosolids.

In the fall of 2000 all plots (1998, 1999 & 2000) were monitored for tree growth and survival including seedling vigor, total height, leader height, stem diameter and mortality. Results from the 1998 plots indicates that trees have high morality (63-75%) and poor growth when planted directly into waste rock with no soil amendments; similar responses were found with Douglas-fir and Lodgepole pine. Improved growth, survival and vigour was observed with increased soil depth up to 40 cm; soil amendments alone to 25 cm in depth did not meet growth expectations. There was an indication that biosolid amendments can significantly improve tree growth but no differences were observed between 75 or 150 dT/ha. Although a positive growth response was seen initially with tea bag fertilization, plots with tea bag amendments did not show significant differences from leader height in other plots without tea bag amendments.

Results from data collected in 2000, from the 1999 plots, indicated no significant difference in growth between the plots; however, general trends show that increased soil depth up to 40 cm improves tree vigour. Plot M (20 cm soil, 20 cm tailing, 75 T/ha biosolids) was removed from the study due to the high mortality of tree seedlings as a result of heavy grass competition.

Only mortality and seedling vigour was recorded for tree seedlings planted in 2000. Mortality was high for seedlings planted with no soil amendments. Although survival was generally better in plots with soil amendments added, high mortality was observed in plots with only biosolid amendments, which literature suggests may be attributed to ammonia toxicity.

A report from 2014 reviews monitoring (2001, 2006, 2012) of tree growth and survival, in plots established in 1998, 1999 and 2000, including productivity and mortality rates as they relate to soil depth, soil amelioration, and revegetation.

Soil Depth: Results show that a minimum amount of soil, 15 cm, on the rock disposal sites is required for tree productivity and survival; biosolids or hydroseeding alone is not adequate for tree growth. Although significant differences were found between shallow (15 to 30 cm) and

deeper (40-65 cm) soils, significant differences were not found within these groupings. Seed mixtures did not influence tree growth.

Soil Amelioration: Results from additions of soil amendments demonstrate that tea bags did not have a lasting effect on any growth parameter but did improve initial tree survival for both Douglas-fir and Lodgepole pine. Additions of biosolids had inconsistent results throughout the 1998, 1999 and 2000 trials with significant growth increases seen in the 1998/1999 trials, no significant differences seen between 75 and 150 dT/ha in the 1998/1999 trials, negative effects of biosolid treatments on the 2000 trials, and increased mortality in both Douglas-fir and Lodgepole pine with 150 dT/ha.

Revegetation: Revegetation was completed with a custom Facility blend (20-40 kg/ha) dry seeded or hydroseeded, and a native-based blend (40 kg/ha) that was dry seeded. Excluding plot M, graminoids and forb's did not result in growth competition for seedlings. It is suggested to use a seed mix with greater proportions of native seed to promote biodiversity and long-term soil productivity.

The 2015 report overviewed results of rooting depth, root abundance and size, and composition and depth of surface materials.

Rooting Depth: Rooting depth was observed in waste rock, overburden, biosolids, tailings, and along slopes. Results suggest that root growth is poor in waste rock (i.e., small and poorly developed) but did extend up to 30 cm in depth. Additions of overburden, biosolids and tailings appeared to improve root growth. Results suggest that a minimum rooting depth of 25-30 cm is required to prevent roots extending into waste rock, positive root growth seen with additions of biosolids combined with 15 cm of overburden, tailings was an amendable growth material, and that slope did not have an effect on rooting depth.

Root Abundance and Size: No significant differences were identified in root abundance or size with overburden depth, slope, sampling depth, or between tree species.

Composition and Depth of Surface Materials: Little to no surface materials (e.g., organic litter, bryophytes, lichen) was not present in control plots of waste rock, as expected. Plots that were amended with overburden showed some surface development, which consisted of ≤1 cm of needles and moss, commonly observed on the forest floor of early successional forest stands. Surface materials on biosolid amended soils consisted of 2-3 cm of organic layer and a 3-10 cm of organic layer on plots where biosolids were applied to the surface (not mixed in).

Recommendations: The 2014 report recommends that future reclamation work should use a minimum of 40 cm of soil with light additions of biosolids (50-75 dT/ha) and seed (5-10 kg/ha). The seed applied should consist of grasses and forbs that are low-growing and non-competing. Application of CWD at a rate of 20-40 m^3/ha is also recommended. This report also outlines future study recommendations, which are included in Section 6.2.

The 2015 report recommends that although trees should not be planted directly onto waste rock, waste rock does not appear to be a physical or chemical barrier to root growth. Results suggest

that biosolids, overburden and tailings can be used as soil amendments and should be applied at a minimum of 15-30 cm in depth.

Initiation Date: 1998

Most Recent Monitoring Date: 2014

Supporting Documents:

Title	Author	Year
Mount Polley Mining Corporation Annual Reclamation Research Report 1998	Inland Timber Management Ltd.	1999
Mount Polley Mining Corporation Annual Reclamation Research Report 1999	Inland Timber Management Ltd.	2000
Mount Polley Mining Corporation Annual Reclamation Research Report 2000	Inland Timber Management Ltd.	2001
2007.Meister.VegMetalSurvey	Forestmeister Services	2007
2012 Assessment Results (excel document)	Unknown	2012
RCP Appendix K – Mount Polley Mining Corporation Tree Plots Research Report	Forestmeister Services	2012
RCP Appendix L – Investigation of Conifer Root Development Mount Polley 1998-2000 Waste Rock Conifer Trials	Ruth McDougall (Agrologist)	March 2015

6.1.1.3 NEZ Dump Seed Plot Success Analysis 2010-2015

Description: The NEZ Dump is an 80 ha area, adjacent to, and west of, Polley Lake. In September 2010, revegetation reclamation research was initiated on a 5 ha section of the NEZ dump within the eastern aspect to determine seed plot success under various soil treatments and seeding and fertilization rates.

Treatments: Three treatment units were established, 2a, 2b1 and 2b2, to test for re-vegetation success under various soil, fertilization, seeding and planting treatments (Table 6-5). The soil treatments consisted of an application of 0.4 m of glacial till, followed by application of biosolids (application rate not identified) onto 2b1 and 2b2. Each treatment unit was seeded with a native grass and forb mix which included eight grasses (mountain brome, native red fescue, rocky mountain fescue, wheatgrass-blue bunch, blue wild rye, June grass and tickle grass) and two forb's (fireweed and lupine). In 2012, all treatment areas were planted with trees and shrubs including Lodgepole pine, Douglas-fir, paper birch, trembling aspen, black cottonwood, Sitka alder, saskatoon, wood rose, and willow. Additionally, there were nine small hand seeded plots established in 2010 on each treatment unit to determine the success of each species.

Table 6-5. North East Zone Dump Reclamation Treatment Parameters in 2010 and 2012.

Treatment Unit	Area (Ha)	Seed Mixture	Seed Rate (kg/ha)	Fertilizer (kg/ha)	Biosolid Applied	Species Planted
2a	2.5	Native	45	283	No	Lodgepole pine, Douglas-fir, paper
2b1	1.25	Native	34	0 (2010)	Yes	

				100 (2012)		birch, trembling aspen, black cottonwood, Sitka alder, Saskatoon, wood rose, willow (in 2012)
2b2	1.25	Native	34	71	Yes	

Seed plot success was monitored in 2011, 2012 and 2015. All areas were irrigated in 2013 and 2014.

Results and Discussion: Results from the 2015 monitoring determined that ground cover (i.e., grass, moss, herbs) in all units was high (>90%) except in areas that did not receive adequate glacial till (< 0.4 m). Plant growth was consistently greater at the bottom of the hill and within contoured and ridged areas on all sites. Ground cover with biosolid applications had denser, taller and more vigorous growth. Areas with biosolids and greater soil depths had low tree and shrub survival but had greater stem height and vigor. Trees with biosolid treatment in shallow soil had higher survival rates and lower vigor. Areas with no biosolids resulted in lower than average growth rates compared to areas with biosolids applications.

Most deciduous stems planted in 2012 (i.e., birch, alder and Saskatoon), did not survive to 2015. The planted willow, cottonwood, and prickly rose, showed greatest success in all the units. Lodgepole pine had higher survival rates than Douglas-fir. A review of the nine small treatment areas, in 2012, showed that june grass and tickle grass had the smallest percent cover. The tall grasses, like rocky mountain fescue and bluebunch wheatgrass, had the highest percent cover. Raspberry, elderberry and black gooseberry naturally established on all three units. Fireweed successfully covered about 5% of all three units and lupine had reduced to 1% coverage.

Reclamation research trials at the NEZ determined that soil application at depths of ≥ 0.4 m results in the greatest revegetation success. It was suggested that the application of 71 kg/ha of fertilizer is ideal, that allows adequate nutrients for tree growth while subsequently preventing growth of a dense ground cover that can reduce seedling survival. Results suggest that planting success can be achieved with Lodgepole pine, black cottonwood, willow and prickly rose; however, other species should also be planted to promote biodiversity. Cottonwood is actively establishing on the treatment units as a result of planting seedlings and natural establishment. Cottonwood appears to be sensitive to heavy grass cover and can withstand shallow (< 40 cm) ground cover.

Recommendations: Routine assessments of ground cover and survivorship of tree, shrub and ground vegetation should be conducted in all three units, ideally in the summer for best identification conditions. To reduce heavy grass cover that competes with seedling establishment, new reclamation sites should have low application rates of fertilizer and biosolids and reduced grass/forb seeding rates. Hydroseeding is recommended for seed application as it may provide result in a more homogenous establishment of grass/forb cover and provide erosion control and suppression of invasive species; however, hand-seeding will suffice when hydroseeding is not practical. It is recommended to apply CWD and create hummocks and depressions to produce microsite habitats that provide shade and moisture, which may promote natural establishment of native tree and shrubs.

Initiation Date: 2010

Most Recent Monitoring Date: 2015

Supporting Documents:

Title	Author	Year
NEZ Dump Reclamation Plots – Update 2011	MPMC	2011
NEZ Dump Reclamation Assessment –Year 2 (2012)	MPMC	2012
NEZ Dump Reclamation Assessment 2015 (NEZ Dump Reclamation Summary – 2015)	MPMC	2015

6.1.2 *Soil Stability: East RDS: Research Requirements (i), (g), (h), (i), (o)*

Description: MPMC retained Golder Associates Ltd. (Golder) in 2018 to conduct soil cover assessments to aid in the closure design for the RCP. The main objective of the work was to assess whether cover systems, constructed from on-site materials, could be expected to reduce deep percolation and water infiltration. Deep percolation is defined as water that infiltrates waste rock below the soil cover and fine waste rock (the active zone). Soil cover assessments were completed through modelling soil-atmospheric conditions using climate data, from the on-site weather station, and specific characteristics of cover materials, gathered through borrow source investigation and laboratory testing. This model predicted the water balance potential for the cover materials based on laboratory-measured hydraulic properties and site-specific weather data. Results of modelling suggest that cover over waste rock could reduce deep percolation of precipitation from 30% to 5-15%, depending on cover thickness. The results also suggested that tailings could be used for cover.

In 2019, Golder designed a soil cover test plot to assess the effectiveness of various soil covers in reducing deep percolation into waste rock. These test plots will provide data to support the cover model and site-wide mine water balance model (MWBM) that show additions of soil cover can reduce infiltration of atmospheric water and mass loading of constituents (accumulation of mobile metals in water; Golder 2018).

Treatments: Four test plots (TP1-TP4) with variable thickness of glacial till, fine waste rock, waste rock and tailings will be created as determined from the cover model (Table 6-6). Potential locations for test plots include the southern portion of the East RDS (Location 1; preferred site), a low grade ore stockpile east of the Leach Pad (Location 2) and the southwest portion of the NBD (Location 3).

Table 6-6. Descriptions of Four Test Plots to be established in Location 1, 2 or 3.

Test Plot	Material	Layer Thickness (m)	Estimated depth of Deep Percolation (Golder 2018b)	Comments
TP1	Glacial Till	0.1	200 mm/year	Control Plot
	Fine Waste Rock	0.5		
	Waste Rock	2.4		
TP2	Glacial Till	0.5	75 mm/year	

	Fine Waste Rock	0.5		Direct comparison to TP3 with a 1 m thick cover.
	Waste Rock	2.0		
TP3	Glacial Till	1.0	50 mm/year	Direct comparison to TP2 with a 0.5 m thick cover.
	Fine Waste Rock	0.5		
	Waste Rock	1.5		
TP4	Glacial Till	0.3	40 mm/year	Direct comparison to TP3 with a 1 m thick cover.
	Tailings	0.7		
	Fine Waste Rock	0.5		
	Waste Rock	1.5		

All test plots should be seeded with the Facility native grass or seed mix to prevent invasive species infestation, but at application rates that do not create competitive vegetation cover for planted trees and shrubs. No fertilizers or biosolids should be used on the plots and woody species will be removed to allow for more accurate comparisons of ground percolation.

Data collected from each test plot will include depth of deep percolation, surface runoff, soil water content, soil suction, and soil temperatures. Climate conditions including air temperature, precipitation (snow and rain), relative humidity, solar radiation, wind speed and direction will be recorded from the on-site weather station. A field camera installed near the test plots will provide real-time images of test plot conditions (i.e., run-off events, snow accumulation, snow melt).

Models indicated that it will take roughly one year of exposure for the soil cover and waste rock to be conditioned to the site. It is expected that deep percolation will be lower in the first year of monitoring and that vegetation will take a few years to establish cover.

Monitoring of the test plots was designed to be completed over a 5 year period; however, instrumental equipment used in the study could withstand over 10 years of data collection. Results of the study should provide quantifiable evidence to support the cover and water balance models. Supporting data should also facilitate provisioning of a vegetation growth medium, reducing infiltration into waste rock storage facilities, improve quality of surface run-off, and limit the mass loading of constituents to passive or semi-passive water treatment facilities.

Results and Discussion: N/A, test plots have not yet been established.

Recommendations: N/A, test plots have not yet been established.

Initiation Date: 2018

Most Recent Monitoring Date: N/A, test plots have not yet been established.

Supporting Documents:

Title	Author	Year
1894924-007-TM-Rev0-41292-Cover_Modelling_13JUL_18.pdf	Golder Associates Ltd.	2018
1894924-068-R-Rev0-41235-Geomorph Guidance_11MAR_19.pdf	Golder Associates Ltd.	2019 (March)

1894924-043-R-Rev0-41272-Soil Test Plot Design_03JUN_19.pfd	Golder Associates Ltd.	2019 (June)

6.1.3 *Metal Uptake in Vegetation 1989-2015: Research Requirements (n)*

Locations: Springer Cariboo Pit, Mill Site, TSF, East RDS Plots, NBD Parcels 1-10, NEZ Dump

Project Names: Mount Polley Mining Corporation Vegetation Metal Survey (2007), Summary: Vegetation Metal Uptake Monitoring at Mount Polley (2011), 2012 MPMC Vegetation Metal Uptake Monitoring, Vegetation Metal Uptake Monitoring Plan (2015), Development of a Molybdenum Screening Value for the Impact Assessment (2016).

Description: Reclamation research at MPMC has included several interrelated studies regarding metal uptake in soils and vegetation to determine if metal concentrations were within acceptable limits for human health, wildlife and livestock health, and the environment. Baseline data was collected in 1989, 1995 and 2006 in the Central and West Pits (now known as the Cariboo and Springer Pits, the Mill Site, and the TSF); additional plots were added in 2006 for increased baseline data set (Table 6-7). In addition to baseline data collection, the research program has monitored metal uptake in vegetation, metal concentrations in soil stockpiles as well as trace element monitoring in soils amended with biosolids. Vegetation metal uptake monitoring was completed within reclaimed areas in 1996, 2007, 2012 and 2014 on various types of vegetation (i.e., grass, legumes, and shrub species potentially foraged by cattle and wildlife).

Table 6-7. Overview of Baseline and Monitoring Data for Metal Uptake in Vegetation.

	Year Established	**Area**	**Site ID**	**Species**
Baseline	1989, 1995, 1996, 2006	Springer Cariboo Pit	n/a	Wildlife forage species & important species for ungulates
		Mill Site	n/a	
		TSF	n/a	
	1998/1999	East RDS Plots	A-M	Red Clover
Monitoring	2007	East RDS Research Plots	A-M	Willow (deciduous foliage); Red or alsike clover (forb); timothy (grass)
	2012	NBD Parcels 1-10	NBD Plot 1	
			NBD Plot 2	
	2014	NEZ Dump	2a	
			2b1	
			2b2	

Abbreviations and Acronyms: RDS: Rock Disposal Site; NBD: North Bell Dump; NEZ: North East Zone.

Acceptable limits of heavy metals in vegetation have not yet been established for ungulate and herbivore consumption, therefore, a risk assessment approach was used to evaluate the potential risk of heavy metals to browsing animals. However, a critical threshold, or safety threshold, for the ratio of copper (Cu) and Molybdenum (Mo) (Cu:Mo) has been established as 2:1; samples with ratios below 2:1 are expected to cause Cu deficiencies in livestock (Miltmore and Mason 1971).

Treatments: In 1989, vegetation samples were collected and analyzed to establish a baseline level of metals within vegetation. Sites were selected from areas where mineral outcrops existed or were shallow and in areas immediately upslope of mineral outcrops. These locations included the "West" Springer Pit (site 1 & site 2), the "Central" Bell Pit (site 3), the NEZ Dump (site 4) and west of the Boundary Zone (site 5). Species and locations selected for sampling are included in Table 6-8. Metals analyzed included Arsenic (As), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Silver (Ag) and Zinc (Zn).

Table 6-8. Species Sampled in 1989 within Sites 1-5 for Metal Analysis.

Species	**Latin Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**
Sitka Alder	*Alnus crisp*	X	X	X	X	X
Willow	*Salix scouleriana*	X				X
Mountain Bilberry	*Vaccinium membranaceum*	X		X		
Sitka Willow	*Salix sitchensis*		X		X	
Wheelers Blue Grass	*Pao nervosa*		X			X
Alsike Clover	*Trifolium hybridum*		X		X	
Western Red Cedar	*Thuja plicata*			X	X	
Pussy Willow	*Salix* spp.			X		
Timothy	*Phleum prentense*				X	
Northern Reed Grass	*Calamagrostis inexpansa*					X
Red Top	*Agrostis stolonifera*					X

In 1995, vegetation samples were collected and analyzed to establish a baseline level of metals in vegetation likely to receive metal inputs from waste rock dumps, tailings areas, or the mill site (Table 6-9). Sites selected for analysis included tailings north (the northern perimeter of the tailings area), mill south (southern perimeter of the mill site), and central pit (the eastern perimeter of the central pit) (Table 6-9). Metals analyzed included Arsenic (As), Copper (Cu), Lead (Pb), Molybdenum (Mo), Selenium (Se), and Zinc (Zn).

Table 6-9. Species Sampled in 1995 within Three Sites (Tailings North, Mill South, and Central Pit) for Metal Analysis.

Species	**Latin Name**	**Tailings North**	**Mill South**	**Central Pit**
Common horse-tail	*Equisetum arvense*	X		
Prickly Rose	*Rosa acicularis*	X	X	
Subalpine Fir	*Abies lasiocarpa*	X	X	X
Pumpelly Brome	*Bromus* spp.	X		
Witches Hair	*Alectoria sarmentosa*	X	X	
Red Clover	*Trifolium pratense*	X		X
Willow spps.	*Salix* spp.	X		X
Scoulers Willow	*Salix scouleriana*	X	X	
Timothy	*Phleum pratense*	X		

Species	Latin Name	Tailings North	Mill South	Central Pit
Huckleberry	*Vaccinium* spp.		X	X
Baldhip Rose	*Rosa gymnocarpa*		X	
Falsebox	*Paxistima myrsinites*		X	X
Saskatoon	*Amelanchier alnifolia*		X	X
Douglas Maple	*Acer glabrum*		X	
Mountain Ash	*Sorbus subg. sorbus*		X	X
Red raspberry	*Rubus idaeus*			X

In 1996, vegetation samples were collected to determine metal uptake within vegetation. Five sites were selected for sampling including the tailings area, mill area, southeast dump, open pit, and the north dump (access was blocked in the north dump which prevented sampling this year). Sites selected for sampling all had adjacent areas which will remain vegetated throughout the Facility life. Species selected for sampling are included in Table 6-10. Metals analyzed included Arsenic (As), Copper (Cu), Lead (Pb), Molybdenum (Mo), Selenium (Se), and Zinc (Zn).

Table 6-10. Species Sampled in 1996 within Four Sites (Tailings Area, Mill Area, Southeast Dump, Open Pit) for Metal Analysis.

Species	Latin Name	Tailings Area	Mill Area	Southeast Dump	Open Pit
Alsike Clover	*Trifolium hybridum*		X		
Birch-leaved Spiraea	*Spiraea betulifolia*	X		X	
Black Cottonwood	*Populus trichocarpa*	X	X	X	
Black Gooseberry	*Ribes lacustre*	X	X	X	
Black Huckleberry	*Gaylussacia baccata*	X	X	X	
Black Twinberry	*Lonicera involucrata*	X	X		
Douglas Maple	Acer glabrum		X	X	X
Falsebox	*Pazistima myrsinites*	X	X	X	X
Fireweed	*Chamaenerion angustifolium*	X	X	X	X
Fringed Aster	*Symphyotrichum ciliolatum*	X			X
Paper Birch	*Betula papyrifera*	X	X	X	
Prickly Rose	*Rosa acicularis*	X	X	X	
Red Elderberry	*Sambucus racemosa*	X	X		X
Red Osier Dogwood	*Cornus sericea*	X			
Rye Grass	*Lolium* spps.		X		
Saskatoon Berry	*Amelanchier alnifolia*	X	X		X
Sitka Alder	*Alnus rubra*	X		X	X
Subalpine Fir	*Abies lasiocarpa*	X	X		X

Species	Latin Name	Tailings Area	Mill Area	Southeast Dump	Open Pit
Thimbleberry	*Rubus parviflorus*		X	X	X
Trembling Aspen	*Populus tremuloides*	X		X	X
Western Mountain Ash	*Sorbus scopulina*	X	X	X	X
Willow	*Salix* spps.	X	X	X	X

In 2006, a study was conducted to determine metal uptake in red clover on plots established in 1998 and 1999. Plots established in 1998/1999 were part of reclamation research that sought to determine the methods, materials and protocol for achieving land use objectives for wildlife and forestry. Research plots established in 1998/1999 in the East RDS, had a total of 36 plots with 12 treatments (e.g., additions of biosolids or tailings to soil). In 2006, red clover was the only vascular vegetation established on the plots, and therefore was the only vegetation sampled for metal analysis. Red clover samples were analyzed for 26 elements and compared, where possible, to the 1989 and 1995 baseline metal analysis. The 26 elements analyzed in 2006 include Aluminum (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Bismuth (Bi), Cadmium (Cd), Calcium (Ca), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Lithium (Li), Magnesium (Mg), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Selenium (Se), Strontium (Sr), Thallium (Tl), Tin (Sn), Uranium (U), Vanadium (V), Zinc (Zn), and Cu:Mo ratios. Cu:Mo ratios are ideally 2:1.

In 2012, vegetation samples were collected to determine metal uptake within vegetation, using a repeatable methodology (to ensure replication in future assessments) (Table 6-11). Three sites were selected for sampling including the NEZ Dump (est. in 2010 as a reclamation site), the NBD (est. in 2011 as a reclamation site), the East RDS tree research plots, and several new sample locations representative of unaffected forest sites.

Table 6-11. Species Sampled in 2012 for Metal Analysis.

Species	Latin Name
Mountain Brome	*Bromus carinatus*
Native Red Fescue	*Festuca rubra*
Rocky Mountain Fescue	*Festuca saximontana*
Bluebunch Wheatgrass	*Pseudoroegneria spicata*
Blue Wildrye	*Elymus glaucus*
June Grass	*Koeleria macrantha*
Tickle Grass	Agrostis scabra
Fireweed	*Chamaenerion angustifolium*
Lupine	*Lupinus* spps.

Metals analyzed included Aluminum (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Bi), Boron (B), Cadmium (Cd), Calcium (Ca), Cesium (Cs), Chromium (Cr), Cobalt (Co), Copper (Cu), Gallium (Ga), Iron (Fe), Lead (Pb), Lithium (Li), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Phosphorus (P), Potassium (K), Rhenium (Re), Rubidium (Rb), Selenium (Se), Sodium (Na), Strontium (Sr), Tellurium (Te), Thallium (Tl), Thorium (Th), Tin (Sn), Titanium (Ti), Uranium (U), Vanadium (V), Yttrium (Y), Zinc (Zn), and Zirconium (Zr).

In 2014, composite vegetation samples were collected from four of the baseline sites, two new control sites (north and southeast of the Facility) and within the East RDS research tree plots.

Metals analyzed included Aluminum (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Bi), Bismuth (Bi), Boron (B), Cadmium (Cd), Calcium (Ca), Cesium (Cs), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Lithium (Li), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Phosphorus (P), Potassium (K), Rubidium (Rb), Selenium (Se), Sodium (Na), Strontium (Sr), Tellurium (Te), Thallium (Tl), Tin (Sn), Uranium (U), Vanadium (V), Zinc (Zn), and Zirconium (Zr).

Results & Discussion: The baseline assessment in 1989 determined that the Cu:Mo ratio in clover and bluegrass was elevated above the 2:1 safety threshold in Sites 1 & 2.

Results of the 1995 assessment suggest that the Cu:Mo ratio in pumpbelly brome, red clover and timothy (from Tailings North) were elevated above the 2:1 safety threshold.

Results from the 1996 assessment show that metal levels were elevated from the 1995 baseline vegetation results. Several species contained high molybdenum concentrations with elevated levels of arsenic and zinc seen in some samples.

Results from the 2006 assessment suggest that all metals tested, except for Mo and Cr, were near or below analytical detection levels and are assumed to be non-toxic to human health, wildlife health, and the environment. Molybdenum foliar levels, ranging from 8-53 mg/kg between plots, were double the mean baseline values. Previous research has suggested that cattle toxicity can occur at 6 mg/kg of Mo; therefore, levels of Mo in some plots may pose a concern to wildlife health. Results of Cu to Mo ratio (Cu:Mo) suggest that plots in 1998 appear to have adequate Cu:Mo, whereas the 1999 plots had low values of Cu and high values of Mo, resulting in ratios below the minimum 2:1. Low Cu and high Mo is likely the result of a high soil pH, as Cu is more soluble in lower pH soil and Mo is more soluble in high pH soil. Chromium levels exceeded baseline data, however, acceptable limits for ungulate consumption of Cr and all other metals are unknown. Results of metal analysis in plots with biosolid and tailings amendments suggest that biosolids appear to be beneficial to Mo and Cu:Mo ratios within soils/vegetation, whereas additions of tailings appear to elevate pH which leads to reduced solubility of Cu and increased solubility of Mo that leads to potential toxicity.

Results from the 2012 assessment show that elevated levels of cadmium, manganese, molybdenum (and the Cu:Mo), selenium, thallium, and zinc were found within the sampled vegetation as compared to the control.

Results from the 2014 assessment were not available.

Recommendations: Several recommendations have been suggested for the assessment of vegetation metal uptake at the Facility including:

- Establish control sites for sampling and collect and analyze baseline data, prior to disturbance, to accurately monitor changes as a result of disturbance and trends over time;

- Establish sampling sites in areas that are likely to be less affected disturbance;
- For sampling, it is suggested to select one 20 m^2 sample plot every two hectares, to a maximum of 10, and to sample areas with known mineralization;
- Collect composite samples (to mimic animal browsing) and species-specific sampling including fireweed, rye grass, and red clover;
- Continue monitoring of vegetation metal uptake in established sites every 5 years, ensuring sample size is adequate for statistical analysis;
- Conduct foliar analysis of foliage (summer) and stems (winter) of deciduous and coniferous trees. Species recommended for sampling include Sitka alder, willows, and Lodgepole pine; and
- Consider conducting soil nutrient and heavy metal analysis using the BC Ministry of Environment *Overview of Contaminated Sites Soil Task Group Procedures for the Derivation of Soil Quality Matrix Standards for Contaminated Sites* or the *Canadian Soil Quality Guidelines for Protection of Environmental and Human Health.*

Initiation Date: 1989

Most Recent Monitoring Date: 2012

Supporting Documents:

Title	Author	Year
2015 Veg Metal Sampling Plan_Combined	MPMC	2015
MPMC-Work-018 Vegetation Sampling	MPMC	Revised Jan 11 2021
Summary: Vegetation Metal Uptake Monitoring at Mount Polley	MPMC	2011
2012 MPMC Vegetation Metal Uptake Monitoring	MPMC	2012
2007.Meister.VegMetalSurvey	Forestmeister Services (Ronald Paul Meister)	2007
RCP Appendix K – Mount Polley Mining Corporation Tree Plots Research Report	Forestmeister Services (Ronald Paul Meister)	2012
RCP Appendix Y – Development of a Molybdenum Screening Value for Impact Assessment	Golder Associates	2016

6.1.4 *Water Management Strategies: Research Requirement (c)*

6.1.4.1 Water Management Plan

Location: Permitted Mine Area

Project Name: Water Management Plan for Mount Polley Mine

Description: In 2015, the RCP was updated and outlined the intention to use the Veolia's Actiflo water treatment technology for short-term water management and that upon closure, a passive treatment system is preferred.

In 2016, Mount Polley submitted a Technical Assessment Report (TAR) to the ministry that outlined a long-term Water Management Plan (WMP) to define water management practices to prevent year-over-year accumulation of contact water at the Facility and to mitigate the potential for unplanned and/or non-compliant release to the environment. This report included an assessment of effluent discharges during operations, impacts to receiving environments, and investigations into preferred discharge location (i.e., Polley Lake outlet, Hazeltine Creek at the mouth, Bootjack Lake outlet, Edney Creek at the mouth, Quesnel River at Likely, the pipeline to Quesnel River, or the pipeline to Quesnel Lake). A memorandum was also created in 2016 that identified key locations suitable for decentralized treatment at source or candidates for direct discharge with minimum treatment.

In 2017, a draft water treatment update to the RCP was created to i) identify preliminary location for passive/semi-passive treatments at closure, ii) identify locations for direct release, iii) identify constituents of concern (COCs) and potential constituents of concern (COPCs), iv) conduct assessment of active and passive technologies and determine location suitability based on results, and v) develop a schedule for water treatment systems)

In 2020, the WMP was revised to meet conditions of Permit 11678. This plan reviews baseline information at the Facility and outlines water management and treatment for the Facility's operational periods from January 2023 to December 2031; the WMP did not address water management during closure or post-closure.

In 2021, a report was created which outlined updates to the water balance model and calibration.

Results/Discussion:

Results from the 2016 TAR suggest:

- Quesnel River at Likely would have sufficient hydrological capacity to provide appropriate dilution rates (2015 study) and that the pipeline to Quesnel Lake, commissioned in 2017, provides the best option for discharge for the remainder of operations (2016 study);
- The discharge rate into Quesnel Lake is within the permitted flow rate (average 0.33 m^3/s) and that the Permit allows an instantaneous flow rate of 0.60 m^3/s for downdrawing the TSF during freshet conditions;
- Where practical, reduce the volume of non-contact water collected on site by diverting it away from the mine-impacted areas;

- Treat and discharge surplus water to reduce accumulation year to year and ensure infrastructure is in place to withstand 1:200-year flow volume;
- Maintain a minimum and maximum pond volume of 1 M-m^3 and 1.7 M-m^3, respectively, in the TSF, and;
- Maintain a minimum 100 m long beaches at the TSF.

Results from the 2017 report:

- Identified 3 potential location suitable for passive/semi-passive treatments at closure (NW Sump, 9K Sump, and South Toe Drain);
- Identified the COCs and COPCs within these locations;
- Determined that passive technology compares favourably to other treatment technologies;
- Proposed a decentralized treatment option, identified the NW Sump as the most favourable location for a pilot study, and;
- Provided a preliminary implementation schedule.

The 2020 WMP overviewed historical baseline information that was summarized for input into modelling of water balance and water quality. Baseline information included:

- Geology (regional and deposit);
- Metal leaching/ acid rock drainage geochemistry;
- Climate and Hydrology including: Temperature, Precipitation, Evaporation, Site Drainage and Surface Hydrology, Pit Ground Hydrology (Springer and Cariboo Pits, Wight Pits, Boundary Pit), and Seepage from the TSF, and;
- Water Quality from: Quesnel Lake, Bootjack Lake, Polley Lake, and Hazeltine Creek.

Water management and treatment reviewed in the 2020 WMP describes is shown visually in Figure 6-1.

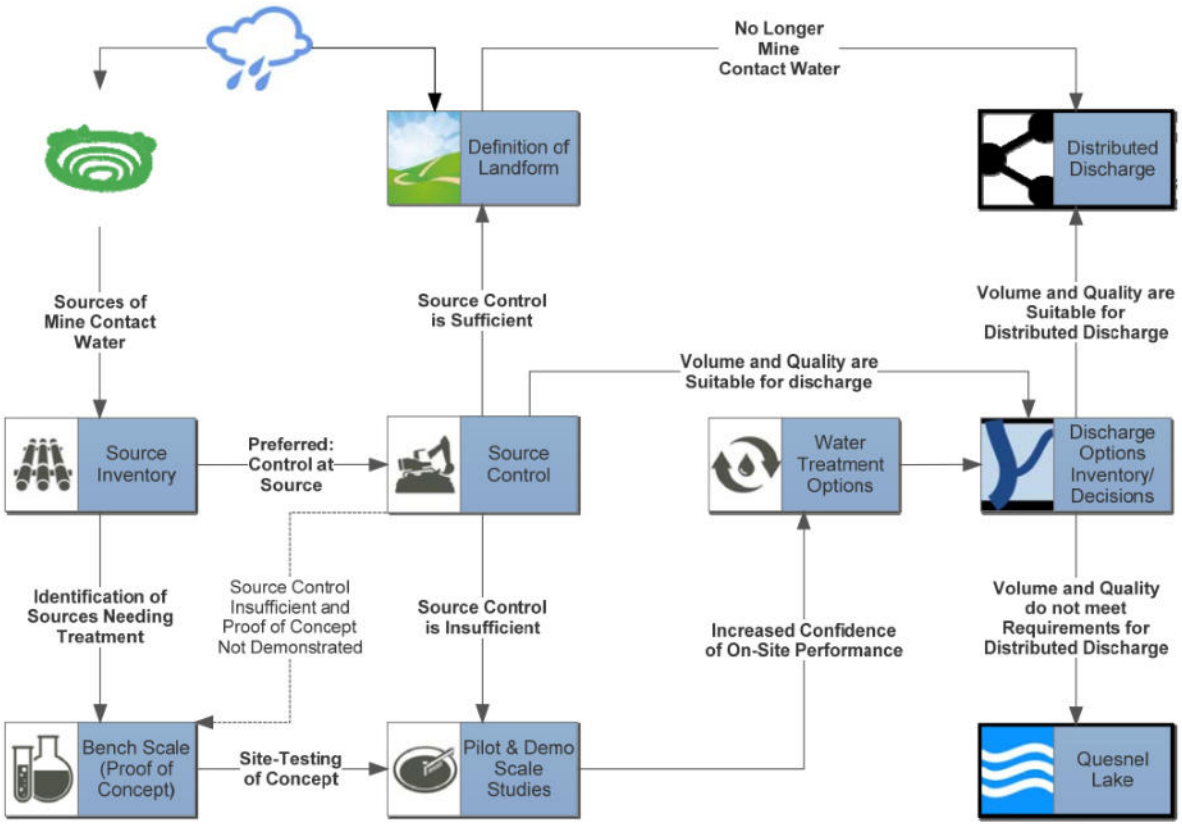


Figure 2-1. Water Management Framework (Golder 2020).

Source Inventory and control (and landform definition), water balance and water quality modelling, discharge options, restorations of watercourses, water treatment technology and scheduling, and potential revisions to the water management plan are described in detail below.

Source inventory: A source inventory of areas identified to generate contact water has been created at the Facility which includes information on location, modelled or measured flow and water quality, and current on-site collection or discharge locations. This database is regularly updated.

Source control: Source control is the method of reducing volumes of mine contact water (i.e., runoff from a reclaimed landform without containing mining materials) as a method for managing water quantity and quality. Non-contact water is currently managed at the Facility through a system of channels that diverts water away from mine infrastructure. Contact water (i.e., waste rock contact water, pit wall runoff, TSF, disturbed/undisturbed runoff, and groundwater inflow) is currently managed with a water treatment plant and conveyed to the TSF or the Perimeter Embankment Till Borrow Pond to be re-used during operations.

Landform Definition: Mount Polley has investigated methods of diverting and discharging water off-site without treatment through literature review (i.e., water management approaches in the USA and Australia), landform criteria identification, and a theoretical impact assessment.

Literature review suggests that successful landform creation has been achieved when i) it is geotechnically stable under long-term conditions, ii) water discharged from the landform does not have negative impacts to downstream habitats, iii) erosion rates are similar to surrounding natural areas, and iv) the landform supports the end land use function. The theoretical impact assessment determined that there is substantial potential to increase the sustainability of water management at closure by reducing the volume of water that requires treatment through creation of suitable landforms, as defined above, upon closure.

Modelling: The water balance at the Facility was, and is continuously, determined through observable data and utilizing modelling software (GoldSim) that incorporates site drainage, surface hydrology, pit groundwater hydrology, seepage calculations, site climate data and climate change predictions. Results from water balance model simulation suggest: average/mean annual discharger from 2023-2029 will be 4.2 M-m^3; TSF storage limit from 2030-2031 will be 984 m and additional dam raises will be required prior to resuming operations; and the maximum annual discharge rate is approximately 10 M-m^3 in 2031. Passive mode of the Water Treatment Plan equates to an average mean annual discharge of 0.33 m^3/s. Note that these results are based on a series of assumptions that will need to be confirmed.

Water quality modelling was also conducted using the GoldSim model software. Results from water quality model simulation suggest that total copper and selenium were the only modelled parameters in the Perimeter Embankment Till Borrow Pond that exceeded proposed effluent discharge limits of 0.033 mg/L and 0.075 mg/L. Note that these results are based on a series of assumptions that will need to be confirmed.

Discharge Options: Discharge locations for contact water will be determined through the BAT for water treatment, results of water quantity and quality, and the ability of the receiving waterbodies to assimilate discharge. Treated and non-contact water will be discharged into site watercourses as per Permit conditions. Previous studies (Golder 2015; 2016) have determined that the pipeline to Quesnel Lake, commissioned in 2015, provides the best option for discharge for the remainder of operations.

Watercourse Restoration: Restoration of any watercourse at the Facility will be under the supervision of a habitat biologist (RPBio) and a river engineer (PEng).

Water Treatment Technology & Schedule: Several water treatment options are being investigated at the Facility for operational and closure including Operational technology (Actiflo water treatment system, TMT (trimercaptotriazine) treatment, and lime treatment) Closure/Post-closure technology (Biochemical Reactor System, Packed Bed Reactor System, Saturated Rock Fill System, Submerged Sand Reactor, Pit Lake Treatment System, and Constructed Wetland Treatment System). Two of these water treatment options have been implemented and several others are under consideration; see Table 6-14 for an inventory of the water treatment technologies and development stages. See Section 4.7.2 of the Golder 2020 Water Treatment Plan for detailed descriptions of these water treatment technologies.

Water Management Plan Revisions: Changes to the current water treatment may be required based on trigger events during operations at the Facility. Mount Polley has outlined potential revisions to the water management plan based on potential triggers in Table 6-12.

Table 12. Revision Process to the Water Management Plan under Potential Trigger Scenarios.

Revision Trigger	Applicable Regulatory Body and Permit	WMP Update	Anticipated WMP Update Submission (Revision Trigger + X months)	Additional Notes
Mine plan update: a change to the permitted mine plan or implementation schedule that results in modifications to the water management systems.	MEMPR; M-200 EMA; PE-11678	Full update	10 months	Update to water balance (including water quality model) and implementation schedule. Updates to groundwater/hydrogeological models may be required.
Tailings Storage Facility: a change to the permitted configuration (i.e., dam crest elevation, water storage volume, or tailings volumes) of the TSF that impacts water storage and discharge requirements.	MEMPR; M-200 EMA; PE-11678	Full update	6 months	Update to water balance (including water quality model) and implementation schedule. Updates to groundwater/hydrogeological models may be required.
Catchment areas: change in the site footprint of more than 10% increase or decrease in runoff volume attributed to changes in the permitted and modified mine areas.	MEMPR; M-200 EMA; PE-11678	Partial update	3 months	Update will be composed of a calibration and sensitivity exercise on the existing water balance (including water quality model). Updates to groundwater/hydrogeological models may be required.
Requirement to update WMP by the Engineer of Record or the Independent Engineering Review Panel.	MEMPR; HSRC	Level of update depends on requirement of Engineer of Record or Independent Engineering Review Panel	6 months	To be determined; however, it may include an update to water balance (including water quality model) and implementation schedule. Updates to groundwater/hydrogeological models may be required.
Requirement to update the WMP by the Statutory Decision Maker of MEMPR or BC ENV	MEMPR; M-200 EMA; PE-11678	Level of update depends on requirement of statutory decision maker	6 months	To be determined; however, it may include an update to water balance (including water quality model) and implementation schedule. Updates to groundwater/hydrogeological models may be required.

WMP = Water Management Plan; TSF = Tailings Storage Facility; EMA = *Environmental Management Act*; MEMPR = Ministry of Energy, Mines, and Petroleum Resources; HSRC = Health, Safety and Reclamation Code for Mines in British Columbia; BC ENV = British Columbia Ministry of Environment and Climate Change Strategy.

Closure and post-closure water management will aim to return the pre-mining drainages back to their natural watersheds (i.e., to Bootjack Lake, Polley Lake, and Hazeltine Creek). Where natural drainage restoration is not feasible, hydraulic engineering design principles (Chow 1959) will be utilized to create self-sustaining features.

The 2021 report outlines updates to the Site Wide Water Balance Model that reflect site water management in 2020. Updates to the model included:

- No tailings were discharged from the ore processing plant to the TSF;
- No dredging operations occurred in the Springer Pit;
- Water was transferred from the TSF to the Cariboo and Springer pits to manage above average freshet flows;
- Increased runoff coefficients to account for above average precipitation in 2020, and;
- Updated the discharge to the environment through the water treatment plant.

Recommendations: Recommendations from the TAR (2016), WMP (2020) and the model update (2021) include:

- Continue with the current WMP, using the existing water management infrastructure (i.e., collection ditches, pipes, sumps, pumps) with some modifications (see Golder 2020 WMP);
- Continuing research and updating of hydrologic data including climate and weather data, along with climate change impact predictions, to maintain current information for water balances calculations and water management plan requirements;
- Research and analyze low-flux cover options and parameters to inform planning efforts and runoff modelling;
- Implement revisions to the WMP as per Table 6-12, as required;
- Ensure measured water levels capture key calibration points;
- Install flow monitoring stations in major drainage ditches to reduce uncertainty in baseflow and runoff volumes to the TSF;
- Increase frequency and period of spring and fall snowpack measurements;
- Provide winter snowfall and rainfall data to increase accuracy of climate data, and;
- Continue refinement of runoff coefficients for future modelling.

Initiation Date: 2017

Most Recent Monitoring Date: 2020

Supportive Documents:

Title	Author	Year
Mount Polley Mine Water Balance Model: Closure and Reclamation	Golder	2017
Water Management Plan (Mine Operations)	Golder	2020
Reclamation and Closure Plan Water Quality Modelling Report	Golder	2017
2020 Site Wide Water Balance Model Update and Calibration – Mount Polley Mine	Golder	2021

6.1.4.2 Water Treatment Systems

Location: Mine site and surrounding waterbodies

Project Name: Annual Anaerobic Biological Reactor Review (2014), Mount Polley Mining Annual Reclamation Report (2017), Mount Polley Mine Long Term Water Management Plan Permit Amendment Application under the Environmental Management Act (2016), Draft Water Treatment Update to Reclamation and Closure Plan (2017), Water Treatment and Discharge Program Progress Report #6 (2020), Water Treatment and Discharge Program Progress Report #7 (2020)

Description: As per Permit 11678, MPMC must undertake a BAT assessment when developing water treatment and discharge technologies at the Facility. Typical project phases to develop a water treatment system includes a pre-concept, concept, pre-feasibility, feasibility, and project execution phases; details and timelines for each of these phases can be found in Table 6-13.

Table 13. Typical Phase of Development for Water Treatment Systems.

Project Phase	Description	Timeline
Pre-Concept	• Initial viability of pre-identified candidate options • Proof-of concept (bench scale testing)	4-9 months
Concept	• Reduce number of options carried forward • Detailed bench-scale testing	7-15 months
Pre-Feasibility	• Identify and define the “go forward” option(s) • Pilot-scale testing under site conditions • Permit unlikely to be required	15-24 months
Feasibility	• Demonstrate feasibility at larger scale (order of magnitude scale up) • Done under site conditions • Permits are necessary to construct at this size	24-36 months
Project Execution	• Detailed engineering design, procurement, construction, commissioning and ramp up at full-scale • BAT assessment	24-36 months

The Facility is in the pre-concept and concept phases for various water treatment technologies including:

- Bio-chemical reactors (BCR);
- Packed Bed Reactor (PBR);
- Pit lake treatment;
- Saturated rock fill (SRF);

- Saturated sand filter (SSF);
- Anaerobic bio-reactor (ABR);
    - In conjunction with Genome BC and UBC Microbiology, the Facility developed and built an on-site semi-passive wastewater treatment system, the Anaerobic Biological Reactor (ABR), in 2009. The objective of the ABR was to passively lower trace metal and nutrient concentrations through microbial activity in a designed anaerobic wetland environment. Water sampling was conducted from 2011 to 2014 at the pond inflow (ABR-IN), outflow (ABR-OUT), and at four sites within the pond itself (ABR-Interface-1 through -4). Sampling included collection of water samples for ex-situ elemental analysis, and in-situ measurements of water quality including pH, conductivity, temperature, and dissolved oxygen through the water column. This process was found to be effective at lowering trace metals and sulphate, but the program was discontinued following the 2014 tailings facility breach.
- Wetland treatment (constructed wetlands treatment system (CWTS)); and
- Active treatment (i.e., TMT addition to the water treatment plan).

Treatments: Two of the water treatment options have been implemented and several others are under consideration; see Table 6-14 for an inventory of the water treatment technologies and development stages.

Table 14. Revision Process to the Water Management Plan under Potential Trigger Scenarios.

Stage of Development / Water Treatment Technology Option	Targeted COCs	Proof-of-Concept Bench-Scale Testing	Detailed Bench-scale Testing	Pilot-Scale Testing	Demonstration-Scale Testing	Project Execution	Deliverables Submitted	Potential Next Steps	Timeframe to Implemented Technology
Operations									
Actiflo water treatment system	TSS					WTP in operation	▪ Bench- and full-scale testing of Actiflo WTP	▪ Not applicable	Not applicable
TMT treatment	Dissolved copper						▪ Bench- and full-scale testing of TMT dosing	▪ Detailed bench-scale test work	6 to 9 years
Lime treatment	Dissolved copper						▪ Not applicable	▪ Not applicable	
Closure/Post-closure									
Biochemical reactor (BCR)	Selenium, nitrate						▪ Concept design ▪ Proof-of-concept bench-scale tests	▪ Detailed bench-scale test work	6 to 9 years
Packed bed reactor (PBR)	Selenium, nitrate						▪ Concept design ▪ Proof-of-concept bench-scale tests	▪ Detailed bench-scale test work	6 to 9 years
Saturated rock fill (SRF)	Selenium, nitrate						▪ Concept design	▪ Proof-of-concept bench-scale tests (underway)	6 to 10 years
Submerged sand reactor (SSR)	Selenium, nitrate						▪ Screening analysis	▪ No further work	Not applicable
Pit lake treatment	Selenium, nitrate						▪ Concept design ▪ Proof-of-concept bench-scale tests	▪ In situ (pilot) study	5 to 8 years
Constructed wetland treatment system (CWTS)	Selenium, nitrate						▪ Concept design ▪ Bench-scale testing	▪ On-site pilot-scale testing (underway) ▪ On-site demonstration-scale test work	5 to 8 years

Eliminated/Rejected Partially eliminated Under consideration Implemented

COC = contaminant of concern; TSS = total suspended solids; WTP = water treatment plant.

Short descriptions of these water treatment technologies are provided below (detailed descriptions of water treatment technologies can be found in Section 4.7.2 of the Golder 2020 Water Treatment Plan.

BCR: The BCR is a passive treatment technology that consists of a lined pond filled with submerged organics substrate media mix. Additions of the organic substrates provide nutrients and carbon sources for biological activity. Selenium is dissolved and retained in the BCR. This treatment technology requires downstream water treatment. A conceptual design for the BCR was developed in 2016 and a bench-scale test was implemented in 2019 in the NW Sump.

PBR: The PBR is similar to the BCR but the substrate is inert (to support microorganisms) and has additions of liquid nutrient and carbon sources to promote biological activity. This treatment technology also requires downstream water treatment. Bench-scale testing was completed for PBR in the NW Sump water in 2019.

Pit Lake Treatment: Stored water within pits may be used to reduce contaminates of potential concern (i.e., copper and selenium) through natural settling and bio-chemical processes. A pilot

study was developed for Cariboo Pit which included a phased application of a carbon source to the water to enhance microbial reduction of selenite and selenite. In 2017 a preliminary assessment of in situ lake treatments was conducted (Golder 2017). In 2019, a bench-scale testing of the in situ pit lake treatment was conducted in the NW Sump. In 2020, an in situ treatment of Cariboo pit water was implemented.

ABR: The ABR is an artificial wetland intended to support microorganisms in anoxic water conditions (especially sulphate reducing bacteria), with the aim of lowering trace metals and sulphate concentrations in discharge water. The wetland has a layered design, consisting (from bottom to top) of organic material, rock fill, and water and is approximately 5 m deep, 85 m wide, and 100 m long (Figure 6-2). Water is pumped into one side of the system through perforated pipes at the bottom of the organic layer, from the East Main Toe Drain (MTD), which collects seepage through the Main Embankment of the TSF. After passing through the ABR, treated water flows out the opposite side, passing through a polishing pond before returning to the Main Embankment Seepage Collection Pond (MESCP).

Treatments were continuously improved while the ABR was functioning. In 2011, inflowing water was heated 20°C to encourage microbial activity. In October 2012, a berm was constructed around the water inflow system to increase retention and the organic material was refreshed. In 2013, booms were installed as wind barriers. Further plans existed to install a cover over the pond, but were not implemented. In 2014, a plan was in place to change the feed water of the ABR from the MTD to the MESCP, to allow water with higher metals content to pass through the ABR. From fall 2009 to the summer of 2014, approximately 50 to 100 gallons per minute were pumped into the ABR.

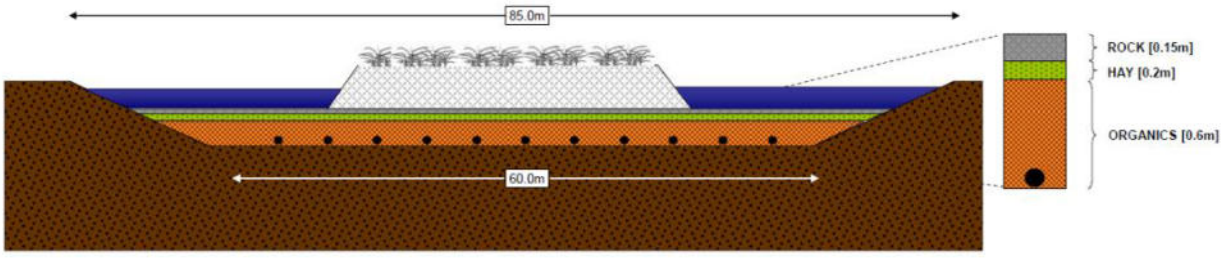


Figure 6-3. Side view of the ABR, showing size and layering of the designed wetland. Figure extracted from Appendix O of the Reclamation Closure Plan "Annual Anaerobic Biological Reactor Review 2014" (2017).

SRF: The SRF is a new technology that is similar to the pit lake treatment and PBR in that it uses water volume at the Facility for treatment and biological treatment for contaminant removal (similar to pit lake treatment), but uses a mined-out open pit as a bioreactor versus the constructed bioreactor in PBR. A proof-of-concept bench-scale study was conducted in 2020 Burnaby by Golder that used samples of waste rock and site water from the Facility.

SSR: The SSR is similar in concept to the SRF but uses tailings as a substrate to provide an energy source for biological reactions.

CWTS: The constructed wetland tailings system (CWTS) is a passive water treatment system is being investigated by Ensero Solutions Inc through a phased approach study. In 2020, an on-site pilot scale CWTS was commissioned and microbial and chemistry sampling was conducted and evapotranspiration and detritus accretion studies were started. Subsequent monitoring will be conducted in the future. Results are not yet available.

Active Treatments: In 2020, a TMT dosing field trial was tested for enhancing copper removal in the Actiflo water treatment plan during freshet.

Results and Discussion:

BCR/PBR: BCR and PBR treatments were successful in removing nitrate (complete or near complete removal), removed high concentrations of selenium, and significant removal of sulphate. It was suggested to use the removal rates for future evaluation of the BCR technology.

Pit Lake Treatments: The pit lake treatment removed complete or near complete nitrate. Selenium was removed in open and closed cells, with better removal in open cells. Results from Cariboo Pit treatments are not yet available.

ABR: The ABR was found to be effective at improving water quality parameters by lowering the concentrations of trace metals and nutrients, especially sulphate, nitrate, selenium, and molybdenum (Table 6-15). Post-treatment water was consistently found to be below BC Water Quality Guidelines for Aquatic Life (BC WQG) for all parameters except for sulphate (Table 6-15).

Table 6-15. Percent Change in Elemental and Nutrient Concentrations between Inflowing (ABR-IN) and Outflowing Water (ABR-OUT) from 2010 to 2014.

	Percent decrease between inflow and outflow					
Parameter (mg/L)	**2010**	**2011**	**2012**	**2013**	**2014 (N=21)**	**Inter-annual average**
Sulphate (Dissolved)	14.9	-6.0	12.3	12.9	7.9	8.4
Nitrate (N)	98.4	97.9	92.1	97.9	87.5	94.8
Phosphorus (Total)	0.0	42.9	-2.2	-487.7	-48.8	-99.2
Aluminum (Dissolved)	12.0	19.6	-20.7	-44.4	10.9	-4.5
Arsenic (Total)	-32.2	22.8	34.6	-48.1	37.4	2.9
Cadmium (Total)	26.2	63.8	55.7	61.0	80.5	57.4
Copper (Total)	-23.3	50.9	33.9	64.7	80.8	41.4
Iron (Total	-929.3	-119.6	-8.9	-102.9	-64.0	-244.9
Lead (Total)	-5.2	91.3	87.1	51.8	-9.5	43.1
Magnesium (Total)	3.0	-8.2	1.8	-6.2	1.0	-1.72
Manganese (Total)	-13.3	28.5	-7.6	-133.3	6.3	-23.9
Molybdenum (Total)	29.7	25.3	28.4	53.4	46.3	36.6
Nickel (Total)	-230.4	54.8	66.1	-20.1	20.9	-21.7
Selenium (Total)	70.7	44.8	60.7	84.7	70.6	66.3
Zinc (Total)	34.8	44.9	32.1	86.1	70.2	53.6

Note that Negative Values Indicate an Increase in Concentration. Samples were Collected Monthly During Operational Periods of the ABR, starting in 2014, and were Analysed by ALS Laboratories in Burnaby. Where Values are Below Method Detection Limit (MDL), Percent Changes are Calculated from MDL/2. Data Presented was Amalgamated from Appendix O of the RCP "Annual Anaerobic Biological Reactor Review 2014" (2017).

- Sulphate: Sulphate levels at ABR-OUT were consistently lower than levels at ABR-IN, with an inter-annual average decrease 8 %, with an average outflow value of 475 mg/L in 2014. Outflowing values for sulphate often exceeded the hardness-corrected BC WQG of 429 mg/L.

- Phosphorus (Total): ABR-OUT reported consistently higher values of total phosphorus than ABR-IN, with an average increase of 99 %, to an average outflow value of 0.049mg/L in 2014. This increase in phosphorus is examined below.

- Copper (Total): Copper levels were consistently lower at ABR-OUT than ABR-IN, resulting in an average decrease of 0.0047 mg/L (81 %). All results were below the BC WQG.

- Iron (Total): Iron concentrations were consistently lower at ABR-IN than ABR-OUT. An average increase of 0.029 mg/L (64 %) was observed. This effect is explained in greater detail below.

- Molybdenum (Total): Molybdenum concentrations were consistently lower at ABR-OUT than at ABR-IN, with an average decrease of 46 %. All results were below the BC WQG.

The increase in phosphorus and iron is believed to be a result of sedimentary iron reducing in anoxic conditions, and forming soluble complexes, especially with hydrogen sulphide (a desired product of sulphate reduction). Phosphorus is commonly bound to iron in sediment, and is also released in soluble form as a result, raising the soluble concentrations of both phosphorus and iron. Lowering sulphate concentrations in the ARB relies on anoxic conditions and releases hydrogen sulphide, producing conditions in which iron and phosphorus can mobilize from sediment. This is an effect that future research on anaerobic bioreactors could address.

Although the ARB was found to lower sulphate loads, the program was not effective at maintaining post-processed water below the BC WQG. Testing of the water column at ABR-Interface sites between 2011 and 2014 indicates that the water column was not consistently anoxic, especially in the summer. Oxygenated conditions do not allow for microbially-mediated sulphate reduction, and may allow reoxygenation of sulphur compounds to take place. Covering or enclosing the reactor, or otherwise ensuring anoxic conditions throughout the water column, should improve the sulphate reduction performance. Improvements to the ABR were planned but were not implemented.

SRF: Results of the proof-of-concept bench-scale study of the SRF demonstrated:

- Nitrate was reduced below the detection limit;

- Selenium was successfully removed in some cases;

- Aeration and settling cells were effective polishing units by lowering BOD total organic carbon and sulphide;

- Flows above the design flow rate reduced effectiveness of polishing;

- Higher levels of copper, cadmium and redox sensitive species (i.e., arsenic, iron, and manganese) were identified in the effluent, and
- Results were reproducible. Additional results are to be made available in 2021.

SSR: It was suggested to remove SSR as a treatment option based on literature review, historical evaluation of water quality monitoring data which showed the TSF does not treat COCs to appropriate levels, low hydraulic conductivity of the tailings, limited flexibility to modify the TSF, TSF design complications, and challenges with obtaining permit amendments.

Pit Lake Treatments and CWTS: These treatments are within the pre-concept and concept phases and results are not yet available.

Active Treatments: Results from the addition of TMT suggest that dissolved copper concentrations were consistently reduced between 4 and 6 µg/L but that the water treatment plan was unable to meet the dissolved copper permit requirements even with additions of TMT.

Recommendations:

Passive or semi-passive wastewater treatment has been identified as an objective for reclamation under the Long Term Water Management Plan (Golder, 2016). The ABR pilot project may represent a cost-effective and semi-passive option for wastewater treatment at the Facility. If the Facility decides to continue with the ABR or a similar system, it is recommended to assess the continual improvements made to the system during its 2009-2014 lifespan:

- Test the influence of heating inflowing water above ambient temperatures, possibly from 7°C to 20°C, as the system was upgraded to do in 2011;
- Review existing data on the relative performance of Phase I (2009-2011) and Phase II (2012-2014) of the ABR, to help assess the influence of renewal of the organic layers and addition of berms around the inflow system to increase retention;
- Develop a cover or wind barrier system, attempted in 2013 and 2014, and test dissolved oxygen values in the water column to ensure the barrier is effective at maintaining anoxic conditions in the bioreactor;
- Develop a trial to test the effect of higher metal (especially iron) content on passive reactor performance. The ABR was operated using input water containing 0.015-0.15 mg/L of total iron, which is believed to be too low. Using different types of mine contact water, or even adding iron, could improve bioreactor performance;
- Test improvements to the bioreactor system that can prevent mobilization of phosphorus and iron, possibly by using different kinds of substrate that are lower in these elements, or altering the composition of inflowing water such as with increased iron as mentioned in the prior bullet.

In 2017, Golder initiated an investigation for passive water treatment (the Draft Water Treatment Update to Reclamation and Closure Plan), and while still ongoing, has tentatively accomplished the following:

- Identified the NW Sump, 9K Sump, and South Toe Drain locations as potentially suitable for full-scale, passive/semi-passive treatment at closure and identified the constituents of concern and constituents of potential concern for these sites;
- Conducted a technology assessment that confirmed passive treatment technology compares favorably against other treatment technologies;
- Identified the NW Sump as one suitable location to construct and operate a pilot-scale passive/semi-passive system;
- Provided a preliminary implementation schedule for the bench-, pilot-, and full-scale systems, and input requirements and outcomes associated with the design, construction, and operation tasks of each;
- Developed a contemplated passive system which would consist of a sedimentation pond, biochemical reactor, sulphide polishing cell, subsurface constructed wetland, free water surface constructed wetland, and aeration cascade;
- Retained Contango Strategies Ltd. (Contango) to conduct a supporting preliminary assessment of passive treatment potential at the Facility and potential conceptual designs, with a focus on treatment wetlands. An onsite pilot scale constructed wetland treatment system was constructed in 2018.

The process of assessing and planning a future passive treatment facility is still ongoing. . More detail on the ongoing process can be found in the Water Management Plan (Mine Operations; Golder, 2020).

Initiation Date: 2009

Most Recent Monitoring Date: 2020

Supporting Documents:

Title	Author	Year
RCP Appendix O– ABR Summary Report 2014	MPMC	2014
2020 Annual Reclamation Report (Section 5.10)	MPMC	2020
Mount Polley Mine Long Term Water Management Plan Permit Amendment Application under the Environmental Management Act	Golder Associates Ltd.	2016
RPC Appendix H – Draft Water Treatment Update to Reclamation and Closure Plan – Mt. Polley Mine	Golder Associates Ltd.	2017

Core sulphate-reducing microorganisms in metal-removing semi-passive biochemical reactors and the co-occurrence of methanogens	Sue Baldwin, Maryam Rezadehbashi	2018
Mount Polley Mine Long Term Water Management Plan Permit Amendment Application under the Environmental Management Act: Technical Assessment Report.	Golder Associates Ltd.	2016
Water Treatment and Discharge Program Progress Report #6: June 2020	MPMC	2020
Water Treatment and Discharge Program Progress Report #7: December 2020	MPMC	2020
Water Management Plan (Mine Operations)	Golder	2020

6.1.5 *Geomorphic Landform and Run-off Modeling: Research Requirement (I)*

Location: Permitted Mine Area

Project Name: Geomorphic Slope Design Guidance for Mount Polley Mine

Description: Geomorphic Slope Guidance Document (Golder 2019) provides direction for grading and landforms to create a more natural restorative closure land surface. This guidance document includes grade and length recommendations, along with comprehensive reviews of pre-mine and current topography, soil mapping, and high-resolution air photos. This resulted in proposed closure grading and runoff catchment areas along with discharge planning. The document states that significant effort in terms of grading would be required to achieve a more natural closure land surface.

The water balance (RCP Appendix F) aligns with the closure grading and runoff catchment mapping recommendations of the Geomorphic Slope Guidance Document.

Refer to Section 5.2.1 of RCP for sediment retention and erosion control planning information.

Recommendations:

- Further research is required to determine the desired application and effects of low-flux cover.
- Continue surveying and modelling to determine appropriate runoff routing in order to re-instate natural drainage patterns appropriately.
- Conduct study of effort required to achieve desired closure grading.

Initiation Date: 2018

Supportive Documents:

Title	Author	Year
Geomorphic Slope Guidance Document	Golder	2019
Mount Polley Mine Water Balance Model: Closure and Reclamation	Golder	2017

6.2 OUTSTANDING

6.2.1 *Vegetation: Research Requirement (d)*

Description: As per requirement d, MPMC is obligated to conduct research to determine the viability of revegetation with native and cultural important plant species.

Overview of Past Work at Mount Polley: Selection of species for revegetation at the Facility has included those determined to be early successional species within the region, species identified from the baseline vegetation assessments, and species identified as culturally important from FN consultation. Vegetation identified from baseline assessments and specific site-series are shown in Table 6-16. Site-specific reclamation prescriptions of grasses and forb's, deciduous and coniferous trees species, and shrub species, for the Facility are provided in Table 6-17 and are based on site-specific BEC zones (site series), and geographic topography.

Table 6-15. Summary of Vegetation within the Interior Cedar Hemlock (ICH) Moist Cool (mk) Variants (01-07 & non-forested sites) Summarized by Literature (Steen 1989) and Field Based Assessments at the Facility.

Site Series		Moisture	Vegetation identified by site series (Steen 1989)	Vegetation identified from field surveys	Additional information from 2019 RCP.
Zonal	ICHmk03 /01	Mesic, submesic	Western red cedar, subalpine fir, falsebox, black huckleberry, bunchberry round-leaved violet, rosy twistedstalk, red stemmed feathermoss.	Western red cedar, Douglas-fir, subalpine fir, black cottonwood, Sitka alder, Douglas maple, Scouler willow, Bebbian willow, red elderberry, black huckleberry, black twinberry, various willows, thimbleberry, western mountain ash, prickly currant, wild red raspberry, fireweed, bluejoint, Solomon's seal, twinflower, and bunchberry.	Selectively logged in 1970s to remove mature Douglas-fir and Western red cedar.
Xeric to Subxeric	ICHmk03 /02	Xeric, Subxeric	Douglas-fir, western red cedar, Saskatoon, soopolallie, pussytoes, wild strawberry, white hawkweed, juniper haircap moss, lichens.	Lodgepole pine, Douglas-fir, occasional black cottonwood. Tall shrub understory: subalpine fir seedlings. Low shrub understory consisted of black huckleberry, birch-leaved spiraea, falsebox, prickly rose, prince's pine. Herb layer (>1%) consisted of twinflower, white hawkweed, and hear-leaved arnica.	Moss species found in this area included red stemmed feather moss, juniper hair cap moss, and dog's tongue lichen.
	ICHmk03 /03		Douglas-fir, western red cedar, Saskatoon, soopolallie, rough-leaved ricegrass, wavy-leaved moss, Peltigera sp. Mosses not forming-carpet-like ground cover.	Patchy western red cedar, subalpine fir, black cottonwood, alder, and willow. Understory consisted of western mountain-ash, Saskatoon, wild rose, and willows.	An 03 site, west of the mill, was selectively logged in the 1970s, which removed mature Douglas-fir and Western red cedar. Greater diversity was found in 03 site series than 02. Fair to good development was seen of bear's hair and witches' hair lichens.
Mesic to Moist Nutrient Rich	ICHmk03 /04	Subhygric, mesic	Western red cedar, falsebox, devils club (≤ 10% cover), foamflower, oak fern (average cover 30%), leafy mosses, red-stemmed feather moss.	Western red cedar, hybrid spruce, subalpine fir. Tall shrub understory consisted of included black cottonwood seedlings, aspen poplar, Sitka alder, Douglas maple, Scouler willow, Bebbian willow. Low shrub understory consisted of thimbleberry, black huckleberry, oval-leaved blueberry, red elderberry, black twinberry, black gooseberry, wild raspberry. Oak fern, lady fern, false Solomon's-seal, star-flowered Solomon's-seal, rosy twisted stalk, bunchberry, fireweed, and one-leaved foamflower.	Many sites within 04 and 05 have been selectively logged and slash-burned creating atypical vegetation growth. Early stage successional areas were dominated by black cottonwood, alder, willows, fireweed, pearly everlasting, dandelion and various grasses, legumes, and weeds. Mature 04/05 site series often dominated by low-palatability plants but had abundant arboreal lichens (witches' hair, bear's hair).
	ICHmk03 /05	Subhygric	Hybrid white spruce, subalpine fir, thimbleberry, black twinberry, red-osier dogwood, fringed aster, sweet-cicely, ragged moss. Shrubs diverse and abundant up to 70%.		
Moist, Very Rich	ICHmk03 /06	Subhydric, mesic	Hybrid white spruce, subalpine fir, devil's club (up to 40% cover), black gooseberry, lady fern, oak fern, enchanter's nightshade, and stream violet, leafy mosses.	Hybrid spruce, western red cedar. Understory consisted of devil's club (up to 40%), oak fern, spiny wood-fern, lady fern, foamflower, false Solomon's seal, rosy twisted stalk, and clasping twisted stalk.	
	ICHmk03 /07	Hygric	Hybrid white spruce, western red cedar, red-osier dogwood, black twinberry, devil's club (10% cover), horsetails, soft-leaved sedge, American brooklime, leafy mosses, and ragged moss. Thallose liverworts in depression and moss layer diverse	Hybrid white spruce, black cottonwood, horsetails, sedges, and red-osier dogwood.	Site series 07 was not found in the mine development area.
Organic Non-Forested (e.g., wetland)	Non-forested	Subhydric	Hybrid white spruce and lodgepole pine; when found trees stunted. Scrub birch, Labrador-tea, hardhack, sedges, and sphagnum mosses.	Scrub birch, Sitka alder, Labrador-tea, hardhack, and willows.	Vegetation present around the pond south-west of the TSF includes poor-fen sphagnum, common green sphagnum, narrow-leaved cottongrass, Labrador-tea, buck-bean, narrow-leaved sundew, bog laurel, sphagnum mosses. Shrub wetland northeast of the pond was dominated by hardhack, Sitka alder, and tall willows.

Table 6-16. MPMC Site-Specific Reclamation Prescriptions Based on Site-Series for Disturbed Areas of the Mine Site including the Mill and Explosive Sites, Waste Rock Dumps, Roads, and the TSF Embankment.

Site Series		**Moisture**	**Gradient**	**Slope Position**	**Aspect**	**Soil Profile Type[2]**	**Grasses/Forb's**	**Deciduous Trees[3]**	**Conifer Trees[4]**	**Shrubs 200-500 sph[1]**
Zonal	ICHmk03 /01	Mesic, submesic	1-20	Middle	Variable	B	Native Grasses/forbs (30 kg/ha; reduce rate to 5-10 kg/ha if biosolids or fertilizers are used; Table 6-18))	Black cottonwood – 200sph Trembling aspen – 50 sph Paper birch – 50 sph	Douglas-fir – 1400 pfh Lodgepole pine – 600 sph Hybrid spruce Western redcedar Alpine Fir	Sitka alder, Saskatoon, prickly rose, willow, huckleberry, blueberry, common juniper (dry sites only), soopolallie
Xeric to Subxeric	ICHmk03 /02	Xeric, Subxeric	0-10	Crest	South or West Facing	A		Trembling aspen – 200 sph	Douglas fir -1400 sph Lodgepole pine – 600 sph Hybrid spruce	
	ICHmk03 /03		50-70	Upper	Variable				Douglas fir -1400 sph Lodgepole pine – 600 sph Western redcedar Hybrid spruce	
Mesic to Moist Nutrient Rich	ICHmk03 /04	Subhygric, mesic	10-35	Lower, middle	Variable	C		Black cottonwood – 200sph Trembling aspen – 50 sph Paper birch – 50 sph	Douglas fir -1400 sph Lodgepole pine – 600 sph Western redcedar Hybrid spruce – 600 sph Alpine fir	
	ICHmk03 /05	Subhygric		Middle, low	Variable					
Moist, Very Rich	ICHmk03 /06	Subhydric, mesic	0-25	Lower, middle	Variable	C			Douglas fir -1400 sph Hybrid spruce – 600 sph Lodgepole pine Western redcedar	
	ICHmk03 /07	Hygric	0	Toe of long slopes or depression	Level			Black cottonwood – 200 sph	Hybrid spruce – 400 sph Western redcedar – 600 sph Alpine Fir Lodgepole pine	
Organic Non-Forested	Non-forested	Subhydric	0	Depression	Level	D		N/A	N/A	
TSF		Hydric	0	Lower	Level	E		Black cottonwood – 500sph	N/A	

[1]Later successional species will be considered for planting after establishment of primary canopy; shrub species will be selected for each site based on research and availability.
[2]Refer to Figure 6-3 for descriptions of soil profiles.
[3]Conifer species are planted at roughly uniform density.
[4]Deciduous tree and shrub species are planted at roughly uniform density except higher biodiversity islands can be established in occasional depressions that retain water and nutrients.

A site-specific native grass and forb seed mixture was developed for the Facility and is summarized in Table 6-18.

Table 6-17. Mount Polley Native Species Grasses and Forb's Seed Mix.

Species	**% by weight**	**% by seed count**
Mountain brome	20	8.61
Native red fescue	10	17.81
Rocky mountain fescue[1]	15	28.94
Bluebunch wheatgrass[1]	25	10.76
Blue wildrye[1]	25	3.34
Junegrass[1]	3	17.81
Ticklegrass	1	11.87
Big leaf lupine	0.97	0.07
Fireweed	0.03	0.81

[1]Forage species.

MPMC undertook Aboriginal engagement, with the Xatśūll and T'exelcemc FN, to identify and incorporate culturally important species into planting trials. Over 25 species were identified, however, some species were dismissed from use because they were non-native and were not documented by the baseline studies. Table 6-19 lists culturally important species and results from planting trials, if implemented.

Table 6-19 also overviews the results of the MPMC revegetation research trials (i.e., vegetation success) at the Facility. Results from these trials allow an opportunity to improve site-specific reclamation knowledge and allow refinement and adjustment of revegetation prescriptions.

Ongoing research is also continuing to refine vegetation species selection including grass and forb's trials, culturally important species trials, trials related to increase deciduous tree and shrub diversity, and to conduct seed collections used for future reclamation.

Table 6-18. Summary of Culturally Important Species, Identified by FN groups, and Non-Culturally Important Species including Location and Planting Results, if Planted.

	Species Common Name	**Latin Name**	**Location of Trial**	**Results**	**Additional Information**
Culturally Important Species	Lodgepole Pine	*Pinus contorta*	NBD, East RDS, NEZ Dump	Successful establishment and growth at most sites, and in most moisture regimes.	
	Western redcedar	*Thuja plicat*	NBD	Poor growth and establishment.	This late successional species planted at limited areas at the Facility. Additional planting of this species at reclamation sites may be required if natural establishment does not occur.
	Balsam fir	*Abies balsamea*	N/A	N/A	Species only present east of the Rocky Mountains.
	Paper Birch	*Betula papyrifera*	NBD, East RDS, NEZ Dump	Moderate performance, best growth at moist sites.	
	Black huckleberry	*Vaccinium membranaceum*	NBD- Metro Vancouver Research Parcel	Poor establishment and growth.	
	Blueberry	*Vaccinium myrtillodies*	N/A	N/A	Not yet planted at the Facility and difficult to establish. Determine viability based on Black huckleberry performance.
	Highbush cranberry	*Viburnum edule*	N/A	N/A	Not document in baseline survey; consider plan.
	Raspberry	*Rubus idaeus*	NEZ Dump	Strong natural establishment observed.	
	Saskatoon	*Amelanchier alnifolia*	NBD, East RDS, NEZ Dump	Moderate performance.	
	Red elderberry	*Sambucus racemose*	NEZ Dump	Natural establishment observed.	Incorporations into revegetation being considered
	Wild strawberry	*Fragaria virginiana*	N/A	N/A	If seed source is found, will incorporate into revegetation prescriptions.
	Soapberry (soopolallie)	*Shepherdia canadensis*	NBD– Parcels 1-10, South Triangle, Metro Van Research Parcel	Poor-good growth and performance.	
	Cow parsnip	*Heracleum lanatum*	N/A	N/A	Expected to naturally establish.
	Common juniper	*Juniperus communis*	NBD– Metro Van Research Parcel	Performed well on hot, dry sites. Non-native plant to area.	
	Kinnikinnick	*Arctostaphylos uva-ursi*	NBD – Dry site	Trials are planned, but plant or seed source unavailable.	
	Falsebox	*Paxistima myrsinites*	N/A	N/A	Expected to naturally establish in late stages of succession in moist areas.
	Labrador tea	*Ledum groenlandicum*	N/A	N/A	Consider incorporations in non-forested organic sites (wet).
	Devil's Club	*Oplopanax horridus*	N/A	N/A	Expected to naturally establish in late stages of succession in established conifer forests.
	Yarrow	*Achilles millefolium*	NBD, East RDS	Successful establishment and growth at most sites, and in most moisture regimes.	

	Species Common Name	**Latin Name**	**Location of Trial**	**Results**	**Additional Information**
	Tiger lily	*Achilles millefolium*	N/A	N/A	Not documented in baseline survey.
	Wild potatoes	*Lilum columbianum*	N/A	N/A	Not documented in the baseline survey. Additional consulting is also required for this survey.
	Mosses	Moss spp.	N/A	N/A	Expected to naturally establish in late stages of succession in moist areas.
	Fiddlehead ferns	Fern spp.	N/A	N/A	Expected to naturally establish in late stages of succession in moist areas.
Species Identified as not Culturally Important	Douglas-fir	*Pseudotsuga menziesii*	NBD, East RDS, NEZ Dump	Successful establishment and growth at most sites, and in most moisture regimes.	
	Black cottonwood	*Populus trichocarpa*	NBD, NEZ Dump	Successful establishment in sites with adequate soil additions.	
	Trembling aspen	*Populus tremuloides*	NBD, NEZ Dump	Successful establishment in sites with adequate soil additions.	
	Prickly rose	*Rosa acicularis*	NBD	Poor growth and establishment.	
	Scoulers willow	*Salix scouleriana*	NBD	Poor growth and establishment.	
	Willow	*Salix* spp.	NEZ Dump	Successful establishment.	
	Alder	*Alnus* spp.	NBD, NEZ Dump	Variable gowth, (best establishment and most vigorous at NBD, no survival at NEZ Dump).	
	Sitka alder	*Alnus rubra*	NBD, NEZ Dump	Successful establishment in sites with adequate soil additions.	
	Hybrid white spruce	*Picea glauca x engelmannii*	NBD	Poor growth and establishment.	
	Wood rose	*Rosa woodsii*	NEZ Dump	Successful establishment.	
	Black Gooseberry	*Ribes lacustre*	NEZ Dump	Natural establishment observed.	
	Forb mix: fireweed, lupine, dryas drummondii, june grass, yarrow, pearly everlasting		NBD, NEZ Dump	Low cover (10-20%). Yarrow most established and vigorous. Fireweed successful in the NEZ Dump. Lupine low success in the NEZ Dump.	
	Grass mix: junegrass, ticklegrass, mountain brome, native red fescue, rocky mountain fescue, blue wild rye, bluebunch wheatgrass,		NBD, NEZ Dump	NBD: High rates of cover (up to 90%). NEZ Dump tall grass (e.g., rocky mountain fescuse, bluebunch wheatgrass) had higher cover than lower grasses.	

	Species Common Name	Latin Name	Location of Trial	Results	Additional Information
	lupine, fireweed, yellow mountain avens.				

Note: Tan cells indicate species that have been actively planted at the Facility; white cells indicate species that will naturally establish or species that will not be used in reclamation prescriptions.
Abbreviations and Acronyms: NBD: North Bell Dump; RDS: Rock Disposal Site; NEZ: North East Zone.

Recommendations from Past Work at Mount Polley: MPMC recommends to continue monitoring vegetation in reclamation areas to determine success of planted and naturally establishing vegetation (Appendix J of the 2019 RCP "Vegetation Assessment Results"). Monitoring of grass/forb trials, culturally important species trials, and deciduous tree and shrub trials should be used to refine vegetation prescriptions for future reclamation areas. Results from monitoring should also be used to assess the need for planting trees and shrubs.

It is recommended to continue collection of seeds from a variety of native plant species naturally occurring at the Facility for future use in reclamation.

MPMC recommends considering an annual groundcover species (e.g., fall rye) to provide short-term erosion and sediment control and organic matter inputs. An annual groundcover species, or seed mix, would not compete with trees and shrubs and could provide a more successful approach to establishing natural forest cover by removing competitive grass cover from areas where native shrub and trees are planted.

It is recommended to continue FN engagement and community-based monitoring throughout reclamation planning as well as expanding culturally important planting trials where possible. For example, the wild potato was identified in the RCP as culturally important, but has yet to be planted at the Facility.

Application from the RCP: The RCP outlines the following methods to select species for reclamation while considering the reclamation objective of meeting end land use targets:

1. Determine local species for each site series that was present prior to development;
2. Review government regulations for reforestation guidelines and dominant overstory and understory species for each site series;
3. Determine commercially available species;
4. Liaison with FN and local communities to determine species that are culturally important and support target wildlife species;
5. Use commercially available species that meet the cultural and wildlife targets;
6. Monitor species planted or seeded within each site series to determine performance;
7. Select species for reclamation to incorporate well-performing species;

8. Investigate local seed sourcing;

9. Incorporate refined prescriptions into future reclamation to develop best practices for establishment of high priority target species; and

10. Continually adapt reclamation prescriptions from new information gathered.

Revegetation prescriptions at the Facility have been developed to mimic natural successional trajectories while meeting land use objectives, as outlined in the RCP (2019). End land use objectives include supporting wildlife values, commercial forestry, and livestock grazing. Successional trajectories of the mine site begin with ground cover establishment (i.e., to prevent ESC issues and invasive plant introduction), followed by planting deciduous trees and shrubs (i.e., promotes wildlife/biodiversity and reduces ESC issues and invasive plant introductions), planting early seral stage conifers (e.g., Lodgepole pine and Douglas-fir), and finally the natural establishment of climax woody species (e.g., Western redcedar, subalpine fir, and hybrid spruce). Site-specific planting trials will provide additional information in regards to successful species within areas of the Facility that can be incorporated into established revegetation prescriptions used during site-wide reclamation (Table 6-20).

Table 6-19. Site-Specific Reclamation Revegetation Prescriptions.

Location	**Revegetation Prescription**
Power Lines	Plant trees and shrubs only, as ground cover already exists.
Pits: Exposed pit faces	Leave unvegetated due to safety issues (i.e., steep terrain and poor access) as permitted under Section 10.7.13 of the *Health and Reclamation Code for Mines in British Columbia.* If access allows, a native grass and forb seed mixture will be broadcasted and hand planted with species that will grow on colluvial venners and steep dry sites (e.g., Lodgepole pine, black cottonwood, Sitka alder, and common juniper).
Ramps	Rip and revegetate with species outlined in 02 site series.
Flooded pits	Consider planting duckweed, pond weed, yellow pond lily, water sedge, beaked sedge, common cattail, river horsetail, and bull rush to increase aquatic species habitat.
Stockpiles	Create mosaic of forested site types based on slope, aspect and substrate type.
Roads	For areas of light Use: preserve roads required for monitoring; roadsides will be seeded with native grass/forb mixture; plant roads according to appropriate site series. Plant haul Roads (e.g., WHR, Tailings Access Road, New Access Road, Wight Pit Haul Road, Wight TSF Haul Road, Old TSF Haul Road): with vegetation appropriate to site series.
TSF	Create a patchy mosaic of deciduous trees and shrub thickets. Low-lying areas should be revegetated with deciduous species including black cottonwood, willow (plugs, wattles or live stakes), Sitka alder, and red osier dogwood. Plant aquatic plants including water sedge, beaked sedge, common cattail, river horsetail, yellow pond lily, and narrow-leaved bur-reed.
Till Borrow Pits	Monitor planted areas.

	Site series 02, 03: plant species according Table 6-16. Site series 01, 05, and 07: plant deciduous including black cottonwood, willow (plugs, wattles, or live stakes), Sitka alder, and red-osier dogwood. Can collect water sedge, beaked sedge, common cattail, river horsetail, yellow pond lily, and narrow leaved bur-reed.

Similar Research outside of Mount Polley: Since MPMC has already developed an extensive research program that targets site-specific species for revegetation, literature review outside of MPMC is not required.

6.2.2 *Ecosystem Restoration: Research Requirement (g)*

Description: As per requirement g, the Permittee shall conduct research intended to inform design of and to test potential mitigation options for restoring ecosystems and habitats that are predicted to be affected by mining activities.

Overview of Past Work at Mount Polley: N/A. Research involving heat or cover treatments for controlling competitive grass cover and invasive plants not yet been completed at the Facility.

Recommendation from Past Work at Mount Polley: N/A

Application from the RCP: The RCP does not contain suggestions for cover treatments during planting.

Similar Research Outside of Mount Polley: It has been shown that non-target vegetation, such as grasses and forb's, can rapidly occupy rooting space and lead to reduced growth of target vegetation (Bockstette et al. 2017). Cover treatments, such as woven landscape fabric or polyethylene film, has been shown to be effective at suppressing growth of non-target or invasive species while significantly increasing growth and survival of target species (Appleton et al. 1990; Martin et al. 1991; Feldman et al. 2000; Musselman et al. 2009; DWB 2020). Polyethylene is inexpensive but requires repeated annual material and labour costs (laying down, removal and disposal), can reduce plant water access, can create oxygen deficiencies, and can create buildup of carbon dioxide from the plastic (Appleton et al. 1990; Feldman et al. 2000). Conversely, landscape fabric only requires a single installation, is permeability for water and air movement and long-term soil fertility can be maintained under landscape fabric through fertilization, additions of soil amendments, and moving landscape fabric every few years (Appleton et al. 1990; Feldman et al. 2000). It has been shown that spun-bound nonwoven fabric is superior to meshed non-woven fabric in reducing non-target species growth (Martin et al. 1991).

6.2.3 *Soil: Research Requirement (i)*

Description: As per requirement i, MPMC will conduct research to inform the development of a soil replacement plan that is designed to achieve land capability and end land use objectives. The ability of vegetation establishment and success is often an indication of successful soil replacement. In addition, the measurable variables of end land use objectives are defined by establishment of an old growth forest (Table 5-1 "End Land Use by Site Series and Structural Stage" of the RCP).

Overview of Past Work at Mount Polley: Soils at the Facility are salvaged and either immediately used for on-site reclamation purposes or are stored for future use, as requirement under the BC *Mines Act* and Permit-200 (stated within the Soil Management Plan, Appendix U of the RCP).

The Soil Management Plan also includes practices that have been, and will be, implemented during soil replacement which include reducing compaction when re-applying soils by conducting works under ideal moisture conditions, reducing/eliminating traffic on soils applied for reclamation, increasing microtopography while applying soils for reclamation, and using CWD to increase habitat diversity

Previous research conducted at the Facility that can inform the development of a soil replacement plan has included test plots in the East RDS (Section 6.1.1), soil stability modelling and design creation (Section 6.1.2), and tree trials in the NBD (Section 6.1.1). In order to have successful revegetation establishment, results from this research suggest using a minimum of 25-40 cm of soil, applying light additions of biosolids (50-75 dT/ha), and seeding (5-10 kg/ha) with seed that is low-growing and non-competing of grass and forbs. Results also suggest that CWD (20-40 m^3/ha) can be used to increase soil complexity and create microsite habitats for vegetation establishment.

Although the Facility currently has sufficient soil volumes for reclamation, if insufficient soil is available contingencies will be explored to ensure adequate volumes. These may include additions of soil amendments, borrowing glacial till material from current borrow areas around the TSF, mixing tailing with till and locating other sources of reclamation soil (on or off site).

Recommendations from Past work at Mount Polley: Outstanding recommendations were identified from previous research projects at the Facility to inform the soil replacement plan.

Research conducted on the 1998, 1999 and 2000 tree trials within the East RDS suggests:

- Maintaining monitoring of the tree trials in the East RDS (ideally up to 50 years);
- Conducting soil nutrient, heavy metal and soil physical property measurements on tree foliage;
- Determining tree nutrient and heavy metal levels in foliage;
- Measure vegetation biomass on the trial plots (to help correlation to soil and ecosystem productivity); and
- Initiate a trial in the TSF to determine the most appropriate soil cover profile for this area.

Research conducted in the NEZ Dump from 2010-2015 suggests a few recommendations for soil improvements including:

- Applying low rates of fertilizer and biosolids, and reduced application rates for grass and forb seed mixes to reduce the risk of establishing competitive vegetation cover; and

- Applying CWD to produce microsite habitats and provide a diversity of shade and moisture surface conditions that will promote natural establishment of native tree and shrubs.

A variety of reclamation research trials that involved testing various soil covers within the NBD include the Metro-Vancouver Research Parcels 1-6 and 7-12, the South Triangle, Phase 1 and Phase 2, Parcel 1-10, the Beside Research, and the Wrap Around Toe. Below is a summary of recommendations from this research:

- Metro-Vancouver Research Parcels 1-6 and 7-12: Monitoring is recommended for these parcels. Future reclamation projects should include applications of glacial till and biosolids to soils for best results. It was recommended that till and biosolids are mixed thoroughly to avoid harming the foliage on the seedlings;

Other recommendations from previous research include:

- Implementing the soil stability design based on the soil stability modelling created by Golder (See Section 6.1.4).

Application from the RCP: The RCP (2017) has recommendations for soil profile designs and soil amendment prescriptions in Section 5.4.1.1 and Section 5.4.1.2, respectively. Although soil profile designs, based on site series (See Figure 6-3 below), are informed by previous research, effectiveness of these designs should be tested in order to determine if successful land capability and land-use objectives can be met. Test plots have been established within site series 01 and 06, in the East RDS, and site series 01, 02 and 04, in the NBD, which suggests that proposed soil profiles should hold validity, although, vegetation success could be measured to determine the large-scale effectiveness of these profiles. No data exists pertaining to proposed soil profiles within site series 05, non-forested areas, and the TSF, which indicates the need for test plots within these areas.

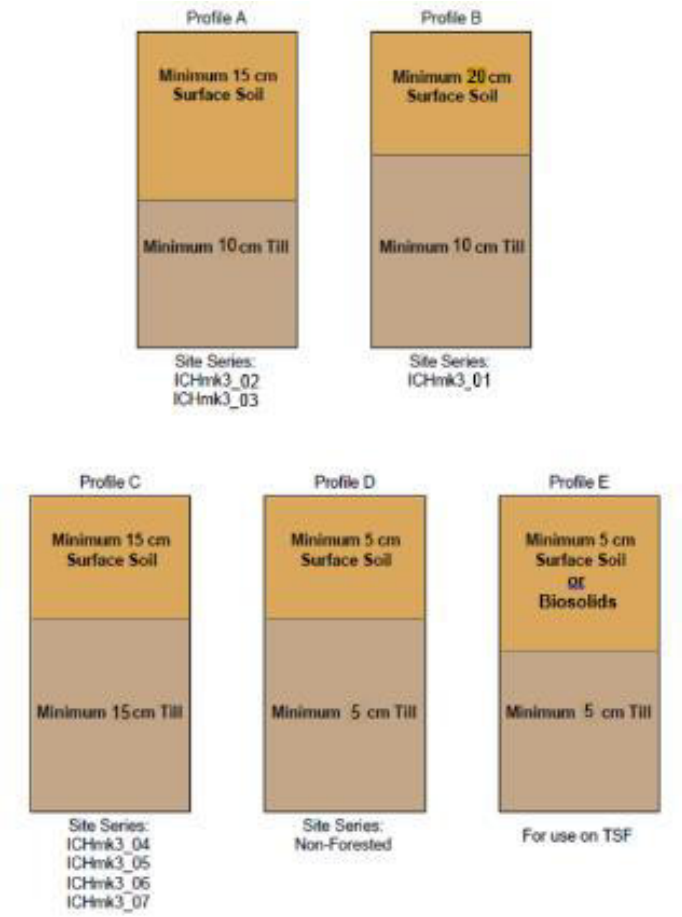


Figure 6-4. Proposed Reclamation Soil Profiles extracted from the 2018 RCP.

Similar Research Outside of Mount Polley: Research outside of the Facility has also shown improvements in soil composition with additions of soil amendments (Sims et al. 1984; Montgomery 2007; Pascualt et al. 1999; Stewart et al. 2000; Straker et al. 2003; Larney and Angers 2012).

Desulphurized tailing (or non-acid generating sand), combined with fertilizer, has also been shown to be a suitable amendment to mine soils that can increase the volume available for reclamation (Carson et al. 2014).

Incorporation of CWD into soils has also been shown to improve soil quality, aid in erosion control, enhance diversity, and function in a long term storage of organic matter (Kwak et al. 2015; Pinno and Gupta 2018). There is also evidence that CWD can increase plant cover and create microsites (Brown and Naeth 2013), improve soil microbial communities (Kwak et al. 2015; Kwak et al. 2016) and improve soil chemical and physical properties (Brown and Naeth 2013, Kwak et al. 2015).

CWD or other wood alternative materials (e.g., wood chips at a low application rate) can also be used as an alternative to grass seeding/cover, as previous planting trials at the Facility indicated that extensive grass cover has impeded tree and shrub establishment (Sanborn et al. 2004; Breton et al. 2016; Klimek et al. 2020). Wood materials can reduce root competition from

competing grass cover and can reduce damage to seedling by indirect wildlife browsing on grass cover. Wood chips applications have also been shown to be an effective amendment for areas of steep slope conditions because they stay in place (Breton et al. 2016).

6.2.4 *Soil and Invasive Species: Research Requirement (i)*

Description: In addition to Section 6.1.1, which outlines additional research required for a soil replacement plan to achieve land capability and end land use objects, a specific request by the ministry was provided to ensure invasive plants identified on stockpiled biosolids were properly managed prior to moving materials.

Overview of Past Work at Mount Polley: N/A. Research involving treatment of invasive plants has not yet been completed at Mt Polley.

Recommendation from Past Work at Mount Polley: N/A

Application from the RCP: The Invasive Plant Management Plan for the Facility, Appendix V of the RCP, outlines a control program to prevent the introduction and spread of invasive plants and manage invasive plants found at the site.

Similar Research Outside of Mount Polley: Development of successful treatments for invasive plants has previously been established through scientific investigation of plant response to various treatment regimes, including those invasive species that occur within the Cariboo Chilcotin region (Inada 1973; Horowitz 1980; Horowitz et al. 1983). Recommended treatment options for species that occur within the Cariboo Chilcotin region, which may occur at the Facility, are listed in Table 6-21. These species are managed by the Chilcotin Invasive Plant Committee.

Table 6-20. Invasive Species Profiles and Recommended Treatment Options within the Cariboo-Chilcotin Invasive Plant Committee Management Area from 2020.

Species	Type	Recommended Treatment Option						
		Deadheading, hand pulling	Herbicide	Mowing	Bio-control	Digging	Cutting	Covering
Baby's Breath	Perennial	X	X					
Black Henbane	Annual or biennial	X	X					
Blueweed	Biennial		X			X		
Caraway	Biennial	X	X					
Common Tansy	Perennial	X	X	X				
Dalmatian Toadflax	Perennial	X	X		X			
Diffuse Knapweed	Biennial or short-lived perennial	X	X		X			
Field Scabious	Perennial	X		X		X		
Flowering Rush	Perennial					X		
Himalayan Balsam	Annual	X						
Hoary Alyssum	Biennial or short-lived perennial	X	X					
Hoary Cress	Biennial or short-lived perennial		X	X				
Hound's Tongue	Perennial		X		X		X	
Knotweeds	Perennial	X					X	X
Leafy Spurge	Perennial	X			X			
Marsh Plume Thistle	Biennial	X	X					
Meadow Knapweed	Perennial	X		X	X			
Mountain Bluet	Annual	X	X					
Nodding Thistle	Biennial	X	X	X	X			
Perennial Pepperweed	Perennial	X	X				X	
Plumeless Thistle	Biennial	X	X	X				
Purple Loosestrife	Perennial	X	X		X			
Russian Knapweed	Perennial	X	X	X				
Spotted Knapweed	Biennial or short-lived perennial	X	X		X			
St. John's Wort	Perennial		X		X			
Sulphur Cinquefoil	Perennial		X			X		
Wild Chervil	Annual, biennial or perennial		X			X		
Yellow Flag Iris	Perennial	X						X

Note: Other treatment options exist should other jurisdictions prefer alternative treatments. Check with the local government to confirm correct treatment for the plant and area of concern.

6.2.5 *Reclamation Prescription for the TSF: Research Requirement (j)*

Description: As per requirement j, MPMC shall conduct research to inform reclamation prescriptions for the TSF, such that it will meet end land use and land capability objectives. The TSF areas include the tailings surface, the roadways, the embankments, spillway, dam wall, etc.

Overview of Past Work at Mount Polley: An abundance of previous research has been conducted at the Facility pertaining to partial reclamation of the tailings beach, the use of tailings as a soil amendment, and the rehabilitation of Hazeltine Creek following the 2014 breach of the TSF and subsequent tailings spill.

At the Facility, site staff noted growth of volunteer grass species on the site tailings beach areas in the spring and summer months of 2002. Growth was attributed to the combination of nutrients present in the tailings surface from manure of cattle that grazed in the area, and native seeds blown onto the beach from the surrounding areas.

During a care and maintenance period from 2002 to 2004, a typical grass seed mixture was applied across 8 ha of the northeast TSF beach area (Section 4.3.2.4 of the RCP). Although a formal vegetation assessment was not completed, photos of revegetation success were taken. Photo documentation revealed some success of revegetation on the tailings beach; however, growth was limited by the fine textured tailings that remain saturated for long periods.

Tree plot trials within the East RDS, established in 1998, 1999, and 2000, showed that additions of tailings as an amendment to mine soils can be beneficial for tree growth and that rehabilitation efforts on the TSF (using the reverse approach) could be successful (Appendix K of the RCP; Section 7.1.1.2).

Following the TSF embankment breach, rehabilitation of terrestrial ecosystems impacted along the Hazeltine Creek channel was initiated and is actively underway (McMahen and Hughes 2016). This area is being remediated as per the Remediation Plan (Golder, 2019) and is outside the scope of this Plan, reclamation monitoring results and field observations from this area may provide specific recommendations for reclamation of the tailings in the TSF at closure, as well as information on success of revegetation efforts.

MPMC has partnered with Thompson Rivers University and the University of British Columbia on two research projects regarding the impacts of tailings downstream of the TSF, along Hazeltine Creek. These projects use genomics to assess the role of wetlands and riparian soils in tailings reclamation. Metagenomics will assess baseline microbial soil communities in reference and impacted riparian areas following the TSF embankment breach, which will allow monitoring of these communities over time. In addition, soil microbial communities and soil chemistry will be assessed in established bioaugmentation plots, which incorporate combinations of straw, wood chips, and a sulphate reducing microbial inoculum, as well as different mixing treatments. Results from this project will provide insight into potential techniques for reclamation of the tailings in the TSF at closure.

MPMC is also working with the University of British Columbia to assess reclamation techniques for rehabilitating soil biological communities, with the goal of improving vegetation establishment.

Native soil transfers as a microbial inoculum and method of improving soil physical and chemical properties have been tested in field and greenhouse trials. Potential additive benefits of site preparation and spatial forest legacies are also being evaluated in the field. Trials are being carried out for tailings and glacial till (subsoil) substrates, with applicability to future reclamation of the TSF and till-capped waste dumps.

Some preliminary observations of seedling establishment and survival during annual vegetation monitoring within reclaimed areas of Hazeltine Creek suggests that where soil and tailings have been thoroughly mixed (admixture), seedlings survival is moderate to high; however, where seedlings have been planted on surfaces that contain only tailings, signs of low seedling vigour, and increased seedling mortality, are evident (per comms. Allan Carson, DWB).

Recommendations from Past Work at Mount Polley: Recommendations from the East RDS tree trial plots, and preliminary observations of seedling survival within tailings impact soils in Hazeltine Creek suggest testing the design of admixing mine soils and tailings to create a suitable medium for plant growth (Section 7.1.1.2; See Appendix K of the RCP).

Application from the RCP: The TSF will remain a permeant structure which has been designed to meet applicable long-term geotechnical stability. At closure, the TSF configuration will include a small permanent pond and wetland area, and a spillway for water level control of the pond. The RCP outlines general reclamation options including creation of a mosaic of forested and wetland habitats (Section 6.10 of the RCP). The RCP suggests that a patchy mosaic of deciduous trees and shrubs be planted in upland portions of the tailings beaches, and deciduous, including black cottonwood, willow, and Sitka alder be planted in wetter low-lying areas.

Similar Research Outside of Mount Polley: Copper mines, such as Mt. Polley, often produce tailings that contain high concentrations of sulphides (Carson et al. 2014). Desulphurisation, or treatments of tailings to remove excessive sulphides, are often performed to create materials that are suitable for use as soil amendments; these materials can be used when soil supply is limited, or as a soil cap to cover sulphidic tailings surfaces (Sjoberg et al. 2003; Carson et al. 2014).

Plant establishment and growth can be limited by nutrient availability in mine tailings, specifically plant available forms of nitrogen (Hossner and Hons 1992; Carson et al. 2014). However, additions of soil amendments, such as fertilizers or biosolids which provide sources of deficient nutrients, have been shown to improve vegetation establishment and growth on tailings surfaces (Hossner and Hons 1992; Gardner et al. 2012).

6.2.6 *Soil Decompaction: Research Requirement (k)*

Description: As per requirement k, MPMC is required to assess decompaction methodologies to ensure that the severity of compaction that exists prior to commencing reclamation activities is effectively addressed in a manner intended to achieve end land use objectives and erosion control.

Overview of Past Work at Mount Polley: Much of the soil application done by MPMC on the mine site and in the breach affected areas is applied with a "rough and loose" target. This has been accomplished using techniques including mechanical mounding, ripping and windrowing. Surficial roughening at the site also has the added benefit of reducing soil erosion potential. Formal research involving compaction assessments has not yet been completed at the Facility.

Recommendations from Past Work at Mount Polley: N/A, research involving compaction assessments has not yet been completed at the Facility.

Application from the RCP: The Soil Management Plan for the Facility, Appendix U of the RCP, outlines several practices that aim to reduce compaction during soil handling and management. Some of these measures for soil salvaging and application include minimizing equipment use on soils (i.e., working systematically and planning access routes to reduce number of passes over soils), roughing the surfaces (i.e., ripping trenching, mounding, mechanical screefing (Appendix C within Appendix U of the RCP)), handling soil in a loose friable state (i.e., not handling soil under exceptionally wet or dry conditions that may degrade its physical structure), ceasing soil handling during high wind events, and scheduling activities to avoid wet and dry months.

Similar Research Outside of Mount Polley: Ample literature exists that shows soil compaction has a negative effect on vegetation growth and survival. Measurements of vegetation success is a quantitative method to determine effectiveness of soil decompaction (Josiah 1986; BC Ministry of Agriculture, 1990; Bockstette et al. 2017; Angel et al. 2018; BC Ministry of Energy, Mines & Petroleum Resources, 2019). It is imperative to decompact soils prior to planting to improve soil physical properties and improve vegetation success. Methods of site preparation, or decompaction, have been successful with a bulldozer fitted with a winged subsoiler or straight ripper shank, or an excavator (Natural Resources Canada, 2016; Table 6-22). A winged subsoiler is a class of tillage equipment that is specifically designed for decompaction without inverting the topsoil that can be used on a wide range of soil types (Natural Resources Canada 2016). An excavator can decompact soils either through a standard mounding technique (i.e., digging a hole and placing soil adjacent) or a rough and loose mounding technique (i.e., digging a hole and placing soil within and adjacent to the hole) (Natural Resources Canada, 2016).

Table 6-21. Soil Decompaction Techniques and Appropriate Site Conditions for Use (Natural Resources Canada, 2019).

Technique	Equipment	Moisture	Clay content	Seasonality	Pattern
Winged subsoiler	Dozer or excavator attachment	Med-very dry	All	Part frozen to unfrozen	Creates straight and overlapping passes (>60 cm deep). Technique does not invert topsoil. Do not use on wet sites.
Straight ripper shank	Dozer attachment	Dry	Low	Frozen to unfrozen	Overlap passes and cross-rip on highly compact soils.
Standard mounding	Excavator	Dry-very wet	All	Frozen to unfrozen	Soil is placed adjacent to excavated hole. Plant on microsite mounds.

Rough and loose mounding	Excavator	Dry-very wet	All	Frozen to unfrozen	Soil is placed adjacent to and within excavate hole.

Incorporations of CWD into compacted soils has also been shown to aid in erosion control, enhance diversity, and function in long term storage of organic matter (Pinno and Gupta 2018). There is also evidence that CWD can increase plant cover, increase microsite diversity (Brown and Naeth 2013), improve soil microbial communities (Kwak et al. 2015a; Kwak et al. 2016) and improve soil chemical and physical properties (Brown and Naeth 2013, Kwak et al. 2015b).

Soil surface sealing, or surface compaction, can occur with the kinetic energy of raindrops that destroys soil aggregates through concomitant compaction, stalking, chemical and physical dispersion and soil particle movement (Armenise et al. 2018). Surface soil sealing is a result of the infilling of fine soil material which can significantly reduce porosity and water infiltration, which in turn, limits vegetation growth (Armenise et al. 2018). Soil with higher concentrations slit and very fine sand particles, low organic matter content and poor structure will have higher incidences of soil sealing, poor drainage, puddling, and higher rates of erosion (Wall et al. 2002; Armenise et al. 2018; Table 6-23). If surface sealing occurs, this can create areas that are inhospitable for seed establishment.

Table 6-22. Variables that Affect the Erodibility of a Soil (Wall et al. 2002).

Variable	**Effect on Erosion**
Soil Texture	Erosion increases with silt and very fine sand particles.
Organic Matter Content	Soils with high organic matter content are more erosion resistant, as they hold more water.
Structure	Soils that do not break down easily are more erosion resistant
Permeability	Soils with better infiltration will have less runoff and less erosion (e.g., medium to coarse sand).
Seasonality	Soils most susceptible in the spring, especially during thaw conditions (i.e., fully saturated soils over frozen soils with low permeability). Soils less erodible in the fall during typically drier conditions.

Soil decompaction success is often measured by soil physical and chemical characteristics and vegetation success (Josiah 1986). Soil characteristics can be observational from test pits or measured in bulk density, volumetric water content, total porosity, available water capacity and penetrometer measurements (Josiah 1986; Angel et al. 2018). Vegetation success can be measured in survival and mortality rates, total plant height, percent cover, and basal stem diameter (Josiah 1986).

6.2.7 *Fertilizer and Biosolids Application: Research Requirement (o)*

Description: As per requirement o, MPMC is required to undertake study programs to evaluate the cumulative effects of fertilization on total nutrient loading and impacts to receiving waters.

Overview of Past Work at Mount Polley: Fertilizer, 18-19-18 NPK, has been applied at the Facility in the South Triangle (NBD), WHR, the East RDS Tree Plot, and NEZ Dump. However,

fertilizer use has been discontinued based on sustainability concerns. Biosolids from Metro-Vancouver, have been applied at the Facility in the NBD (Metro Vancouver Research Parcels 1-6 and 7-12; Phase 1 and 2; Parcel 1-10), the East RDS Tree Plots, and the NEZ Dump. Application of biosolids was, and must be, conducted under the supervision of a qualified professional to oversee appropriate management practices.

As per the 2019 CEMP, the Facility maintains eight hydrology monitoring stations, as required by the M-200 permit, which monitor surface and ground water chemistry parameters. Results of these analyses are submitted to the Director (ENV Statutory Decision Maker) every month that discharge occurs. Water sample parameters that are required to determine impacts of fertilizers/biosolids on receiving waters include temperature, pH, nitrate, nitrite, and ammonia (MPMC Environmental Department 2019). The CEMP does not include a schedule for monitoring receiving waters prior to, or following, the application of fertilizer or biosolids to an area.

Recommendations from Past Work at Mount Polley: N/A, research involving impacts to receiving waters from fertilizer/biosolids has not yet been completed at Mt Polley.

Application from the RCP: The 2019 RCP states that water quality monitoring is required to determine the long-term chemical stability of mine contact water and to verify model predictability that can be used for water management planning.

Water treatment summaries are found in the RCP, including Appendix G (RCP Water Modelling Report) and Appendix H (Draft Water Treatment Update to the Reclamation and Closure Plan) which outline water management strategies related to treatment and monitoring of contact water at the Facility.

Similar Research Outside of Mount Polley: Fertilizer provides inputs of essential nutrients (e.g., nitrogen, phosphorous, and potassium) that can be effective at promoting vegetation growth. Retention of nitrogen following fertilization is largely related to the nutrient uptake capacity of the present vegetation (Winkler 1986) and the top organic soil layers (Flint et al. 2008). As such, reduced vegetation cover will lead to increases in soil moisture and temperature, increased microbial activity and decreased nitrogen uptake (Winkler 1986).

Indirect fertilization inputs to watercourses, in the forms of nitrite, nitrate and ammonia, can be toxic to freshwater fish and other aquatic animals such as invertebrates and amphibians (Lewis and Morris 1986; Jensen 2003; Camargo et al. 2005). Toxicity occurs through active transport of nitrite, nitrate, and ammonia across gills which can cause mortality from compromised blood oxygen transport; ammonia can also impair growth, stamina, swimming ability and metabolism (Lewis and Morris 1986; Jensen 2003; Camargo et al. 2005). Nitrogen based compounds are regulated under the BC WQG that provides short-term maximum (i.e., 96 hrs) and long term-term averages (i.e., 5 samples over 30 days) for human health (i.e., drinking water) and freshwater aquatic life (Table 6-24).

Table 6-23. Ministry of Environment Guidelines for Nitrite, Nitrate and Ammonia, Found in Fertilizer, for the Protection of Human Health and Freshwater Aquatic Life (Ministry of Environment 2019).

Parameter	**Maximum values for Human Health (i.e., drinking water)**	**Maximum Values for Freshwater Aquatic Life (mg/L)**		
Nitrite	1.0 mg/L	**Chloride**	**Short Term**	**Long Term**
		<2	0.06	0.02
		2-4	0.12	0.04
		4-6	0.18	0.06
		6-8	0.24	0.08
		8-10	0.30	0.10
		>10	0.60	0.20
Nitrate	10.0 mg/L	-	**Short Term**	**Long Term**
		-	32.8	3.0
Ammonia	No current guidelines	**pH @ 20°C**	**Short Term**	**Long Term**
		7.0	19.2-23.2	1.22-2.08
		9.0	0.752-0.703	0.102-0.135

Note: When nitrate and nitrite are present, total nitrate-nitrogen plus nitrite-nitrogen should not exceed the nitrate BC WQG (Ministry of Environment, 2019). Short Term is Defined by samples collected in the first 96 hrs following a treatment; Long Term is Defined as 5 Samples collected over 30 Days following treatment.

Previous research has indicated that cold weather conditions reduce the likelihood of nitrite release into streams (Anderson 2002) and that nitrate accumulation is rare (Smith et al. 1997). Most studies have indicated that values of nitrate accumulation are well below the maximum threshold, under the water quality guidelines, and slightly increase during the first major storm or snowmelt (Eremko, 1987, 1990).

Biosolids applications have the potential to release organic and metal contaminants to surface and groundwater (Stehouwer et al. 2006); rates of release will be dependent on contaminates present (and their concentrations), microbial decomposition and vitalization, and uptake of plants (Haynes et al. 2009; LRCS 2016). Some of these contaminants can bind to soil, dissolved aluminum, ferric oxides or organic matter (McBride et al. 1997). Potential for ground and surface water contamination is highest immediately after land application, with high concentrations of soluble organic matter levels, and during significant rainfall events (Haynes et al. 2009). Soil permeability, soil depth, slope and aspect can also affect soil contamination of water. Even at low levels, these organic contaminates in biosolids can pose a risk to aquatic organisms (Arnold et al. 2014; Jones et al. 2004; Wu et al. 2015), although very limited field-based research has been completed to date. However, previous research has indicated low metal leaching following modest biosolids application (Gottschall et al. 2012; Hanief et al. 2015; Joshua et al. 1998; Rostago and Sosebee 2001).

7 PROJECTED 5-YEAR RECLAMATION RESEARCH PLAN

The projected 5-year plan for reclamation research at the Facility will include the challenges identified from progressive reclamation works (Section 5.1.2) and outstanding reclamation research requirements (Section 6.2) and are summarized in Table 7-1. Detailed descriptions of proposed projects are provided in Sections 7.1 to 7.8. While these projects are designed to fill in gaps in existing research, they are currently only at the proposal stages and not all of the final design work has been completed. As such, some of the proposed projects may be changed or eliminated based on the outcomes of the final design work. An initiation date for the projected 5-year reclamation research plan has not yet been determined but a tentative schedule for the research projects is provided in Section 7.9.

Table 7-1. Summary of Ongoing and Future Reclamation Research at the Facility and their Relevance to Permit Conditions.

Permit Condition	Permit Condition Status (Incomplete, Partially Completed or Completed)	Ongoing or Future	Projects	Description	Location	End Land Use	Informs progressive Reclamation
a	Incomplete	N/A	N/A	N/A	N/A	N/A	N/A
b	Partially Completed	Ongoing/Future	See Sections 6.0, 7.0, 8.0				All ongoing and future research at the Facility is conducted to continuously improve reclamation strategies that aim to satisfy end land use objectives.
c	Partially Completed	Ongoing/Future	Anaerobic Biological Reactor	Semi-passive water treatment	Toe of TSF	**Structural Stage 7 (Old Growth Forest)** Commercial Forestry Recreation FN Use Wildlife Habitat (Winter Range – Ungulate, Birds, Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat	
d	Partially Completed	Ongoing	Metro Vancouver Research Parcels 1-6 and 7-12	Soil amendments & revegetation	NBD		
			South Triangle		NBD		
			Phase 1 and Phase 2		NBD		
			Parcel 1-10		NBD		
			Beside Research		NBD		
			Wrap Around Toe		NBD		
			East RDS		East RDS		
		Future	Species-Specific Planting Trials	Revegetation	Areas that lack established trials (e.g., TSF).		
e	Completed	N/A	RCP Appendix B – Baseline Environmental Setting and Land Capacity	Baseline Assessment	Mine site.		
f	Incomplete	Future	See Section 8.3	N/A	N/A		
g	Partially Completed	Ongoing	Projects identified under requirement (c), (d), (i), (j), (k), (l), (m), (n), (o)	Includes water management strategies, revegetation strategies and metal uptake in vegetation, soil management including decompaction, TSF management, and fertilization effects	All areas of the mine.		
		Future	Projects identified under 5-year plans (Section 8.0) for requirement (c), (d), (i), (j), (k), (l), (m), (n), and (o).				
	Incomplete	Future	Methods for Reducing High Competing Grass Cover	Revegetation	Areas with high grass cover that are successional stagnant.		
h	Partially Completed	Ongoing	Projects identified under requirement (c), (d), (i), (j), (k), (l), (m), (n), and (o).	Includes water management strategies, revegetation strategies and metal uptake in	NBD, NEZ Dump, East RDS, Springer Cariboo Pit, Mill Site, TSF, and Polley Flats.		

Permit Condition	Permit Condition Status (Incomplete, Partially Completed or Completed)	Ongoing or Future	Projects	Description	Location	End Land Use	Informs progressive Reclamation
		Future	Projects identified under 5-year plans (Section 8.0) for requirement (c), (d), (i), (j), (k), (l), (m), (n), and (o).	vegetation, soil management including decompaction, TSF management, and fertilization effects.	Locations with ongoing research trials and areas that lack established trials (e.g., TSF, site series 05, non-forested areas, compacted soil areas), areas with high grass cover that are successional stagnant, NW Sump, 9K Sump, South Toe Drain, Bootjack Lake, Edney Creek, and selected from current water sampling sites.		
i	Partially Completed	Ongoing	Metro Vancouver Research Parcels 1-6 and 7-12	Soil Amendments	NBD		
			South Triangle		NBD		
			Phase 1 and Phase 2		NBD		
			Parcel 1-10		NBD		
			Beside Research		NBD		
			Wrap Around Toe		NBD		
			East RDS		East RDS		
		Future	Soil Replacement Plan	Soil Amendments	Areas that have not yet had test plots established (e.g., site series 05, TSF, non-forested areas).		
			Management for Invasive Plants	Soil Amendments & Vegetation Management	Based on locations of invasive plant infestations.		
j	Incomplete	Future	TSF	Water Management, Soil Amendments, Revegetation Prescriptions and Metal Update in Vegetation.	TSF	**Structural Stage 1 to 3 (Sparse-Shrub/Herb)** Recreation FN Cultural Use Wildlife Winter Range (Ungulate Focus) Wildlife Habitat (Birds, Small Mammals, Black Bear) Livestock Grazing	
k	Incomplete	Future	Assessment of Soil Decompaction	Testing of decompaction methodologies.	Sites will be determined based on severity of soil compaction.	**Structural Stage 7 (Old Growth Forest)** Commercial Forestry	

Permit Condition	Permit Condition Status (Incomplete, Partially Completed or Completed)	Ongoing or Future	Projects	Description	Location	End Land Use	Informs progressive Reclamation
m	Incomplete	Future	Reclamation and Research Monitoring Plan	Monitoring Plan of ongoing and proposed research.	All areas of the mine.	Recreation FN Use Wildlife Habitat (Winter Range – Ungulate, Birds, Cavity Dependent) High Biodiversity Value Rare and Listed Plant Habitat	
n	Partially Completed	Ongoing, Future	Metal Uptake in Vegetation 1989-2015	Determining amounts of various metal uptake in vegetation.	Springer Cariboo Pit, Mill Site, TSF, East RDS Plots, NBD Parcels 1-10, NEZ Dump		
		Future	Reclamation and Research Monitoring Plan	Monitoring Plan of ongoing and proposed research	All areas of the mine.		
o	Partially Completed	Initiated		Fertilizer was applied but the CEMP does not include a schedule for monitoring receiving waters pre- and post-fertilization.	NBD, WHR, East RDS, NEZ Dump		
		Future	Cumulative Effects of Fertilization on Total Nutrient Loading and Impacts to Receiving Waters	Determining effects of fertilization including fertilizer and biosolid applications to receiving waters.	Water quality sampling sites will be dependent on areas that fertilizer or biosolids are applied.		

Abbreviations and Acronyms: RDS: Rock Disposal Site; RCP: Mine Reclamation and Closure Plan; NBD: North Bell Dump; TSF: Tailings Storage Facility; NEZ: North East Zone, WHR: Waste Haul Road.

7.1 WATER MANAGEMENT STRATEGIES AND POST-CLOSURE MAINTENANCE AND CONTINGENCY REQUIREMENTS: RESEARCH REQUIREMENT (C)

Description: The Permittee shall conduct research to inform closure water management strategies and identify post-closure maintenance and contingency requirements.

Rationale: Ensure that water management outcomes align with the objectives detailed in the Water Management Plan, and conform to BC WQG.

Approach: Passive and semi-passive wastewater treatment development is ongoing. Several water treatment systems are being investigated at the Facility and are in the pilot testing stage or under current development (See Section 6.1.4 for details). The following recommendations are in reference to all water management at the Facility including current and proposed treatment systems.

Step 1: Continue to assess and update mine hydrology models (if deemed necessary) to establish a water balance and a discharge inventory. Continue utilizing the two existing meteorological stations on the mine site, in conjunction with the existing network of gauges, weirs, and wells in use. Assessments and modelling should focus on understanding quantity, location, and flow of water on site, to inform discharge and treatment options. Long-term data sets are of greater use to adaptive management than short-term ones, so whenever possible, continue with established regimens to generate hydrological data that reflects the changes from operation, to care and maintenance, to closure, and reclamation. Particular attention should be paid to peak flows during freshet, which have the potential to overwhelm water management systems.

Continue to assess on-site mine contact water bodies (i.e., TSF South Toe Drain, pit lakes, sumps, ditches) and identify substances deleterious to human or aquatic life. Research at the Facility has already identified potentially deleterious substances (e.g., trace metals and metalloids (such as copper, selenium, molybdenum), soluble nutrients/ions (e.g., such as phosphate, nitrate) and body-specific contaminants of concern and contaminants of potential concern (Golder 2017; Golder 2020; Appendix H of the RCP); this data should be collated.

Continue pilot-scale studies at the Facility for water treatment systems to fruition to determine BAT.

Step 2: Develop a maintenance sampling schedule for passive and semi-passive treatments from historical sampling results, under the discretion of a qualified professional. Five years of data from initiation of a water treatment system should provide the systems that are the BAT for post-closure maintenance.

Step 3: Develop a contingency plan for water management in the event that the BAT water treatment system under-perform or if unprecedented changes occur to the Facility's water balance, in the post-closure environment. Potential trigger scenarios and subsequent actions are summarized in Section 6.1.4.

Step 4: Monitor and record maintenance efforts for water management infrastructure. This information can be used to develop closure and post-closure maintenance requirements and cost models.

Location: NW Sump, 9K Sump, South Toe Drain, Bootjack Lake, Edney Creek, pit lakes.

Timing: Timing of implementation and monitoring of water treatment systems will be dependent on the phase of development for each water treatment system. Monitoring should continue for active water treatment systems and for pilot studies until sufficient data exists to determine whether or not the system can be incorporated into the Facility's long-term water management plan as a BAT.

Duration: Year 1-5: Annual monitoring to inform post-closure plans.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): High. It is recommended to collect and analyze 12-20 water samples per month over the entire five-year period. However, as sampling can be incorporated into existing monitoring programs costs may not increase the gross budget for water quality monitoring.

Future Application as a Part of RCP: Recommendations from this five year plan would be relevant to the RCP, as sampling techniques and locations could be kept continuous post-closure, and passive treatment is planned to continue in perpetuity.

7.2 SPECIES-SPECIFIC PLANTING TRIALS: RESEARCH REQUIREMENT (D)

Description: Planting trials to test specific species or compositions for specific site conditions.

Rational: Establishing revegetation trials within areas lacking revegetation trials will inform future revegetation prescriptions on a site-specific basis and meet end land use objectives, as defined in Table 5-1 of the RCP.

Approach: Step 1: All recommendations from existing trials should be applied to new trial areas, where practical (Section 6.1.1). For all areas where trials have not yet been established, determine appropriate locations for test trials.

Step 2: Establish planting trials within each area that includes the appropriate revegetation prescriptions based on the site-specific reclamation planting prescriptions (Table 6-15; Table 6-16), the site-specific grass/forb mixture (Table 6-17), and culturally important species (Table 6-16). In addition, detailed progressive reclamation prescriptions should be considered from the RCP (Table 4-2). Appropriate soil amendments should be added to ensure successful vegetation establishment (Figure 6-3 in Section 6.2.4). It is recommended to reference the latest version of site-series information for the Cariboo region from "A Field Guide to Forest Site Identification and Interpretation for the Cariboo Forest Region" (Steen and Coupe 1997).

Step 3: Monitor vegetation success on a consistent basis, as completed within historical trial areas. Metal uptake in vegetation and soils should also be monitored within newly established test plots.

Step 4: Use results gathered from monitoring (i.e., species-specific success) to refine vegetation selection in future reclamation areas.

Step 5: Continue consultation with FN for knowledge exchange.

Location: Location of new revegetation trials will be based on areas that currently lack trials (e.g., the TSF). Monitoring will be conducted on established trial areas.

Timing: Year 1: Establish new trial areas for revegetation, applying vegetation prescriptions based on site-series and land use objectives, including culturally important species.

Year 2-4: Vegetation monitoring should be completed annually at similar times of the year during the growing season to provide data that meets the assumptions for statistical analyses.

Duration: Monitoring of revegetation success should be completed annually for at least five years post-planting. Ideally vegetation monitoring should continue until the natural successional trajectory that aims to satisfy the end land use objectives has clearly been established.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): Low, generally pertains to continued monitoring of established research trials.

Future Application as a Part of RCP: Results from the revegetation prescription trials should provide strong evidence to inform future species selection, including culturally important species, for site-specific areas at the Facility.

7.3 Methods for Reducing High Competing Grass Cover: Research Requirement (G)

Description: Use of landscape fabric when planting tree and shrub seedlings in highly competitive grass/forb cover.

Rational: Using landscape fabric to suppress competitive grass/forb cover, in combination with planting native trees and shrubs, will contribute to meeting the end land use objectives, as defined in Table 5-1 of the RCP.

Approach: Step 1: Determine areas that have highly competitive and/or successional stagnant grass cover throughout the Facility for selection of cover treatment sampling sites. Areas of highly competitive cover can be generally defined as those with ≥ 40 % grass cover or areas where grass cover appears to be sod forming and is preventing natural of native seed from natural dispersal vectors (e.g., wind, animals). Sites selected for cover treatments should consider the area required for cover as materials for treatment are costly.

Step 2: Establish cover treatments at a control site and sampling sites in areas with highly competitive grass cover. At sampling sites, begin by removing the grass cover and then installing landscape over the exposed soil. Alternative, to test a reduced effort approach, one additional treatment to consider would be testing the installation of landscape fabric directly over grass cover (no grass removal).

Step 3: Cut small holes in the landscape fabric and plant seedlings or live stakes from species that are appropriate for the sample area site series at evenly spaced intervals. If planted during hot and dry conditions, supplement seedlings and live stakes with water to reduce mortality rates.

Step 4: Vegetation monitoring should be conducted annually to assess the survival and growth rates of seedlings and/or live stakes. Monitoring of control sites and treatment sites can be compared to determine success of cover treatments.

Location: Use of landscape fabric should only be used in small areas when doing island restoration, such as heavily grassed areas that are successionally stagnant. A site assessment will be required to determine locations.

Timing: Year 1: Establish cover treatments and apply appropriate vegetation prescriptions based on site-series and land use objectives.

Year 2-4: Monitor success of cover treatments annually, during the growing season, at similar times of the year to meet assumptions for statistical analyses.

Duration: Monitoring the success of the cover treatment should be completed annually for at least five years post-planting to ensure target vegetation is well established. Re-planting and removal of non-target vegetation may be required in areas with extensive non-target growth. Ideally vegetation monitoring should continue until the criteria for vegetation monitoring (see Section 8.1) are met.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): Cost will dependent on the area size of cover treatment.

Future Application as a part of RCP: Results from cover treatments will determine success of target species with cover treatments, effectiveness of cover treatments at reducing non-target vegetation, and determine if location has an effect on cover treatments.

7.4 SOIL REPLACEMENT PLAN: RESEARCH REQUIREMENT (I)

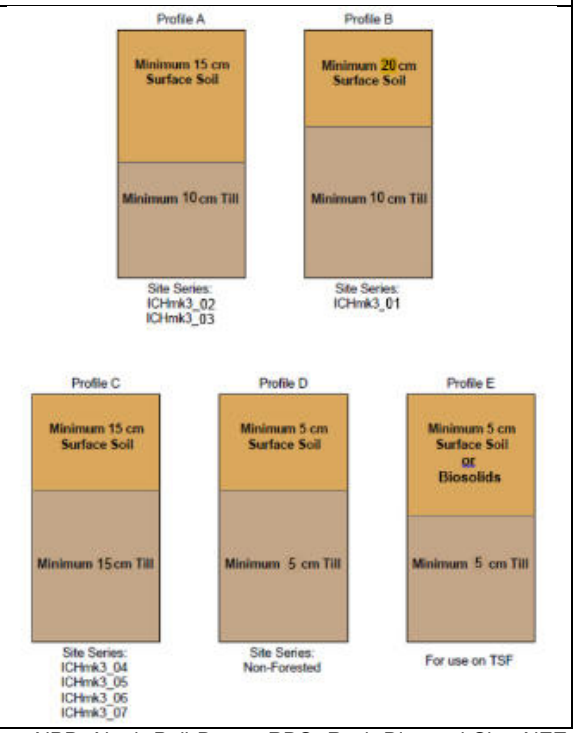
Description: Conduct research to inform the development of a soil replacement plan.

Rational: Performing research for the soil replacement will inform land use and land capability objectives, as defined in Table 5-1 of the RCP.

Approach: Step 1: All recommendations for existing sites at the Facility should be applied to test plots, where practical (See Section 6.2.4). For areas where test plots have not yet been established (i.e., site series 05, non-forested sites, and the TSF), determine appropriate locations for test plots.

Step 2: Create test plots within site series 05, non-forests sites, and the TSF using a variety of the best soil prescriptions using information from previous research at the Facility and recommendations from the 2018 RCP (Figure 5-3 from the 2018 RCP “Proposed Reclamation Soil Profiles; Table 7-2).

Table 7-2. Soil Replacement Recommendations based on Previous Research and the 2018 RCP.

Previous Research Recommendations		**2018 RCP Recommendations**
NBD	• Use a combination of glacial till and biosolids for soil amendments • Ensure biosolids are mixed thoroughly to reduce harm to seedlings	
East RDS Tree plots	• Use a minimum of 40 cm of soil • Use light additions of biosolids (50-75 dT/ha) and seed (5-10 kg) • Seed should be low growing and non-competing of grass and forbs • Add CWB at 20-40 m^3/ha • Do not plant trees directly into waste rock • Use 15-30 cm of soil amendments (i.e., biosolids, overburden or tailings) over waste rock	
NEZ	• Apply low rates of fertilizer, biosolids, and seed • Add CWD (to create microsites)	

Abbreviations and Acronyms: RCP: Mine Reclamation and Closure Plan; NBD: North Bell Dump; RDS: Rock Disposal Site; NEZ: North East Zone; CWD: Coarse Woody Debris.

Step 3: Test plots should be seeded and planted with species outlined in Table 4-2 “Detailed Progressive Reclamation Prescriptions”. This table outlines grass seed mixes, shrub and deciduous species, and conifer tree prescriptions for specific areas around the Facility based on the end land use objectives.

Step 4: Success of soil replacement prescriptions can be determined through vegetation monitoring. Monitoring should be conducted on a consistent basis, as completed within historical test plots at the Facility through vegetation monitoring and soil analysis. Metal uptake in vegetation and soils should also be monitored within newly established test plots.

Qualitative and Quantitative Measures: Success of soil prescriptions can be assessed with soil and vegetation measurements through vegetation monitoring. Qualitative data may include describing soil and vegetation conditions. Quantitative may include vegetation measurements (i.e., percent cover, total tree and shrub height, seedling vigor, grass cover vigor, and mortality rates) and heavy metal analysis (See Section 6.1.3 for metals to analyze).

Location: In addition to established research plots, test plots should be established within site series 05, non-forested areas and the TSF.

Timing: Year 1: Establish new test plots including incorporations of soil amendments, mixing of soils, and vegetation planting during non-frozen conditions. Vegetation should be selected based on site-series and end land use objectives.

Year 2-4: Complete annual vegetation monitoring at similar times of the year during the growing season to provide data that meets the assumptions for statistical analyses. In addition, complete annual metal uptake analysis of soil and vegetation.

Duration: Frequent and successional monitoring of vegetation will determine the effectiveness of the soil replacement prescriptions. Longer periods of vegetation monitoring will provide additional evidence of the success of soil prescriptions. Recommendations from the 2018 RCP suggest monitoring vegetation success at the Facility for up to 50 years post-closure.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): Cost should be generally low as most test plots have already been established. Costs will mainly be attributed to monitoring vegetation success.

Future Application as a part of RCP: Results from the soil replacement research should provide strong support for selecting the appropriate soil cover for various locations at the Facility.

7.5 MANAGEMENT FOR INVASIVE PLANTS: RESEARCH REQUIREMENT (I)

Description: Soils contaminated with invasive plants at the Facility require management during stockpiling and prior to use.

Rational: Management of invasive plants falls within requirement i, as part of the soil replacement plan, to ensure reclaimed areas are designed to achieve land capability and end land use objectives (i.e., free of invasives).

Approach: Step 1: Conduct a survey to inventory the invasive plants present at the Facility. Prior to field assessments, a desktop review could be conducted to pre-determine areas of high potential for invasive plants, such as high traffic areas, road right-of-ways, disturbed areas, and areas with poor vegetation cover. Investigation will be required to determine the invasive plant management strategies and priority ranking by the Cariboo-Chilcotin Invasive Plant Committee to inform management and treatment at the Facility.

Following the desktop review, field surveys should be completed. As per the recommendations of the *Invasive Alien Plants Pest Management Plan (IAPP) for Provincial Crown Lands in Central and Northern British Columbia* (MFLNRO 2015) information recorded during surveys included the date, species, UTM (Universal Transverse Mercator) coordinates, location description, estimation of distribution and density, distance to sensitive areas, soil texture and photos. It is recommended that invasive plant survey and inventory information be documented using the *IAPP Site & Invasive Plant Survey Record* and submitted into IAPP to add to the regional inventory.

Step 2: *Treatments*: Appropriate authorities will be consulted to determine control and monitoring measures of invasive plant species found at the Facility. If control of an invasive plant is required, treatment options and timing windows will be established that include consideration of the invasive plant species, site conditions and infestation size. Treatment of invasive plants may include mechanical or chemical control methods.

Prevention

Throughout closure and reclamation activities at the Facility, preventing the introduction of invasive plants, and quickly responding to the initial spread will be the most effective and cost-efficient method to managing invasive plants. Best managed practices outlined in Appendix V of the RCP should be followed including minimizing disturbance, seeding disturbed and/or stockpiled soil with quickly establishing seed mix, limiting vehicle and foot access through areas of infestations, and training personnel on identification and prevention methods.

Mechanical

Mechanical treatment methods can be used where invasive plants have low distribution/density because treatment is simple, effective, and eliminates the potential negative effects of chemical treatment. Mechanical treatment methods are often used in specific locations of an invasive plant infestation where herbicide is not permitted or practical; for example, near riparian habitat or other environmentally sensitive features. Types of mechanical treatment methods include hand pulling, digging/excavating, cutting, mowing, mulching, controlled burning, tilling, dead-heading, and covering/smothering. Mechanical treatments can be costly and labour intensive due to repeated monitoring requirements.

Mechanical treatment options can be limited by safety issues (i.e., burning can pose risk to workers and environment), timing windows (i.e., mowing must occur prior to seed dispersal), cost (i.e., mechanical treatment may be labour intensive; follow-up treatments may be required throughout the growing season and can be required for a consecutive 3-5 years to ensure effective treatment), and effectiveness (i.e., mowing is not effective on smaller invasive plant species; digging/dead-heading/mowing is not effective on species that grow from adventitious root buds or rhizomes.

If mechanical treatment does occur, appropriate disposal of all plant material and propagules is required. This includes placing invasive plants into dark plastic bags and bringing bags to a landfill that has a designated area for invasive plant species. Invasive plant species must not be composted. It is recommended that mechanical treatment of invasive plants is documented using the *Invasive Plant Chemical and Mechanical Treatment Record* and submitted into the IAPP to add to the regional inventory (BC MOFR 2010).

Chemical

Chemical treatment includes fertilizers and herbicides. Fertilizers can be used to increase the competitive ability of native plant species and out-compete invasive plants. Herbicides, although effective, should be used as a last resort and may not be permitted for use at the Facility (i.e., FN input).

If herbicide use is required, the Facility must obtain a certified applicator that is licensed for chemical applications. Selection and application of approved herbicide will be performed in compliance with BC's *Integrated Pest Management Act* (Province British Columbia 2003). When possible, chemical spot-treatment will be used rather than broadcast spraying to reduce negative impacts to the surrounding environment. It is recommended that application information be documented using the BC Ministry of Forests, Lands and Natural Resource Operations *Invasive*

Plant Chemical and Mechanical Treatment Record and be submitted into IAPP (MOFR 2010). In addition, herbicides will not be used under the following conditions:

- Invasive plants are within a Pesticide Free Zone (PFZ), such as near a water source or well,
- Invasive plants are within coarse textured soils that would reduce effectiveness of herbicide,
- Invasive plant treatment is occurring under inappropriate weather conditions (e.g., persistent precipitation, wind >8 km/hr, temperature >28 °C,
- Residual herbicides may not be used within 10 m of water source and 30 m from well,
- Non-residual herbicides may not be used within 1 m of water source or well,
- Residual herbicides may not be used within a gravel pit,
- Residual herbicides with the active ingredient 24-D may not be used on areas that fall within Ministry of Transportation and Infrastructure (MOTI) jurisdiction.

Step 3: *Monitor*: Monitoring should be conducted on a consistent basis to determine effectiveness of invasive species treatments. Treatment success will be determined through visual assessments including recording occurrences of new propagules and status of any plant material that had been previously mechanically or chemically treated (e.g., status of plants that were dead-headed or sprayed with herbicide).

Location: Treatment of invasive plants will be based on locations of infestations.

Timing: Survey and treatments of invasive plants should be completed prior to reclamation activities, including, but not limited to, the transport of contaminated soil, and during non-frozen conditions.

Year 1: Survey for invasive plants and record areas of infestation. If possible, treat infestations prior to seeding and during the current year.

Year 2-4: Monitor treatment areas from Year 1. Conduct annual surveys and subsequent treatments, as required.

Duration: Survey, treatment, and monitoring for invasive plants should be completed within the same year. Surveys and follow-up treatments should be completed for invasive species prior to production of seeds, typically within late spring/early summer. Follow-up treatment methods should be implemented for invasive species identified prior to plants going to seed. Monitoring of invasive species should occur no sooner than two weeks post-treatment.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): General cost will be dependent on species identified (including priority), infestation area size, density, and distribution as well as effectiveness of control methods.

Future Application as a part of RCP: Treatment and management strategies have been established for invasive species in the Cariboo-Chilcotin region which should be followed during reclamation activities at the Facility. Results from the survey of invasive plants at the Facility will identify areas and potential activities of concern that may require management during ongoing reclamation. In addition, treatment methods and their effectiveness will be documented at the Facility which can be used to manage any future establishment of invasive species.

7.6 RECLAMATION PRESCRIPTION FOR THE TSF: RESEARCH REQUIREMENT (J)

Description: Conduct research to inform reclamation prescriptions for the TSF.

Rational: Research surrounding the TSF will inform and ensure that reclamation prescriptions applied will successfully meet end land use and land capability objectives.

Approach: Research trials have not yet been established in any area surrounding or within the TSF. Trials should be established near and within the TSF that include water management strategies and post-closure requirements, soil amendment additions, metal uptake analysis, and revegetation prescriptions.

Step 1: *Tailings Properties:* Physical and chemical properties of the tailings will be evaluated to identify any adverse substrate characteristics prior to initiating revegetation trials (Hossner and Hons, 1992).

Step 2: *Soil Amendment Additions*: Test plots should include a control and treatment plots, on the TSF beach, stockpiled tailings, and surrounding areas. Treatment plots will include the proposed reclamation soil profiles suggested within the RCP for use on the TSF and potentially test the use of hydraulically applied biotic soil amendment (BSM; e.g., Profile ProGanics Biotic Soil Media) to the tailings surface. Proposed soil profiles from the RCP include 1) a 5 cm biosolids application to the surface (admixing) with 5 cm of glacial till, and 2) a 5 cm soil application (admixing) with 5 cm of till. In addition, to facilitate planting of trees and shrubs on the upper portions of the beach, a soil profile of 10cm of soil admixed with 10cm of biosoilds and placed ontop of 5cm of till, could be tested. Treatments could also potentially include the admixing of biosolids and soil directly into the surface of the tailings.

Step 3: *Revegetation Prescriptions*: Revegetate all test plots with appropriate revegetation prescriptions based on the site-specific reclamation planting prescriptions (Table 6-15; Table 6-16) and the site-specific grass/forb mixture (Table 6-17).

Step 4: *Monitoring*: Monitor vegetation establishment and growth in all test plots on an annual basis using parameters outlined in Section 8.0. Monitor metal uptake in vegetation and soils, ensuring sample size of data collected is adequate for statistical analysis. Vegetation sampling for metal analysis will be conducted using the repeatable methodology established in test plots in the NBD in 2012 and will be collected in composite samples, to mimic animal browsing, for species-specific sampling (e.g., fireweed, rye grass, red clover). Soil nutrient and heavy metal analysis will be conducted using the BCMOE *Overview of Contaminated Sites Soil Task Group Procedures for the Derivation of Soil Quality Matrix Standards for Contaminated Sites* or the *Canadian Soil Quality Guidelines for Protection of Environmental and Human Health.*

Vegetation monitoring results will be used to inform best soil amendment prescriptions and will refine vegetation prescriptions for larger reclamation areas of the TSF.

Location: The TSF beaches, stockpiled tailings and surrounding area.

Timing: Year 1: Test tailings surface of physical and chemical properties. Establish test plots on the TSF beach and surrounding area with various soil amendment and planting prescriptions.

Year 2-4: Monitor vegetation growth at similar times of the year during the growing season to provide data that meets the assumptions for statistical analyses. Monitor for heavy metal uptake annually.

Duration: Establishment, soil amendment additions and revegetation of test plots within the TSF could be completed within one summer. Monitoring success of soil cover with vegetation measurements, and analysis of metal uptake in vegetation should be completed for at least 5 years post-trial establishment.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more): High

Future Application as a part of RCP: Research will determine the best approach to developing a suitable medium for plant growth on the beaches of the TSF. Test plots should be established to evaluate a few potential plant mediums to determine the best design. Evaluation would include monitoring of plant performance, physical and chemical properties of tested mediums and metal uptake for plants. The most effective and safe approach could then be implemented on a larger scale as a second stage and, if deemed successful, could be utilized to reclaim the remaining areas of the TSF beaches. Developing a suitable medium will require improvements to the texture and nutrient availability of tailings by incorporation of a soil amendment and surface preparation.

7.7 Assessment of Soil Decompaction Methodologies: Research Requirement (K)

Description: Assess methodologies of decompaction to determine effectiveness.

Rational: Measuring decompaction methodologies prior to and during reclamation will inform land use objectives and erosion control measures during reclamation activities.

Approach: Step 1: Determine severity of compaction throughout the Facility through selection of compaction sampling sites. Compaction severity should be determined on a scale of low to high based on observations of areas with visible compaction and by digging test pits in areas of visible compaction; test pits will provide an area for compaction depths. Low compaction areas can be characterized as cleared areas that have experienced minor equipment access and high compaction areas would be characterized as with areas with repeated high traffic (e.g., road right of ways) and areas with high surface run off as a result of fine soil surface sealing. Emphasis should be placed on testing surfaces where different types of equipment have travelled. For example, large rock trucks, with their weight and size, compact soils very well, whereas light vehicles or equipment contribute much less impact to soil compaction. In addition, soil compaction can also differ between areas where wheeled or tracked equipment have passed, as wheeled

equipment results in greater compaction. Areas of high surface sealing should also be identified. Multiple sites of compaction testing may be required depending on the variability of soil compaction.

Non-disturbed baseline measurements (i.e., undisturbed soils outside of the active mine site) should be collected to inform end land use compaction criterion for areas of planned decompaction.

Step 2: It will be necessary to ascertain the types of equipment available at the Facility to determine which decompaction methodologies can be applied at the site. Types of decompaction include ripping, trenching, mounding and mechanical screefing. Details of these techniques are provided in Appendix U of the RCP).

Step 3: Each available methodology for decompaction should be applied to several test plots that represent variable severities of compaction to determine effectiveness of methodology (e.g., apply rip trenching to low and high compaction areas). Test plots should also have woody debris or wood chip incorporations into the soil to determine effectiveness on decompaction (should create microsites).

Step 4: After decompaction of soils and woody material placement, test plots should be seeded and planted with species outlined in Table 4-2 “Detailed Progressive Reclamation Prescriptions”. This table outlines grass seed mixes, shrub and deciduous species, and conifer tree prescriptions for specific areas around the Facility based on the end land use objectives.

Step 5: Success of decompaction methodologies should be monitored on a consistent basis to determine the appropriate decompaction methodology for each soil type (i.e., low or high compaction). Success of decompaction can be determined by vegetation measurements (i.e., grass growth success, growth of shrub & tree seedlings (i.e., tree survival, total height, basal stem diameter, and mortality rates) and soil physical properties (i.e., bulk density, volumetric water content, total porosity, and available water capacity).

Effectiveness of decompaction methodologies and woody material incorporation will be determined by bulk density and vegetation measurements, including survivorship, percent cover, and tree height.

Qualitative and Quantitative Measures: Success of decompaction methodologies should be assessed based on soil and vegetation measurements through visual observations and digging test plots (soil) and vegetation monitoring. Qualitative data may include recording type of decompaction, collecting UTMs, photographing test pits and describing soil and vegetation conditions. Quantitative may include soil measurements (i.e., bulk density, volumetric water content, total porosity, available water capacity) and vegetation measurements (i.e., percent cover, total tree and shrub height, seedling vigor, grass cover vigor, and mortality rates).

Location: Location of sampling sites for compaction will be pre-determined based on severity of soil compaction. Compaction severity should be determined on a scale of low to high based on observations of areas with visible compaction and measurements of compaction depths. Low compaction areas might be characterized as cleared areas that have experienced minor

equipment access whereas high compaction areas would be areas with repeated high traffic (e.g., road right of ways) and areas with high surface run off. Multiple sites of compaction testing may be required depending on the variability of soil compaction.

Non-disturbed baseline measurements (i.e., undisturbed soils outside of the active mine site) should be collected to inform end land use compaction criterion for areas of planned decompaction.

Timing: Year 1: Determine compaction severity and establish control and sample sites at the Facility. Decompact areas with various methodologies, place soil additions (i.e., biosolids, CWD), and apply appropriate vegetation prescriptions based on site-series and land use objectives.

Year 2-4: Monitor decompaction success annually through vegetation measurements and soils physical characteristics.

Duration: Baseline data collection and establishment of test plots could be completed within one summer. To determine success of decompaction methodologies, soil and vegetation data should be completed up to 5 years post-decompaction. Results from this monitoring duration would illustrate the superior decompaction methodology for each type of soil compaction.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): Low

Future Application as a part of RCP: Results from the decompaction research should confirm the appropriateness decompaction methodologies for various soil compaction severities. As such, future decompaction reclamation activities should base decompaction method selection from results of this research.

7.8 Cumulative Effects of Fertilization and Biosolids Application on Total Nutrient Loading and Impacts to Receiving Waters Research Requirement (o):

Description: Determine the cumulative effect of fertilization on total nutrient loading to receiving waters.

Rational: Measuring total nutrient loading will reveal whether fertilization (i.e., fertilizer and biosolids) has a negative impact on receiving waters and provide evidence to justify mitigation measures, if required. It should be noted that fertilizer has been used in very limited quantities at the Facility and has been discontinued based on sustainability concerns.

Approach: Step 1: Sample locations to monitor surface, ground and contact water where fertilization or biosolid treatments have already been applied at the Facility or where applications are planned (MPMC Environmental Department 2019). Select control sampling sites outside the zone of influence (i.e., upstream of the treatment areas), and treatments sampling sites within the zone of influence (i.e., downstream of treatment areas). Sampling within treatment sites should focus on low velocity flows or areas of pooling water (i.e., settling areas, depositional banks).

Step 2: Water quality sampling should be completed within 96 hrs post-treatment for short-term effects, and for at least five days within the subsequent 30 day period post-treatment, for long-

term effects. Sampling protocols should follow established methods within the MPMC 2019 CEMP (MPMC Environmental Department 2019). Water quality sampling should including testing for temperature, pH, nitrite, nitrate and ammonia.

Step 3: Collect air temperature and precipitation data throughout the duration of the monitoring.

Step 4: Complete statistical analysis from water samples and climate data to determine if levels of nitrate, nitrite and ammonia are within acceptable limits for human health and the environment under the 2019 BC WQG (Ministry of Environment 2019). Climate data can be used to inform spikes in contaminants.

Qualitative and Quantitative Measures: Effects of fertilizer loading on receiving waters should be assessed based on quantitate water quality measurements. Qualitative information collect could consist of UTMs and photographs of testing locations. Field measurements of quantitative parameters should include temperature, pH, and conductivity. Triplicate samples for laboratory analysis should be collected to test for of nitrite, nitrate, and ammonia concentrations.

Location: Within areas where fertilizer or biosolids have been applied or are planned to be applied.

Timing: Year 1: Water quality testing for nutrient loading is time sensitive. Testing should be conducted prior to fertilization treatments, to determine baseline measurements, within 96 hrs following fertilization, to determine short-term impacts, and from at least five days within the subsequent 30 day period following treatment for long-term impacts.

Year 2-4: Sampling of water quality should continue on an annual basis to observe changes in the concentrations of nitrite, nitrate and ammonia over time following application.

Duration: Data collection should be completed after every application of fertilizer, within 96 hrs for short-term fertilization measurements and for at least five days within the subsequent 30 day period for long-term fertilization measurements; therefore, duration of sampling will be dependent on number of fertilization applications.

General Cost (e.g., low cost ($10,000-$30,000), high cost ($100,000 or more)): High

Future Application as a part of RCP: Results from fertilization/biosolid testing will determine if there are negative impacts to the receiving waters surrounding the Facility from their application. If negative impacts are identified, mitigation measures should be implemented.

Recommendations from this five year plan would be relevant to the RCP, as sampling techniques and locations could be kept continuous post-closure, and passive treatment is planned to continue in perpetuity.

7.9 SCHEDULE

Research projects described in the above sections will be implemented based on project specific timelines that are required to obtain relevant reclamation information prior to mine closure. A tentative schedule for research projects is suggested in Table 7-3.

Table 7-3. Tentative Schedule for Research Projects in the Projected 5-year Reclamation Research Plan.

Task	Duration	Start	Finish	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10 (mine closure)
Water Management Strategies and Post-Closure Maintenance and Contingency Requirements: Research Requirement (c)	Year 1-Year 10	Year 1	Year 10[1]	Dependent on water management system									
Species-Specific Planting Trials: Research Requirement (d)	Year 1 - Year 10	Year 1	Year 10	Establish New Test Plots	Continue Current Monitoring			Establish Test Plots surrounding the TSF	Monitor				
Methods for Reducing High Competing Grass Cover: Research Requirement (g)	5 year period	Any year	5 years from initiation	As required									
Soil Replacement Plan: Research Requirement (i) **does not include TSF	5 year periods	Year 1	Year 10	Establish Test Plots within areas that do not have plots	Monitor								
Management for Invasive Plants: Research Requirement (i)	As needed	Year 1	Year 10	Survey & Treat	Monitor treatment effectiveness, retreat as required								
Reclamation Prescription for the TSF: Research Requirement (j)	5 year period	5 years prior to mine closure	Year 10					Establish Test Plots	Monitor				
Assessment of Soil Decompaction Methodologies: Research Requirement (k)	5 year period	5 years prior to mine closure	Year 10					Determine Areas of Severe Compaction & Establish Test Plots	Monitor				
Cumulative Effects of Fertilization and Biosolids Application: Research Requirement (o)	Up to 30 days	Prior to application of fertilizer/biosolids	Up to 30 days post-treatment	As required									

Note: current mine closure date estimated to be 2031.
[1]Passive water treatments and watercourse restorations may not have a finish date.

8 RECLAMATION RESEARCH MONITORING PLAN: RESEARCH REQUIREMENT (M & N)

This section has been developed to meet monitoring requirements for all progressive reclamation and reclamation research projects. This includes research requirements as outlined in “m” and “n”, which require development of ecosystem-specific sampling parameters, performance criteria, and benchmarks as well as the evaluation of habitat restoration, soil development, and erosion control. The primary goal of this monitoring plan is to provide criteria and measures for each sampling parameter that can be used to determine whether reclamation activities are successful.

Monitoring results will be compared against regulatory guidelines, where applicable, and against comparable benchmark ecosystems where no guidelines exist. Monitoring parameters and criteria will continue to evolve and improve through the ongoing incorporation of new information, technology, and stakeholder input.

8.1 SAMPLING PARAMETERS, CRITERIA AND MEASURES

Table 8-1 summarizes the sampling parameters, criteria and measures for reclamation monitoring. Current and future monitoring to determine the success of reclamation research or progressive reclamation activities will be completed on individual land parcels at the Facility (MPMC, 2017) using the following approach:

1) Sampling parameters will be selected for each monitoring effort based on the nature of the reclamation research or progressive reclamation works;

2) Develop a project-specific monitoring plan criteria and measures outlined for each of the relevant sampling parameters.

3) Reclamation will be identified as successful when all criteria identified for each sampling parameter are met;

Table 4. Sampling Criteria and Measures of Monitoring at the Facility.

Sampling Parameter	Criteria	Measures
Landform Function	Landforms have geotechnical stability.	• Visually inspect presence/absence of subsidence, erosion, deposition of sediment in low-lying areas, ponding, gullying, riling or slumping, including bank stability around watercourses and waterbodies; ○ No evidence of surface instability have been observed; • No mass movement has occurred or is anticipated to occur;

	Landscape enhancements are appropriate to the ecosystem and increase the diversity of the landscape.	• Observe utilization of landscape enhancement features (e.g., large rocks, CWD) by vegetation and wildlife. Confirm whether:
		  ○ Vegetation is naturally establishing on landscape enhancement features;
		  ○ Wildlife is utilizing landscape enhancement features as forage/hunting, breeding or denning habitat;
		• Landscape enhancements provide microsite diversity for the natural establishment of native plant species and wildlife;

Soil	Metal concentrations are within acceptable limits for human health, wildlife and livestock health, and the environment or are below concentrations observed from baseline (pre-disturbance) sampling.	• Monitor metal concentrations in applied soils and amendments and compare to baseline conditions and/or acceptable limits;

	Soil conditions are analogous to the pre-existing landform and soil moisture regime.	• Physical and chemical properties of applied soils and amendments are analogous to conditions estimated to have been present prior to disturbance. Properties assessed may include:
		  ○ Physical Properties: Depth, texture, bulk density, organic matter content and surface compaction;
		  ○ Chemical Properties:
		• Applied soils and amendments are stable and are not subject to instability or mass movement (refer to Section 6.1.2);
		• Applied soils and amendments do not provide adverse conditions that would significantly limit, or completely prevent, the establishment of planted, seeded or naturally establishing vegetation;

		○ Example for biosolid application (ammonium and ammonia concentrations); • Where completed, assess the success of decompaction with soil & vegetation measurements. ○ Measurements may include bulk density, volumetric water content, total porosity, and available water capacity and vegetation measurements may include percent cover, total tree & shrub height, seedling vigor, grass cover vigor, and morality rates;
	Soils provide an adequate medium for plant growth.	• Vegetation establishment is not limited by any physical or chemical soil conditions; • Natural establishment of native plant species is occurring; • Soil surface has the following features: ○ Diverse microtopography that provides a range of moisture conditions and features the establishment of naturally dispersed native seed; ○ Loose and uncompacted; ○ Organic matter is present;
Vegetation	Metal concentrations are within acceptable limits for human health, wildlife and livestock health, and the environment.	• Monitor metal uptake in vegetation. Refer to Section 6.1.3;
	Vegetation cover is 'self-sustaining'.	• Confirm if significant seedling mortality is occurring. Mortality may be due to natural processes (e.g., excess herbivory), or anthropogenic factors (e.g., planting/handling of seedlings, adverse soil conditions); • Monitor vegetation cover; cover should be stable or increasing; • Confirm that natural recruitment of native species is not limited; ○ recruitment may be limited by competition from existing vegetation cover, herbivory or surface conditions (e.g., soil compaction); • Monitor species diversity of vegetation cover. Cover should be diverse and not a monoculture;
	Vegetation cover is following the natural successional trajectory that aims to satisfy the end land use objective.	• Confirm that vegetation cover is dominated by pioneer tree and shrub species identified as early successional species of the target ecosystem (e.g., subzone/variant); ○ e.g., species diversity & abundance, % cover, tree and shrub seedling height, density & vigour;

		• Confirm that vegetation cover consists of late successional tree and shrub species of the target ecosystem; • Confirm that vegetation cover does not consist of any significant cover of non-target species (e.g., invasive, agronomic, nuisance weeds); • Confirm that any cover of non-target species present is either declining or, evidence suggests that non-target species cover will decline over time; • Identify factors limiting natural succession on reclaimed areas, or portions of reclaimed areas (e.g., plant competition, surface conditions, herbivory), and, confirm that these factors have been addressed and will no longer limiting;
Water Quality	Post-treatment water is consistently found to meet BC Water Quality Guidelines (Ministry of Environment 2019).	• Regularly monitor water quality parameters. Analyse water sample data to determine whether all levels are within acceptable limits for human health and the environment;

8.2 MONITORING SCHEDULE & SURVEY PERIOD

Monitoring should occur annually for at least 5 years following the initiation of any research projects, or until criteria for each relevant sampling parameter identified, have been met.

Monitoring should occur in the summer or fall under non-frozen conditions. Seasonal considerations should also be considered prior to monitoring (i.e., conduct measurements at similar times of year for sound statistical analysis, identify noxious plants prior to seed dispersal to reduce propagation).

9 ADAPTIVE MANAGEMENT STRATEGY: RESEARCH REQUIREMENT (F)

Long-term monitoring and maintenance activities are planned to continue until the Facility is ready for certification. If monitoring identifies negative impacts, contingency plans will be implemented that may include activities such as soil and/or amendment application, soil decompaction, landform stability works, infill planting, fertilization, mulching, noxious plant control and pest control. This adaptive management strategy is illustrated in Figure 8-1. Specific contingency plans related to soil, reclamation materials, and the Springer Pit can be found in Section 5.9 of the RCP (MPMC, 2017).

Figure 8-1. Adaptive Management Cycle extracted from the 2018 RCP.

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Appendix A
Summary of Progressive Reclamation

Site Specifications				Soil				Revegetation			Schedule						
Site	**Parcel(s)**	**Area**	**End Land Use Objectives**	**Soil Stockpile Source**	**Volume (m^3)**	**Application Depth (cm)**	**Ammendments**	**Grass Seed Mix[1]**	**Shrub & Deciduous Tree Planting**	**Conifer Tree Planting**	**Re-Contour**	**Soil Application**	**Soil Ammendment Application**	**Coarse Woody Debris Applicaiton**	**Grass Seeding**	**Shrub & Deciduous Tree Planting**	**Conifer Planting**
North Bell Dump	Parcels 1-10	11.59	Wildlife, forestry	Wight Till	10,600	20	Biosolids (122 dt/ha)	Native grasses (30 kg/ha) (hydroseeded with fibre mulch, except southern-most Parcel 10 hand seeded at 35 kg/ha)	Black cottonwood - 60 sph Paper birch - 34 sph Trembling aspen - 34 sph Sitka alder - 172 sph Saskatoon - 34 sph Prickly rose - 34 sph Scoulers willow - 79 sph Soopolalie - 100 stem trial plot	Lodgepole pine - 1075 sph Douglas fir - 451 sph Western red cedar - 54 sph Hybrid spruce - 54 sph Consider underplanting with later successional species in future.	2011	2011	2011	2011	2011	2013 - poor survival 2014 - re-plant	2014
	South Triangle	1.30	Wildlife, forestry	North Bell Dump Till	1,733	30	18-19-18 Fertilizer (75 kg/ha)	Native grasses (35 kg/ha) (hydroseeded with fibre mulch)	<u>2013</u> Black cottonwood - 1000 sph Sitka alder - 800 sph <u>2014</u> Soopolalie - 100 stem trial plot	Lodgepole pine - 1400 sph Douglas fir - 600 sph Consider underplanting with later successional species in future.	2011	2011	2011	-	2011/2012	2013/2014	2014
	Phase 1	2.21	Wildlife, forestry	North Bell Dump Till	3,920	20	Biosolids (138 dt/ha)	Native grasses/forbes (35 kg/ha) (hand seeded)			2012	2012	2012	-	2012		
	Phase 2	2.87	Wildlife, forestry	North Bell Dump Top	4,680	20	Biosolids (135 kg/ha)	Native grasses + lupine (35 kg/ha) (hand seeded)			2012	2012	2012	-	2012		
	Metro Van Research Parcel 1	2.81	Wildlife, forestry	North Bell Dump Till	4,680	20	Biosolids (107 dt/ha) (on 2.34 ha)	1) No seed 2) Forbes mixture (75 g/ha fireweed, 1 kg/ha lupine, 113 g/ha Dryas drummondii, 4.9 kg/ha june grass, yarrow, pearly everlasting mix) 3) Fireweed (75 g/ha) 4) No seed 5) Native grasses/forbes (5kg/ha) 6) Native grasses/forbes (10 hg/ha)	Black cottonwood - 200 sph Paper birch - 50 sph Trembling aspen - 50 sph Sitka alder - 200 sph Saskatoon - 50 sph Prickly rose - 50 sph Scoulers willow - 50 sph Huckleberry - 50 sph	Lodgepole pine - 1120 sph Douglas fir - 480 sph Consider underplanting with later successional species in future.	2012	2013	2013	-	2014	2014	2014
	Wrap Around Toe	2.20	Wildlife	North Bell Dump Till	14,418	6	None	Native grasses (~15 kg/ha) (hand seeded)	Monitor natural vegetation ingress		-	2012	-	-	2012	TBD - monitor ingress	
	Beside Research	2.00	Wildlife, forestry	Direct Placement: SEZ Stripping	4,000	20	None	Monitor natural growth from direct placement.			2012	2013	-	TBD - monitor ingress			
	Metro Van Research Parcel 2 (in Beside Phase 2 parcel 4.79 ha area)	2.00	Wildlife, forestry	North Bell Dump Top	4,000	20	Biosolids (107 dt/ha)	1) No seed 2) Forbes mixture (75 g/ha fireweed, 1 kg/ha lupine, 113 g/ha Dryas drummondii, 4.9 kg/ha june grass, yarrow, pearly everlasting mix) 3) Fireweed (75 g/ha) 4) No seed 5) Native grasses/forbes (5kg/ha) 6) Native grasses/forbes (10 hg/ha)	Black cottonwood - 200 sph Paper birch - 50 sph Trembling aspen - 50 sph Sitka alder - 200 sph Saskatoon - 50 sph Prickly rose - 50 sph Scoulers willow - 50 sph Huckleberry - 50 sph	Lodgepole pine - 1190 sph Douglas fir - 510 sphh Consider underplanting with later successional species in future.	2012	2014	2014	-	2014	2015	2015
Waste Haul Road	Heli Pad Area	1.53	Wildlife, forestry	Old Cariboo Stockpile/ Springer Pit	3,825	28	18-19-18 Fertilizer (170 kg/ha)	Aggressive seed mix (26 kg/ha) (hydroseeded)	Monitor natural vegetation ingress	Douglas fir - 216 sph	-	2013	-	TBD - monitor ingress	2014		2015
	Above WHR (Pond Zone)	1.81	Wildlife, forestry	Old Cariboo Stockpile/ Springer Pit	5,456	30	None	Native grasses/forbes (22 kg/ha)	Monitor natural vegetation ingress		-	2013	-	TBD - monitor ingress	2013		
East RDS	Highway to Heaven	11.52	Wildlife, forestry	<u>2014:</u> Direct Placement: Cariboo Ore Stockpile, WX Zone Stripping <u>2015:</u> Highway to Heaven	<u>2014:</u> 26,700 <u>2015:</u> 8,200	40	None	Native grasses/forbes (30 kg/ha)			2014 - 9.47 ha	2014 - 6.58 ha	-	TBD - monitor ingress	2014		
	Tree Plots[2]	2.13	Wildlife, forestry	Bell Pit Stockpile	Not Calculated	0 - 65	<u>Amendment Tested:</u> Fertilizer (RTI Bio Pack's, 10g/bag) Biosolids (50 - dt/ha) Tailings (20cm)	Domistic grasses (20kg/ha - 40 kg/ha) Native grasses/forbes (40 kg/ha) - two different mixtures	-	Lodgepole pine - 1400 sph Douglas fir - 600 sph	2000	1998 - 2000	1998 - 2000	-	1998 - 2000	-	1998 - 2000
	Above Access Road	3.78	Wildlife, forestry	Direct Placement: TSF Rd Stripping (Bootjack Creek), Cariboo Ore Stockpile, WX Zone	9,000	25	None	~ 0.75 kg/ha lupine ~2 kg/ha june grass, yarrow, pearly everlasting mix ~35 g/ha Fireweed (~1 ha on eastern side only) Remaining area: Native			2011	2014	-	TBD - monitor ingress	2014		

								grasses/forbes (30 kg/ha)									
TSF		23.95	Wildlife, forestry, livestock	South Till Borrow	N/A	N/A	Biolids - 12.00 ha	Unknown			Unknown	N/A	Unknown	-	Unknown		
NEZ Dump	Parcel 2 (a/b)	5.13	Wildlife, forestry	Wight Till	20,000	40	2a: fertilizer (238 kg/ha) 2b1: biosolids 2b2: fertilizer (71 kg/ha), biosolids	Native grasses/forbes (handseeded) 2a: 45 kg/ha 2b: 34 kg/ha	Paper birch - 100 sph Trembling aspen - 100 sph Black cottonwood - 200 sph Sitka alder - 100 sph saskatoon - 100 sph wood rose - 100 sph Willow live stakes - 40 sph	Lodgepole pine - 1300 sph Douglas fir - 700 sph	2010	2010	2010	-	2011	2012	2012
Boundary Zone	Boundary Dump	4.70	Wildlife, forestry	PAG Dump Stripping	12,000	28	None	Monitor growth from direct placement and natural ingress (monitor invasive species establishment)			2011	2014	-	TBD - monitor ingress	Monitor growth from direct placement and natural ingress		

Notes:

1) Native grasses/forbes: mountain brome, native red fescue, Rocky Mountain fescue, wheat grass - blue bunch, blue wild rye, june grass, tickle grass, fireweed.
   Native grasses: mountain brome, native red fescue, Rocky Mountain fescue, wheat grass - blue bunch, blue wild rye.
   Aggressive seed mix: dahurian wildrye, slender wheatgrass, perennial ryegrass, timothy
2) Refer to summary reports on the tree plots for detailed information on the treatment units and research design

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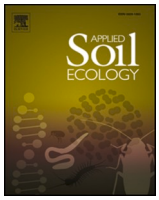

Small-volume additions of forest topsoil improve root symbiont colonization and seedling growth in mine reclamation

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ABSTRACT

Beneficial soil microbes, such as mycorrhizal fungi and nitrogen-fixing bacteria, can improve plant nutrient acquisition and increase plant resilience to stressors. Yet, the waste materials left behind following major disturbances, such as mining, have negligible biological activity and fresh topsoil availability for reclamation is often limited. We tested if small-volume additions of native forest topsoil can improve early seedling survival and growth, and promote colonization of beneficial root symbionts. In a greenhouse experiment, we grew seedlings representing different functional groups in tailings and glacial-till overburden from the Mount Polley Mine, Canada. We applied 5 % (38 mL) and 25 % (188 mL) forest-soil additions for comparison with tailings/overburden controls and reference forest soil. The experiment was replicated with sterilized soil to isolate the biological effects of the forest soil from the physical and chemical effects. Willow (*Salix scouleriana*) and spruce (*Picea engelmannii* x *glauca*) seedling survival and growth increased with proportion of forest soil, which corresponded with increased ectomycorrhizal fungal colonization. Forest soil additions benefited seedlings grown in both overburden and tailings, with ~200 mL (25 %) forest soil additions generally supporting initial seedling growth comparable to seedlings grown in reference forest soil. Alder (*Alnus viridis*) showed minimal benefit from forest soil additions, likely due to a lack of nitrogen-fixing bacteria in the forest soil, highlighting the importance of matching the plant and microbial communities of the soil donor site with the target plant species. Differential results among plant species in sterilized soil indicated that plants exhibiting greater dependence on microbial symbionts (spruce and alder), benefited from the biological component of the inoculum, while willow, an early successional species with low mycorrhizal dependence, benefited from the physical and chemical properties of the forest soil. This research showed that targeted additions of small volumes of topsoil from native ecosystems can improve initial seedling survival and growth, and promote recovery of limiting soil microbial communities, making it a promising approach for mine reclamation when topsoil availability is limited.

1. Introduction

Mining causes severe disturbances to terrestrial ecosystems. To reclaim mining areas, topsoil that was salvaged prior to the mining disturbance is typically spread on reclamation areas as a growing medium for revegetation. Compared to mine waste materials, the physical and chemical properties of topsoil, such as greater organic matter content and nutrient availability, are more suitable for plant growth (Tordoff et al., 2000). An additional benefit of local topsoil over mine wastes and other soil amendments is that it contains native plant propagules and soil organisms, which can support the establishment of native plant species and increase the diversity, abundance and activity of soil microbes (Boldt-Burisch and Naeth, 2017; Macdonald et al., 2015; Moynahan et al., 2002). Topsoil applications promote the colonization of plant roots by microbial mutualists, such as mycorrhizal fungi and nitrogen (N)-fixing bacteria, which form symbioses with roots and improve plant access to nutrients and soil resources in exchange for photosynthates (Smith and Read, 2008). These mutualisms can increase plant resilience to environmental stressors such as drought, herbivory, nutrient deficiencies and elevated levels of metals or salt (Johnson et al.,

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2016), making them of particular importance for seedling establishment in harsh, low-nutrient mine reclamation environments. A lack of mycorrhizal fungi and N-fixing bacteria can limit the recovery of ecosystems following disturbances (Mueller et al., 2019; Nara, 2006; Seeds and Bishop, 2009), suggesting that revegetation without re-establishing the soil microbial community may reduce restoration success (Koziol et al., 2018).

Applications of local topsoil to reclamation substrates inoculate native microbes, which have been shown to benefit plant growth more than foreign or commercial inoculants (Ji et al., 2010; Maltz and Treseder, 2015). The generalist species used in commercial inocula do not account for local adaptations, which can support a home-field advantage for native plant-soil-microbe relationships (Rúa et al., 2016). Use of native inoculants also avoids the relatively unstudied risk that microbes introduced in commercial inoculums could become invasive or pathogenic (Thomsen and Hart, 2018). Additionally, whole soil amendments contain the full soil biological community, not just one or a few species (Hoeksema et al., 2010), including many species that are unculturable and/or disperse by root or hyphal fragments instead of spores. The presence of diverse soil microbial communities increases the probability of beneficial microbial species suitable for the environmental conditions being present (Koziol et al., 2018), and can improve plant performance when plants are exposed to environmental stressors (Bradáčová et al., 2019; Crossay et al., 2019). Diverse soil microbial communities also have the potential for additive benefits. For example, Shishido et al. (1996) found that plant growth-promoting bacteria and mycorrhizal fungi enhanced conifer growth through unrelated mechanisms.

Yet, topsoil is often of limited availability at mines due to a lack of historic soil salvaging practices, necessitating the use of mine waste materials, such as waste rock, overburden and mine tailings, as supplementary growing mediums. Even at mines where topsoil is salvaged, it can undergo degradation during long-term storage in stockpiles, including changes in nutrient availability and loss of biological propagules (Gorzelak et al., 2017; Paterson et al., 2019). Thus, reclamation methods that efficiently use limited quantities of fresh topsoil, which has the greatest inoculum potential, are necessary to maximize the benefits of topsoil for revegetation. Potential methods include spreading a thin layer of fresh topsoil over lower-quality reclamation materials or mixing small volumes of fresh topsoil into the rooting zones of seedlings during planting (termed "soil transfers"; Amaranthus and Perry, 1988; Borchers and Perry, 1990).

Soil transfers have had mixed effects on revegetation of silvicultural and ex-agricultural sites (Amaranthus and Perry, 1987; Pareliussen et al., 2006; St-Denis et al., 2017), but may be more effective at mine sites because: (1) negligible soil microbial community establishment has occurred, thus mutualistic microbes may not yet be present and minimal competition from established microbes is expected, and (2) reclamation materials are low in nutrients, and microbial symbionts can be critical for nutrient acquisition in low-nutrient environments (Carbajo et al., 2011; Getachew et al., 2019). Soil transfers may additionally benefit planted seedlings by providing localized improvements in soil physical and chemical conditions for initial establishment of roots and soil organisms (Lance et al., 2019). Limited research on small-volume topsoil additions has been conducted at mine reclamation sites, but Helm and Carling (1993a, 1993b) showed 250 mL soil transfers from a balsam poplar (*Populus balsamifera*) stand to the rooting zone of balsam poplar seedlings growing in overburden increased seedling growth, nutrient status and ectomycorrhizal (EM) fungal colonization. Two greenhouse experiments found that amending reclamation materials with unsterilized topsoil had greater positive effects on plant growth and mycorrhizal fungal colonization than sterilized topsoil amendments, showing the effectiveness of the biological inoculation (Emam, 2016; Saxerud and Funke, 1991). However, further research is necessary to refine recommendations for topsoil application rates and to investigate the effects of small-volume topsoil additions on different substrates, such as mine tailings, and on different plant functional groups, including conifers.

The objective of this study was to assess the physical, chemical and biological effects of small-volume forest topsoil additions on seedling performance in mine reclamation materials from the Mount Polley Mine, Canada. In a greenhouse experiment, we grew seedlings representing different functional groups in tailings and glacial-till overburden with different proportions of fresh forest topsoil. The experiment was replicated with sterilized soil to isolate the biological effects of the forest soil from the physical and chemical effects. We hypothesized that: (1) growth, foliar N and root symbiont colonization of seedlings grown in reclamation materials would increase with the proportion of forest soil, (2) seedlings grown in reclamation materials with forest soil additions would achieve comparable performance to seedlings grown in reference forest soil, and (3) the biological component of the added forest soil would be partially responsible for positive effects of forest soil additions on seedling performance.

2. Methods

2.1. Substrate collection

This greenhouse experiment used soils from the Mount Polley Mine, an open pit copper and gold mine in British Columbia (BC), Canada (52°32′42.35″ N, 121°37′58.67″ W; Fig. S1). In 2014, a tailings dam embankment failure at the mine, releasing 25 M m^3 of water, mine tailings and dam construction materials to the downstream environment (Golder (Golder Associates Ltd.), 2015). The dominant materials requiring reclamation were native glacial-till material (overburden) exposed by erosion and deposited mine tailings. The Mount Polley Mine tailings are non-acid generating and have not shown negative toxicological effects on soil fauna or plants (Van Geest et al., 2017). Glacial-till overburden and tailings were collected from the disturbed corridor (Fig. S1). Fresh forest topsoil (herein referred to as "forest soil") was collected from the adjacent and unimpacted Interior Cedar Hemlock forest (Moist Cool subzone, Horsefly variant; ICHmk3; Steen and Coupé, 1997) in mid- and late-seral stands dominated by western redcedar (*Thuja plicata*), subalpine fir (*Abies lasiocarpa*) and hybrid white spruce (*Picea engelmannii* x *glauca;* Fig. S1, Table S1). At each reference site, litter was removed and the top 15–20 cm of soil collected, including the fermentation and humic layers, and the upper mineral horizons. Substrates were homogenized and mixed with 20 % v/v perlite to compensate for structural losses due to handling.

Samples of each substrate type were air dried and sieved to <2 mm. Electrical conductivity and pH were measured with a Seven Compact S230 Conductivity meter and PH/Ion meter S220, respectively (2:1 w/v deionized water:soil solution). The following parameters were analyzed by the BC Analytical Laboratory, Victoria, BC: exchangeable cations (Al, Ca, Fe, K, Mg, Mn, Na) and effective cation exchange capacity through barium chloride extraction (0.1 N) and ICP-OES analysis; total N and carbon through combustion and analysis with an elemental analyzer; and available phosphorus (PO_4-P) by Bray P-1 extraction (1-min shake) and UV–Vis analysis. Physical and chemical properties of each substrate type are presented in Table 1.

2.2. Experimental design

A 3 × 3 × 2 factorial set of treatments replicated five times was applied to greenhouse-grown seedlings in a completely randomized design. Individual seedlings were grown in 750 mL Ray Leach tubes containing one of three substrates: tailings, glacial-till overburden, or a 1:1 mixture by volume of tailings and overburden (herein referred to as "tailings + overburden"). Substrates were mixed with one of three forest soil application rates: 0 % (0 mL), 5 % (38 mL), or 25 % (188 mL). These treatments targeted lower ratios of forest soil where the greatest relative improvements in plant performance were expected. The third factor tested was sterilization, where soils autoclaved for 1 h at 121 °C (Trevors, 1996) were used to differentiate between the physical and

Table 1
Chemical and physical properties of forest soil, overburden and tailings collected at the Mount Polley Mine, British Columbia. Forest soil includes the fermentation layer, humic layer and upper mineral horizons. CEC = effective cation exchange capacity; EC = electrical conductivity.

Parameter	Forest soil	Overburden	Tailings
Sand (%)	44.46	48.12	62.07
Silt (%)	34.71	36.69	29.08
Clay (%)	20.83	15.18	8.85
Texture	Loam	Loam	Sandy loam
pH	5.2	8.09	8.23
EC	417	230	543
Total N (%)	0.605	0.025	0.013
Total C (%)	14.28	0.82	0.48
PO_4-P (mg/kg)	41.98	1.42	1.21
CEC	35.139	8.929	6.742

chemical versus biological effects of the forest soil additions. One additional treatment of 100 % forest soil ($n = 5$) was added for comparison to reference conditions.

The above treatments were tested on three plant species native to the Mount Polley Mine area: hybrid white spruce (*Picea engelmannii* Parry ex Engelm. x *glauca* (Moench) Voss), Scouler's willow (*Salix scouleriana* Barratt ex Hook.), and Sitka alder (*Alnus viridis* (Chaix.) D.C.). These plant species represent a cross section of functional groups, plant-microbe associations, and successional stages. Spruce is a mid- to late-seral conifer forming EM, while willow and alder are early successional deciduous shrubs that form EM and possibly arbuscular mycorrhizae (AM; Molina et al., 1992). Alder roots also associate with the N-fixing bacterium *Frankia alni*.

Five seeds collected from the Mount Polley Mine area were sterilized with hydrogen peroxide and planted in each container, then thinned to one seedling per pot following germination. Re-planting in select treatments was done early in the growing period to achieve the desired replication. Seedlings were grown for six months in the University of British Columbia (UBC) Horticulture Greenhouse, Vancouver, BC under 600 W high pressure sodium lights (17-h photoperiod) and hand watered as needed. To mimic mine site conditions, seedlings were not fertilized during the experiment.

2.3. Data collection

Following harvest, seedling shoots were dried for 72 h at 70 °C and weighed. Samples of the youngest foliage were analyzed for total N using an Elemetar vario EL Cube elemental analyzer at the UBC Stable Isotope Facility, Vancouver, BC. Roots washed with deionized water were scanned for morphological analysis using WinRhizo software.

As an indicator of soil microbial activity and the biological effects of the forest soil additions, symbiotic relationships with soil microbes were evaluated. The number of N-fixing nodules on each alder root system was counted and the wet weight of nodules was measured. For analysis of mycorrhizal fungi, 50 random spruce root tips and 50 random 1-cm willow and alder root segments (or 50 % of available tips/segments for small root systems) were collected from each root system. The remaining roots were dried for 72 h at 70 °C and weighed. Willow and alder root segments were cleared in 10 % KOH and stained in an ink and vinegar solution (Vierheilig et al., 2005). The proportion of tips colonized by EM fungi was evaluated for the stained root segments using the gridline intersect method (Giovannetti and Mosse, 1980). AM and non-AM fungal endophyte percent colonization were evaluated at 100 intersections under a compound microscope as per McGonigle et al. (1990). AM fungal colonization data were not used in statistical analyses, as colonization was not detected on alder roots and was negligible on willow roots (only present on seven seedlings at ≤5 %).

Spruce root tips were morphotyped under a dissecting microscope as per Goodman et al. (1996) to assess EM fungal percent colonization and diversity. Voucher specimens (a single root tip or system) of each morphotype were collected and stored at −20 °C for genetic identification. Individual voucher specimens were ground with a sterile micropestle and sterile microsand followed by DNA extraction using the Qiagen PowerPlant Pro Kit as per the manufacturer's instructions. Extracts underwent Illumina MiSeq sequencing at the Integrated Microbiome Resource at Dalhousie University, Halifax, Nova Scotia as per Comeau et al. (2017) using fungal-specific primers for the ribosomal RNA second internal transcribed spacer (ITS2) region, ITS86 and ITS4 (Turenne et al., 1999; Vancov and Keen, 2009; White et al., 1990). The resulting sequences were trimmed for quality using the sliding window function in Trimmomatic (version 0.39; Bolger et al., 2014) where the average quality per base within the four base pair window fell below fifteen. Sequences were then imported into QIIME2 (version 2019.7; Caporaso et al., 2010) and trimmed using Cutadapt to remove primers and read through (Martin, 2011). Following, the ITS2 region was extracted, and chimeras and non-ITS2 sequences were removed using the ITSxpress QIIME2 plugin (version 1.8.0; Rivers et al., 2018). Bidirectional reads were assembled, denoised and assigned to amplicon sequence variants (ASVs), dereplicated, and filtered for chimeras using the DADA2 pipeline (Callahan et al., 2016). Taxonomic identities of the ASVs were determined using a Naïve Bayes classifier trained on the UNITE database (Abarenkov et al., 2010). ASVs were assigned to fungal guilds using the FUNGuild database (Nguyen et al., 2016). Each morphotype voucher was assigned to the EM fungal taxon with the highest number of reads. Sequences are available through GenBank (accession number PRJNA749874).

2.4. Statistical analysis

Analyses were conducted in R (R Core Team, 2021; version 4.0.3). Biomass data were relativized per growing day to account for minor differences in growing periods due to replanting. Linear models were used except for root fungal percent colonization, where binomial or quasibinomial generalized linear models (link = logit) were used. Data for linear models were transformed, as required, to meet model assumptions of normality and equal variance. For all analyses, significance was evaluated as $P \leq 0.05$ and marginal significance as $0.05 < P < 0.1$.

Separate models for each plant species (spruce, willow and alder) were run for each plant performance parameter (response variable) with reclamation material type x forest soil ratio as the explanatory variables. Factor significance was evaluated with Type III ANOVA and post-hoc contrasts using the *emmeans* package (Lenth, 2020) with the Tukey adjustment for multiple comparisons. These models were run for sterilized and unsterilized soil treatments. More detailed comparisons with the reference forest soil treatment were conducted using post hoc contrasts of linear models (*emmeans*; Lenth, 2020) with each unique unsterilized soil treatment (reclamation material type and forest soil ratio combined) as the response variable.

To provide insight into the effects of root symbiont colonization, linear models were run for unsterilized soil treatments with symbiont colonization as the explanatory variable and shoot biomass, root:shoot ratio or specific root length (root length divided by biomass) as the response variable. Soil treatment (reclamation material type and forest soil ratio combined) was used as a covariate to account for differential effects of soil treatment on these relationships. Correlation analysis using the *corrplot* package (Wei and Simko, 2021) was carried out for 100 % tailings, overburden and forest soil treatments (i.e., treatments with associated soil sample data) to show relationships between soil physical, chemical and biological properties and seedling responses.

3. Results

Seedling responses were consistent among the reclamation materials tested (tailings, overburden and tailings + overburden; Table S2). Given the absence of significant differences among reclamation material types

and a lack of interactions between reclamation material type and forest soil application rate (Table S2), combined results across all reclamation material types are presented.

3.1. Forest soil addition effects on seedling performance

Spruce seedlings had greater shoot biomass and foliar N in reclamation materials with 25 % forest soil than in reclamation materials with 5 % forest soil or controls (0 % forest soil), with no difference between the 5 % and 0 % forest soil treatments (shoot biomass: $F_3 = 5.74$, $P = 0.002$; foliar N: $F_3 = 8.93$, $P < 0.001$; Fig. 1). While there was no effect of soil treatment on initial seedling survival ($ResDev_{48} = 48.8$, $P = 0.382$), survival tended to increase with forest soil volume (Table 2). EM fungal colonization was greater in the 5 % and 25 % forest soil treatments than in control reclamation materials ($ResDev_{41} = 883.3$, $P < 0.001$; Fig. 1). Forest soil additions had no effect on root biomass ($F_3 = 1.90$, $P < 0.144$) or EM fungal morphotype richness ($F_2 = 0.41$, $P = 0.669$), which was low (≤ 3 taxa per seedling) and dominated by *Wilcoxina* spp., *Pseudotomentella* sp., *Melinomyces bicolor*, *Tuber* sp., and *Amphinema byssoides* (Table S2, Table S3). Only spruce seedlings in the 25 % forest soil treatments had comparable shoot biomass to seedlings

Table 2
Initial survival (prior to thinning and re-planting) of spruce, willow and alder seedlings by forest soil addition treatment.

Forest soil (%)	Survival (%)		
	Spruce	Willow	Alder
0	66.1	18.1	60.2
5	79.8	24.5	53.6
25	77.0	31.3	56.9
100	85.0	60.1	100

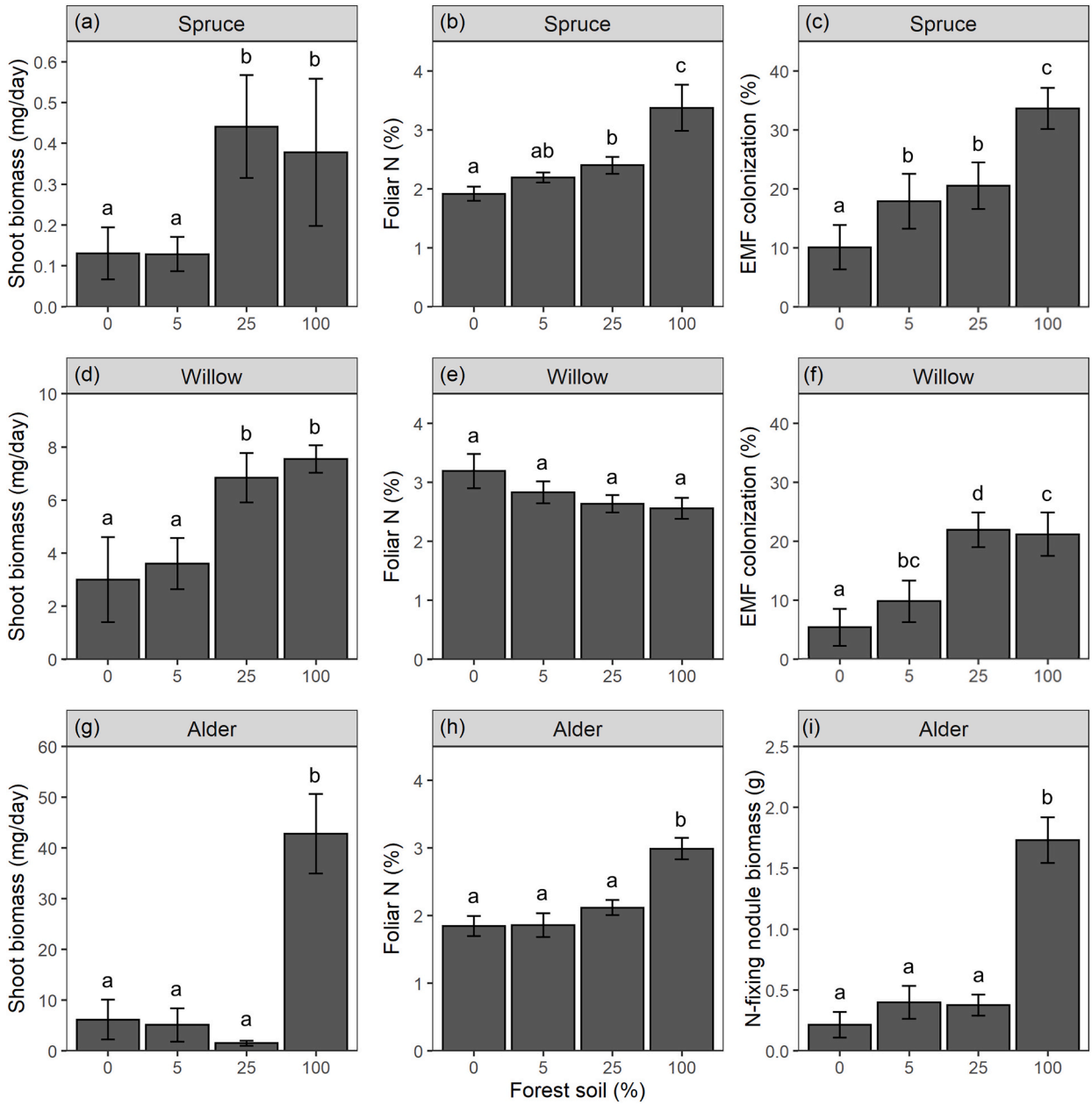

Fig. 1. Effects of different forest soil application rates on spruce (a–c), willow (d–f) and alder (g–i) seedling growth, foliar nitrogen (N) and root symbiont colonization in unsterilized reclamation materials (tailings, overburden and tailings +overburden). Significant differences are indicated by different letters. Error bars = 1 SE. EMF = ectomycorrhizal fungi. Shoot biomass was relativized per growing day to account for minor growth period differences due to replanting.

grown in 100 % forest soil. In treatments containing overburden, the higher quality reclamation material, 25 % forest soil additions also resulted in spruce seedlings having foliar N comparable to that of seedlings grown in 100 % forest soil (overburden: $T_{36} = 2.14$, $P = 0.511$; tailings + overburden: $T_{36} = 2.61$, $P = 0.248$). EM fungal colonization and EM morphotype richness were lower in all reclamation-material treatments (with 0 %, 5 % or 25 % forest soil) compared to seedlings grown in 100 % forest soil (Fig. 1).

Willow seedlings had greater shoot and root biomass in reclamation materials with 25 % forest soil than in reclamation materials with 5 % forest soil or controls (0 % forest soil), with no difference between the 5 % and 0 % forest soil treatments (shoot biomass: $F_3 = 4.36$, $P = 0.011$; root biomass: $F_3 = 4.36$, $P = 0.008$; Fig. 1). Survival also increased with forest soil proportion ($ResDev_6 = 82.3$, $P = 0.007$; Table 2). Willow seedling biomass did not differ between the 25 % and 100 % forest soil treatments (Fig. 1). Willow seedling root colonization by EM fungi and non-AM fungal endophytes was greatest in treatments with 25 % forest soil, followed by 5 % forest soil treatments, then the reclamation-material controls containing no forest soil (Fig. 1, Table S2). 5 % and 25 % forest soil additions to reclamation materials achieved symbiont colonization equivalent to, or greater than, the 100 % forest soil treatment (Fig. 1, Table S2). Forest soil additions had no effect on willow foliar N concentrations ($F_3 = 1.56$, $P = 0.218$; Fig. 1).

Forest soil additions had negligible effects on the performance of alder seedlings. Alder seedlings grown in reclamation materials with 0 %, 5 % or 25 % forest soil showed no difference in shoot biomass ($F_2 < 0.01$, $P = 0.996$), root biomass ($F_2 = 0.05$, $P = 0.955$), foliar N ($F_2 = 1.17$, $P = 0.327$) or N-fixing nodule biomass ($F_2 = 0.22$, $P = 0.807$; Fig. 1, Table S2). However, despite a lack of interaction between reclamation material type and forest soil transplant volume ($F_4 = 0.98$, $P = 0.43$), 25 % forest soil additions tended to increase root nodule biomass in tailings, the lowest quality reclamation material, compared to controls ($T_{10} = 2.39$, $P = 0.089$). Compared to the 100 % forest soil treatment, seedling survival, biomass, foliar N and root symbiont colonization were lower in all reclamation-material treatments (with 0 %, 5 % or 25 % forest soil; $P < 0.001$; Fig. 1, Table 2, Table S2).

3.2. The role of soil biota

Soil sterilization reduced root symbiont colonization to zero or low levels for all plant species, and colonization was significantly lower than in unsterilized treatments (except where colonization was minimal in unsterilized treatments, for example in 100 % tailings; Fig. S2).

For spruce, the positive effects of forest soil additions on seedling shoot biomass and foliar N in unsterilized soils did not occur in sterilized soils where EM fungal colonization was negligible (Table 3). This aligned with models across all unsterilized treatments, which showed that spruce EM fungal colonization was positively related to shoot biomass ($P < 0.001$) and tended to negatively relate to root:shoot ratio, i.e., higher EM colonization corresponded to greater aboveground biomass allocation ($P = 0.074$; Table S4). Similar relationships were observed for alder: N-fixing nodule biomass was positively related to shoot biomass ($P < 0.001$) and alder seedling specific root length decreased (i.e., roots became thicker and less acquisitive) with increased nodulation ($P = 0.009$; Table S4). The minimal benefit of forest soil additions to alder, which tended to increase root nodulation in tailings, did not occur in sterilized treatments (Fig. S2). In contrast to spruce and alder, forest soil additions still benefited the performance of willow seedlings in sterilized treatments (Table 3) and EM fungal colonization did not relate to willow shoot biomass ($P = 0.225$; Table S4). Willow root:shoot ratio was positively related to EM ($P = 0.025$) and non-AM endophyte fungal colonization ($P = 0.032$), i.e., higher colonization corresponded with lower aboveground biomass allocation (Table S4).

Correlation analysis results for the 100 % tailings, overburden and forest soil treatments (i.e., treatments with associated soil sample data) showed that colonization of symbionts (EM fungi, non-AM endophytes and N-fixing nodules), shoot biomass and foliar N had positive relationships with soil nutrient content (total N, total C, PO_4-P, and CEC), but negative relationships with pH and sand content (Fig. 2), indicating greater colonization, growth and nutrient content where pH was lower (characteristic of pH 5 forest soil vs. pH 8 tailings and overburden) and the soil texture was finer. The one exception was foliar N in willow, which did not relate to any other measures.

Table 3
Spruce, willow and alder seedling biomass and foliar nitrogen (N) in sterilized soil treatments (mean ± 1 SE). For each plant species, significant differences among forest soil application rates to reclamation materials (tailings, overburden and tailings + overburden) are indicated by different letters. Growth parameters were relativized per growing day to account for minor growth period differences due to replanting.

Plant species	Forest soil (%)	Shoot biomass (mg/day) ± SE	Root biomass (mg/day) ± SE	Foliar N (%) ± SE
Spruce	0	0.070 ^{a} ± 0.005	0.034 ^{a} ± 0.006	1.91 ^{a} ± 0.14
	5	0.054 ^{a} ± 0.006	0.041 ^{a} ± 0.009	1.92 ^{a} ± 0.14
	25	0.069 ^{a} ± 0.005	0.048 ^{a} ± 0.007	1.82 ^{a} ± 0.15
Willow	0	2.0 ^{a} ± 0.7	0.6 ^{a} ± 0.2	3.02 ^{a} ± 0.22
	5	6.1 ^{b} ± 0.6	3.1 ^{b} ± 0.4	2.74 ^{a} ± 0.12
	25	9.7 ^{c} ± 0.7	5.8 ^{c} ± 0.4	2.21 ^{b} ± 0.11
Alder	0	9.9 ^{a} ± 3.9	5.5 ^{a} ± 2.2	1.59 ^{a} ± 0.13
	5	7.3 ^{a} ± 2.9	2.9 ^{a} ± 1.1	1.60 ^{a} ± 0.11
	25	10.2 ^{a} ± 2.9	5.3 ^{a} ± 1.7	1.42 ^{a} ± 0.06

4. Discussion

The substrates requiring reclamation at mine sites, including tailings and overburden, have poor physical structure, low nutrient content, and negligible biological activity (Bois et al., 2005; Tordoff et al., 2000). We found that amending reclamation materials with low rates of forest topsoil can inoculate beneficial microbial root symbionts and improve initial seedling survival and growth under greenhouse conditions. These findings are applicable to mine sites where limited topsoil is available for reclamation.

In support of our first hypothesis, biomass and EM fungal colonization of spruce and willow seedlings increased with the proportion of forest soil added. Initial seedling survival also increased with forest soil proportion, suggesting an immediate benefit of the soil transfer method in ecological restoration. Spruce roots were colonized by the EM fungal taxa that dominate the roots of spruce seedlings growing near the forest soil collection site, including *Wilcoxina* spp., *Amphinema byssoides* (McMahen, 2020), indicating successful inoculation of native EM fungi.

Forest soil additions were beneficial in all the mine reclamation substrates tested: tailings, overburden and tailings + overburden. Despite the unique setting of the Tailings Storage Facility failure at the Mount Polley Mine, tailings and overburden are common reclamation substrates in the mining industry and both the overburden and tailings used had low nutrient levels and low inoculum potential, consistent with other mine reclamation studies (Bois et al., 2005; Moynahan et al., 2002; Zong et al., 2015). Thus, our findings are likely applicable to other sites. Our results are consistent with Helm and Carling (1993a, 1993b) who found that topsoil transfers to the rooting zone of balsam poplar (*Populus balsamifera*) seedlings at a mine reclamation site increased seedling height, foliar N and EM fungal colonization after two years. Their findings suggest that the results from our greenhouse study may translate to field conditions.

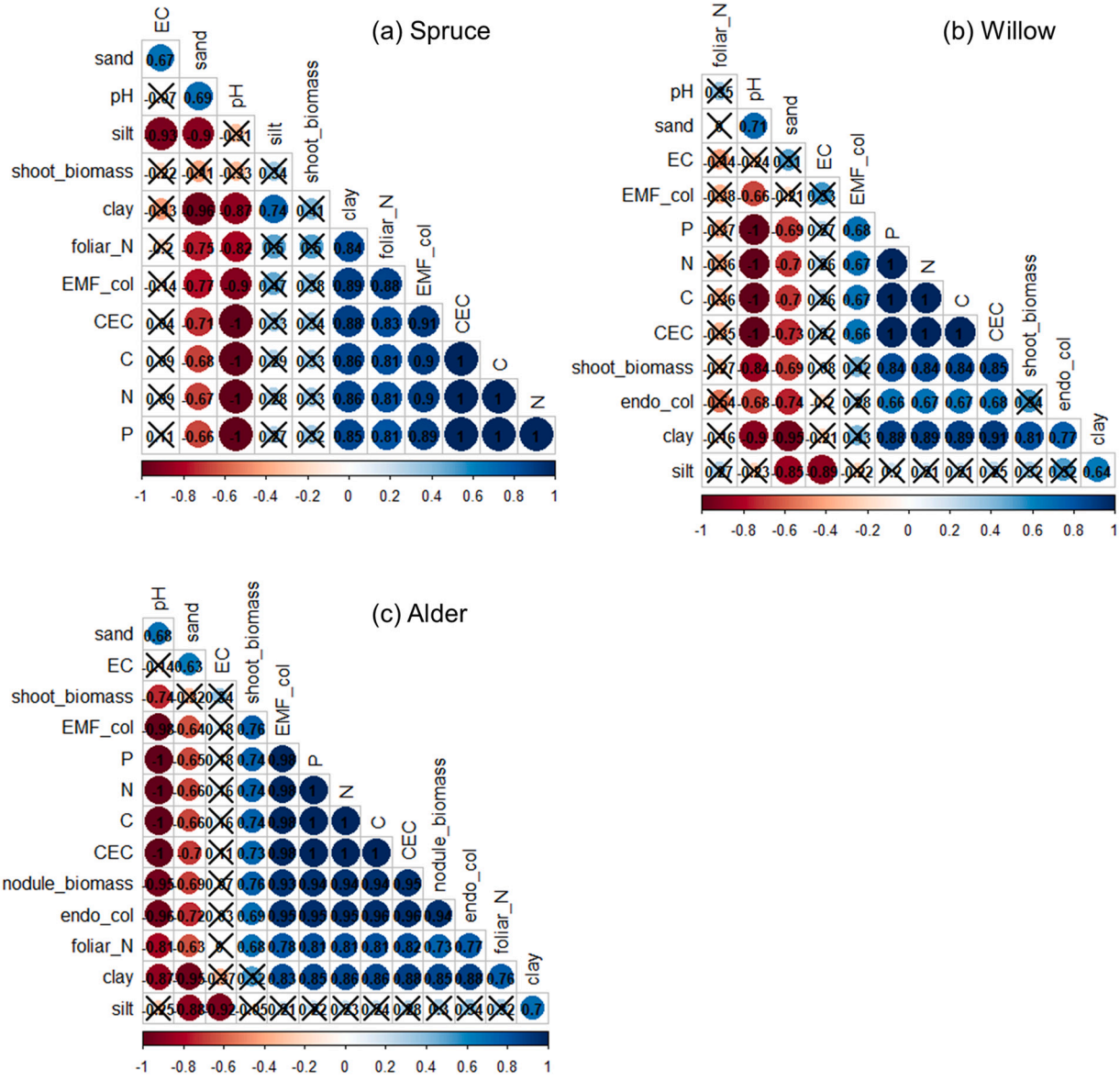

Fig. 2. Correlation matrices of seedling response variables and soil physical and chemical properties for spruce (a), willow (b) and alder (c) seedlings in 100 % forest soil, overburden and tailings treatments (i.e., treatments with associated soil sample data). Non-significant correlations are denoted by an "X". CEC = effective cation exchange capacity; EC = electrical conductivity; EMF = ectomycorrhizal fungi; endo = non-AMF fungal endophyte. While the positive relationship between EM fungal colonization and shoot biomass for spruce was not significant in this limited analysis (100 % tailings, overburden and forest soil treatments only), it was when evaluated over the full dataset ($P < 0.001$).

Unlike spruce and willow, forest soil additions had no effect on alder seedling growth, and only tended to increase N-fixing nodule formation in tailings. The variation in species-specific responses may be due to mismatches between alder and the plant community of the soil donor site (van der Putten et al., 2013). Amaranthus and Perry (1988) found that soil transfers from an arbutus (*Arbutus menziesii*) stand to the rooting zones of Douglas-fir (*Pseudotsuga menziesii*) seedlings had limited benefits, whereas Amaranthus and Perry (1987) found regeneration of Douglas-fir was promoted by soil transfers from older Douglas-fir plantations. Similarly, Guichon (2015) found that soil transfers from stands of AM western redcedar (*Thuja plicata*) to the rooting zones of EM western hemlock (*Tsuga heterophylla*) seedlings had an inhibitory effect on their growth and mycorrhizal colonization. In this study, soil was collected from mid- to late-seral forests where spruce but not alder or willow were present, and it is possible that limited compatible microbial inoculum was available. The N-fixing bacterium *Frankia alni*, which associates with alder, is an actinomycete. PLFA tests on the same forest soil used in this experiment found actinomycetes to account for only 4.7 % of microbial biomass (453 ng/g) and N-fixing *Rhizobia* bacteria were entirely absent (McMahen, 2020), indicating that N-fixing bacteria are not ubiquitous and that *Frankia alni* inoculum levels in the forest soil were likely low. The positive relationship between alder nodulation and shoot biomass suggests that the topsoil additions would have benefited seedlings if the topsoil contained compatible inoculum. Similarly, the negligible colonization of alder roots by EM fungi may have been because alder associates with a high proportion of genus-specific EM fungi, which were likely not present in the forest soil added (Molina, 1979; Tedersoo et al., 2009). Lack of compatible EM fungi may have been compounded by the fact that alder generally does not form symbioses with EM fungi until its roots have been colonized by N-fixing bacteria (Chen et al., 2020; Koo et al., 1995). Our alder results highlight the importance of careful selection of donor soil and using topsoil from areas containing the target plant species or plant species that associate with compatible soil microbes.

In support of our second hypothesis, the larger forest soil addition volume (188 mL, 25 % of the greenhouse pot) was sufficient for improving spruce and willow seedling growth to levels comparable with seedlings grown in 100 % forest soil. Compared to the 38 mL or 5 % treatment, the larger volume may not only provide a higher inoculum load, but also increase nutrient availability and alter rhizosphere conditions (e.g., decrease pH and increase the proportion of finer soil particles) to be more amenable to root development and/or symbiont colonization (Dumbrell et al., 2010; Lance et al., 2019). The 188 mL volume of forest soil applied in our 25 % treatment is comparable to topsoil volumes applied in field experiments by Helm and Carling (1993a, 1993b, 250 mL), Amaranthus and Perry (1989, 150 mL), Querejeta et al. (1998; 150 mL) and Berman and Bledsoe (1998; 250 mL) who found topsoil transfers to seedling rooting zones had positive effects on plant growth and/or mycorrhizal fungal colonization across different disturbance types.

In partial support of our third hypothesis, we found that the biological component of the added forest soil contributed to improved seedling performance, but only for plant species that exhibited dependence on microbial mutualists (i.e., spruce and alder, but not willow). Improvements in spruce growth and foliar nutrition, and increases in alder nodulation (tailings only) with forest soil additions were not present in sterilized soil. Accordingly, spruce EM fungal colonization and alder nodulation were positively related to shoot biomass and also related to seedling morphology changes consistent with increased reliance on microbial symbionts for nutrient uptake (decreased root allocation in spruce and decreased specific root length in alder). These results indicate that soil biota, such as EM fungi and N-fixing bacteria, contribute to growth and nutrient acquisition for these plant species, and play a key role in their establishment. Negative effects of soil sterilization on seedling performance are consistent with Saxerud and Funke (1991) and Emam (2016) who found increased biomass, foliar nutrition and AM fungal colonization of grasses in mine reclamation materials with unsterilized versus sterilized soil additions. Our results also align with research from grassland ecosystems where native soil and mycorrhizal fungal inoculations were more beneficial for late-successional plants, which have greater mycorrhizal dependence than early successional species (Cheeke et al., 2019; Koziol and Bever, 2015).

In contrast to spruce and alder, the benefits of forest soil additions to willow were maintained in sterilized soil, indicating that willow primarily benefited from the physical and chemical components of the forest soil. These results may be explained by the lower mycorrhizal dependence of early successional species, such as willow, which are adapted to soils with low biological activity (Cheeke et al., 2019; Koziol and Bever, 2015). Willow shoot growth was not related to EM fungal colonization and forest soil additions had no effect on foliar N, indicating that seedlings were not N-limited. This suggests that the fibrous fine roots of willow support nutrient acquisition without relying on mycorrhizal fungi. It is possible, however, that willow would show a biological benefit with the addition of topsoil collected from areas where willow plants are present, as willow were not present at our forest soil collection sites and the soil may have lacked compatible mutualists. Of the four dominant EM taxa on roots of willow seedlings growing in these substrates in a separate study, only *Melinomyces bicolor* overlapped with the morphotypes identified on spruce seedlings, suggesting limited overlap in spruce and willow fungal communities (McMahen, 2020). The negligible colonization of willow roots by AM fungi may similarly suggest a lack of compatible inoculum in the forest soil, but it may also reflect EM being a more suitable symbiont in low-nutrient reclamation materials (e.g., ability of EM fungi to access inorganic phosphorus; Teste et al., 2020). Finally, whole soil amendments introduce the full diversity of the soil biological community, ideally inoculating a consortium of microbes that interact to benefit plants, but there is also the potential to transmit antagonistic organisms. A separate study using the same soils found non-AMF fungal endophytes—which can range from mutualistic to parasitic, with the potential to counteract benefits from mycorrhizal fungi (Mayerhofer et al., 2013)—had a negative effect on willow seedling growth (McMahen, 2020). We found a positive relationship between non-AMF fungal endophyte colonization and root:shoot ratio in willow, suggesting that the endophytes present may be detrimental. Early successional species are more susceptible to pathogens, with selection pressures promoting rapid growth and reproduction over defense traits (Kardol et al., 2013; van der Putten et al., 1993). Thus, competitive release may have occurred for willow in sterilized soil.

Further research is required to assess if soil transfers will have lasting effects on seedling growth and nutrition as roots extend beyond the treated rooting zone, as the findings from this experiment only apply to initial seeding establishment. Middleton and Bever (2012) found benefits of inoculated AM fungi to spread to neighbouring plants 2 m away within a couple of growing seasons, suggesting that although growth may lag compared to seedlings growing in reference areas, over time established plants will maintain and further develop communities of microbial mutualists through applied nucleation (Michaels et al., 2020). Although soil biota can ingress over time through their natural dispersal mechanisms, reclamation methods that promote recolonization of soil organisms in substrates with low biological activity can potentially bootstrap ecosystem recovery (Perry et al., 1989). While we are not promoting disturbing new areas to source soil—especially sensitive or at-risk ecosystems—if topsoil is not available or has deteriorated in quality from long-term storage in stockpiles, collecting soil from dispersed areas of adjacent undisturbed ecosystems may be a minimally invasive option at some sites. For example, collecting the top 15 cm of soil from a 1 m^2 area would provide sufficient soil for 750 $\times$ 200 mL soil transfers (equivalent to a rate of 0.5 m^3/ha for 200 mL transfers at 2500 stems/ha). In addition to using minimal topsoil, the soil transfer approach of mixing fresh topsoil into the rooting zones of seedlings during planting does not require heavy machinery (i.e., tree planters carry one bag of soil and one bag of seedlings). Soil transfers could also be applied to seedlings grown in an on-site nursery, supplementing commercial topsoil with native soil biota.

5. Conclusion

We found that amending mine reclamation materials with low rates of forest topsoil can inoculate beneficial microbial root symbionts and improve initial establishment of willow, spruce and alder under greenhouse conditions. Plants dependent on microbial mutualists benefited from the biological component of the forest soil, although this was contingent on the added topsoil containing compatible microbes. Conversely, willow, an early successional plant with low microbial dependence benefited from the physical and chemical components of the topsoil. These findings show that targeted additions of small volumes of fresh topsoil from native ecosystems can improve seedling growth and promote recovery of limiting soil microbial communities, making soil transfers and other methods of applying low rates of topsoil promising approaches for enhancing revegetation of mines and other highly disturbed areas when topsoil availability is limited.

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Declaration of competing interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.apsoil.2022.104622.

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RESEARCH ARTICLE

Soil microbial legacies influence plant survival and growth in mine reclamation

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Abstract

Plants alter soil biological communities, generating ecosystem legacies that affect the performance of successive plants, influencing plant community assembly and successional trajectories. Yet, our understanding of how microbe-mediated soil legacies influence plant establishment is limited for primary successional systems and forest ecosystems, particularly for ectomycorrhizal plants. In a two-phase greenhouse experiment using primary successional mine reclamation materials with or without forest soil additions, we conditioned soil with an early successional shrub with low mycorrhizal dependence (willow, *Salix scouleriana*) and a later-successional ectomycorrhizal conifer (spruce, *Picea engelmannii* × *glauca*). The same plant species and later-successional plants (spruce and/or redcedar, *Thuja plicata*, a mid- to late-successional arbuscular mycorrhizal conifer) were grown as legacy-phase seedlings in conditioned soils and unconditioned control soils. Legacy effects were evaluated based on seedling survival and biomass, and the abundance and diversity of root fungal symbionts and pathogens. We found negative intraspecific (same-species) soil legacies for willow associated with pathogen accumulation, but neutral to positive intraspecific legacies in spruce associated with increased mycorrhizal fungal colonization and diversity. Our findings support research showing that soil legacy effects vary with plant nutrient acquisition strategy, with plants with low mycorrhizal dependence experiencing negative feedbacks and ectomycorrhizal plants experiencing positive feedbacks. Soil legacy effects of willow on next-stage successional species (spruce and redcedar) were negative, potentially due to allelopathy, while ectomycorrhizal spruce had neutral to negative legacy effects on arbuscular mycorrhizal redcedar, likely due to the trees not associating with compatible mycorrhizae. Thus, positive biological legacies may be limited to scenarios where mycorrhizal-dependent plants grow in soil containing legacies of compatible mycorrhizae. We found that soil legacies influenced plant performance in mine reclamation materials with and without forest soil additions, indicating that initial restoration actions may potentially exert long-term effects on plant community composition, even in primary successional soils with low microbial activity.

KEYWORDS
ecological restoration, mycorrhizal fungi, plant–soil feedback, plant–microbe interactions, primary succession, root fungal community

TAXONOMY CLASSIFICATION
Ecosystem ecology, Genomics, Microbial ecology, Restoration ecology, Soil ecology

1 | INTRODUCTION

Understanding the factors influencing plant establishment following severe disturbances is necessary for informing ecosystem restoration methods and enabling predictions of successional trajectories. The vegetation communities that develop during succession are a function of abiotic characteristics (e.g., soil properties, climate, topography), but also biological interactions (Connell & Slatyer, 1977). Plants shape soil physiochemical properties and soil biological communities through root development, root exudates, litter inputs, and creation of habitats for specific organisms (van der Putten et al., 2013). Changes in the soil environment based on plant identity leave "ecosystem legacies" that influence the fitness and niche space of successive plants, with effects on plant performance ranging from negative to positive (Bever et al., 1997; Ke & Wan, 2020).

Shifts in the abundances of soil organisms, including mutualists and pathogens, are increasingly recognized as drivers of ecosystem legacies. Legacies resulting from changes in the community composition of soil organisms can influence the structure and dynamics of plant communities through plant–soil feedbacks (Chung et al., 2019; Klironomos, 2002), and create historical contingencies in which the order and timing of past events affect community assembly during succession (Duhamel et al., 2019; Fukami, 2015). In the context of ecological restoration, this means that plant species selected for revegetation can create soil legacies that have the potential to influence the trajectory of the plant community.

Plant–soil feedbacks associated with soil biological legacies vary with plant nutrient acquisition strategy. In general, plant–soil feedbacks tend to be positive for ectomycorrhizal (EM) plants, neutral for arbuscular mycorrhizal (AM) plants, and negative for nitrogen-fixing and non-mycorrhizal plants (Teste et al., 2017). Variation in plant–soil feedbacks according to plants' nutrient acquisition strategies aligns with patterns in vegetation succession: later successional plants with greater mycorrhizal dependence tend to experience more positive feedbacks, while early successional plants, which commonly have more explorative root systems and low mycorrhizal dependence, tend to experience negative feedbacks (Cortois et al., 2016). Early successional plants typically invest more in growth than defense, making them susceptible to pathogens, which is accentuated by their lack of pathogen protection from mycorrhizal fungi (Koziol & Bever, 2015; Lemmermeyer et al., 2015). Accordingly, accumulation of soil-borne pathogens can have negative legacy effects on early successional plants, breaking their dominance and promoting increases in plant diversity as well as species turnover in succession (Kardol et al., 2007; van der Putten et al., 1993).

As pathogen-mediated negative soil legacies reduce the vitality and abundance of early successional plants, niche space opens for other plant species, including the next successional stage plant species. The subsequent plant communities that establish are a function of not only abiotic conditions and stochastic processes, such as dispersal, but also soil biological legacies (Dumbrell et al., 2010). In plant communities dominated by mycorrhizal-dependent plants, particularly EM plants (associated with slower growth but increased pathogen resistance; Cheeke et al., 2019; Koziol & Bever, 2015), the buildup of mycorrhizal fungal propagules in the soil may generate positive legacies and promote establishment of plants that associate with those mycorrhizae. For example, Horton et al. (1999) found EM Douglas-fir (*Pseudotsuga menziesii*) to establish near EM manzanita (*Arctostaphylos* spp.) but not AM chamise (*Adenostoma fasciculatum*). This is consistent with studies reporting overlap in the EM fungal taxa colonizing understorey and overstorey plants (Kennedy et al., 2003) and mid-seral and late-seral tree species (Kennedy et al., 2012). The presence of positive mycorrhizal-mediated legacy effects in later successional plant communities is, however, ecosystem dependent; climax plant communities composed of AM and less mycorrhizal-dependent plants, as opposed to EM plants, can be characterized by neutral to negative legacies, which prevent individual species from becoming dominant, promoting coexistence and diversity (Crawford et al., 2019; Mack et al., 2019).

Limited research has been conducted to understand if the soil legacy effects associated with plant nutrient acquisition type and successional stage described above are consistent under primary successional conditions, including mine reclamation settings (Zhu et al., 2022), and how the initial microbial community influences plant community assembly. Given the severely nutrient-liming conditions in primary succession, simply growing plants in these barren soils can have positive legacies due to abiotic improvements in the soil, particularly when N-fixing plants are present (Castle et al., 2016; Kuťáková et al., 2020; Png et al., 2019). In terms of biological legacies, neutral to negative biological legacies have been found for AM plants in early successional post-glaciation soils (Castle et al., 2016) and foredunes (van der Putten et al., 1993), while Kuťáková et al. (2020) found soil fungi to potentially be positively linked to initial plant establishment in post-mining soils, and Seeds and Bishop (2009) found positive legacies associated with N-fixing bacteria in an area impacted by a volcanic eruption. These results suggest that while biological legacies in primary successional soils may be offset by abiotic legacies or weaker due to low abundances of soil organisms and low nutrient availability, they may be sufficiently present to influence plant community assembly. There is, however, a lack of studies in mine

reclamation settings (Zhu et al., 2022) and on plants that dominate temperate forests, including conifers.

In a greenhouse experiment, we tested three hypotheses regarding how seedlings representing different functional groups and mycorrhizal associations create soil microbial legacies that influence the growth of successive plants in primary-successional mine reclamation materials and mine reclamation materials amended with forest soil.

H1: Intraspecific (same-species) legacy effects would vary with plant nutrient acquisition strategy and successional stage: willow (*Salix scouleriana* Barratt ex Hook.), an early successional shrub with low mycorrhizal dependence, would have negative intraspecific legacy effects corresponding to pathogen accumulation, while hybrid white spruce (*Picea engelmannii* Parry ex Engelm.×*glauca* (Moench)), a later successional stage EM conifer, would have positive intraspecific legacy effects associated with increased colonization by mycorrhizal fungi.

H2: Positive legacy effects would occur on next successional stage plants associating with compatible mycorrhizal fungal guilds, while a lack of compatible mycorrhizal fungal guilds would correspond with neutral legacy effects. Specifically, EM willow would have positive legacy effects on EM spruce, but EM willow and spruce would have neutral legacy effects on AM redcedar (*Thuja plicata* Donn ex D. Don).

H3: In unamended mine reclamation materials, which are low nutrient and have a lower abundance and diversity of soil organisms, legacy effects would be weaker than in mine reclamation materials amended with forest soil.

2 | MATERIALS AND METHODS

2.1 | Study system

Our greenhouse experiment used soils collected near the Mount Polley Mine, an open pit copper and gold mine in British Columbia (BC), Canada (52°32′42.35″ N, 121°37′58.67″ W). Glacial till subsoil (exposed by severe erosion) and deposited mine tailings were collected from the area disturbed by the 2014 tailings dam embankment failure (Figure S1, Table S1). The Mount Polley Mine tailings are non-acid generating and have not shown negative toxicological effects on soil fauna or plants (Van Geest et al., 2017). Forest soil was collected from the adjacent, unimpacted Interior Cedar Hemlock (ICH) forest (Moist Cool subzone, Horsefly variant; Steen & Coupé, 1997) in mid- and late-seral stands dominated by western redcedar, subalpine fir (*Abies lasiocarpa*), and hybrid white spruce (Figure S1, Table S1). At each forest site, litter was removed and the top 15–20 cm of soil collected, including the fermentation and humus layers, and the upper mineral horizons. Soils were homogenized and mixed with 20% v/v perlite to compensate for structural losses due to handling. This corresponds to a mixed soil sampling design as per Gundale et al. (2019), and thus the experiment evaluates the effects of the average or composite soil community of the sample locations.

TABLE 1 Chemical and physical properties of forest soil, subsoil, and tailings collected from the Mount Polley Mine, British Columbia.

Parameter	Forest soil	Subsoil	Tailings
Sand (%)	44.46	48.12	62.07
Silt (%)	34.71	36.69	29.08
Clay (%)	20.83	15.18	8.85
Texture	Loam	Loam	Sandy loam
pH	5.2	8.09	8.23
EC	417	230	543
Total N (%)	0.605	0.025	0.013
Total C (%)	14.28	0.82	0.48
PO_4-P (mg kg^{-1})	41.98	1.42	1.21
CEC (cmol + kg^{-1})	35.14	8.93	6.74

Note: Forest soil includes the fermentation layer, humus layer, and upper mineral horizons.

Abbreviations: CEC, effective cation exchange capacity; EC, electrical conductivity.

This design is suitable for mine reclamation research because in reclamation, soils commonly undergo some level of mixing during stockpiling and application. Physical and chemical properties of each soil type are presented in Table 1 (analytical methods are detailed in Appendix S1).

2.2 | Experimental design

In a two-phase greenhouse experiment, plants species from different functional groups were grown to condition the soil microbiome (conditioning phase) followed by a second growing period (legacy phase) in which conditioning-phase soil was used to grow the same plant species or a later-successional-stage plant species characteristic of ICH ecosystems. As shown in Figure 1, eight conditioning phase-legacy phase combinations were tested (three unconditioned controls and five conditioned treatments). Soil conditioned by willow, an early successional EM shrub, was used to grow willow, hybrid white spruce (a mid-successional EM tree), and western redcedar (a mid- to late-successional AM tree). Spruce-conditioned soil was used to grow spruce and redcedar. For comparison, in the legacy phase, control willow, spruce, and redcedar seedlings were grown in unconditioned soil that was stored at 4°C during the conditioning phase. Phospholipid fatty acidgh-throughput Illumina MiSeq se analysis was conducted to verify that soil inoculum load did not decrease during the storage period (Appendix S2).

We applied two soil factors to all the conditioning-legacy combinations, including the unconditioned controls: (1) three reclamation materials were tested (mine tailings, glacial till subsoil, and a 1:1 mixture by volume of tailings and subsoil, herein referred to as "tailings + subsoil"); and (2) reclamation materials were mixed with 25% v/v forest soil or left unamended. Three reclamation materials × two forest soil treatments × eight conditioning-legacy combinations amounts to 56 treatments (Figure 1).

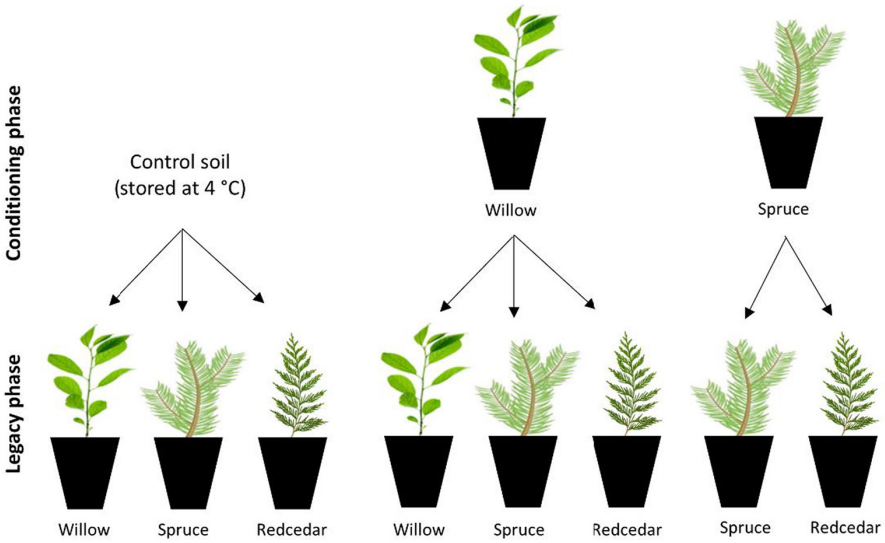

FIGURE 1 Combinations of conditioning- and legacy-phase plant species tested in the two-phase greenhouse experiment evaluating legacy effects on the same species and later-successional species using willow (early successional), spruce (mid-successional), and redcedar (mid- to late-successional). The conditioning-legacy combinations were carried out for three types of reclamation materials (tailings, subsoil, and tailings + subsoil) with or without forest soil additions (8 × 3 × 2 treatments).

For both phases, five seeds collected from the Mount Polley Mine area were sterilized with hydrogen peroxide, sown into pots, and thinned to one seedling per pot. Containers were randomly arranged in the University of British Columbia (UBC) Horticulture Greenhouse, Vancouver, BC under 600 W high pressure sodium lights (17-h photoperiod) and hand watered as needed. To mimic mine site conditions, seedlings were not fertilized during the experiment.

In the conditioning phase, seedlings were grown in 3 L pots in the greenhouse for 6 months, then harvested and the soil and seedlings retained. The roots of the conditioning-phase seedlings were cut into approximately 1 cm pieces and mixed back into their respective soils. In the legacy phase, willow, spruce, and redcedar seedlings were grown in 250-ml Ray Leach cones containing conditioned soil. Soil from each individual conditioning-phase seedling formed an individual legacy-phase treatment. Due to substantially higher mortality of willow seedlings than spruce seedlings in the conditioning phase, fewer replicates of legacy-phase seedlings could be grown in willow-conditioned soil treatments ($n = 6$) than in spruce-conditioned and control soil treatments ($n = 7$).

2.3 | Plant performance assessment

For each legacy-phase seedling, initial germinant survival prior to thinning was recorded. Following harvest, shoots were dried for 72 h at 70°C and weighed. Samples of the youngest foliage were analyzed for total foliar nitrogen (N) and carbon (C) using an Elemetar vario EL Cube elemental analyzer at the UBC Stable Isotope Facility, Vancouver, BC. Washed spruce and redcedar roots were scanned using WinRhizo software to calculate specific root length (SRL; the ratio of root length to root dry biomass). Willow roots were not scanned to avoid inaccuracies associated with their dense, fibrous form. Root tips/segments for mycorrhizal fungal analysis were collected immediately postharvest and the remaining roots were dried for 72 h at 70°C then weighed.

2.4 | Root fungal community assessment

For willow and redcedar, 40 × 1 cm randomly selected root segments per seedling were collected and frozen at −20°C until analysis. Twenty segments per sample were cleared in 10% KOH and stained with ink and vinegar (Vierheilig et al., 2005). Percent colonization of AM fungi and non-AM fungal endophytes was evaluated using 100 intersections under a compound microscope as per McGonigle et al. (1990). For willow, EM fungal percent colonization was measured from the same stained roots using the gridline intersect method (Giovannetti & Mosse, 1980). To assess the identity and diversity of root-associated fungi, DNA was extracted from the remaining 20 willow and redcedar root segments per sample using Qiagen DNeasy Plant Pro kits. High-throughput Illumina MiSeq sequencing was conducted by Integrated Microbiome Resource at Dalhousie University, Halifax, Nova Scotia as per Comeau et al. (2017) using the fungal-specific ribosomal RNA internal transcribed spacer (ITS) region ITS2 primers ITS86 and ITS4 (Turenne et al., 1999; Vancov & Keen, 2009; White et al., 1990). DNA characterization was only conducted for root samples from the 100% tailings and subsoil treatments, as well as 100% forest soil treatments (installed separately to support to support this simplified analysis), because the forest soil addition treatments represented a mixture of the analyzed soils, and therefore likely contained the same fungal species.

The resulting sequences were trimmed for quality using the sliding window function in Trimmomatic (version 0.39; Bolger et al., 2014) where the average quality per base within the four-base-pair window fell below fifteen. Sequences were then imported into QIIME2 (version 2019.7; Caporaso et al., 2010) and trimmed using Cutadapt to remove primers and read through (Martin, 2011). The ITS2 region was extracted and chimeras and non-ITS2 sequences were removed using the ITSxpress QIIME2 plugin (version 1.8.0; Rivers et al., 2018). Bidirectional reads were assembled, denoised, and assigned to amplicon sequence variants (ASVs), dereplicated, and filtered for chimeras using the DADA2 pipeline (Callahan et al., 2016). Taxonomic identities of the ASVs were determined

using a Naïve Bayes classifier trained on the UNITE database (Abarenkov et al., 2010). ASVs were assigned to fungal guilds using the FUNGuild database (Nguyen et al., 2016). Nonfungal sequences and singletons were removed, then data were rarified to the lowest number of reads.

For spruce, 50 random root tips were collected from each root system (or all tips for systems with <50 tips) and morphotyped under a dissecting microscope as per Goodman et al. (1996) to assess EM fungal percent colonization and diversity. For each morphotype, vouchers (one or a few root tips from an individual root system) were collected and stored at −20°C. Individual voucher specimens (minimum three per morphotype except for rare morphotypes observed less than three times) were ground with a sterile micropestle and sterile microsand followed by DNA extraction with PowerPlant Pro kits (Qiagen, 2017) as per the manufacturer's instructions. The ITS1 and ITS2 regions were amplified using polymerase chain reaction (PCR) with the fungal-specific primers ITS4 (White et al., 1990) and ITS1F (Gardes & Bruns, 1993) using GE illustra PuReTaq Ready-To-Go PCR Beads, following the manufacturer's protocol. Thermocycler parameters for PCR involved an initial denaturation of 5 min at 94°C, followed by 35 cycles of denaturation at 94°C for 30 s, annealing at 55°C for 30 s, and elongation at 72°C for 30 s, followed by 7 min at 72°C for a final elongation. Bidirectional Sanger sequencing of PCR products was performed at Macrogen, Korea. Bidirectional reads were trimmed (error probability limit = 0.01) and aligned into consensus contigs using Geneious Prime (version 2019.2.3). The resulting sequences were identified using the Basic Local Alignment Search Tool (BLAST) against the National Center for Biotechnology Information (NCBI) GenBank database and the UNITE database (Abarenkov et al., 2010) with a 97% sequence similarity threshold.

Where morphotype voucher PCR products had more than one band in gel electrophoresis or Sanger sequencing failed, genomic DNA extracts underwent Illumina MiSeq sequencing and downstream bioinformatics as described above (except singletons were not removed and data were not rarified). Each morphotype voucher was assigned to the EM fungal taxon with the highest number of reads.

2.5 | Statistical analysis

Statistical analyses were conducted in R (version 4.0.3; R Core Team, 2020). Linear models for each legacy-phase plant species (willow, spruce, and redcedar) were constructed with soil treatment factors (reclamation material type × forest soil addition treatments × conditioning treatment (i.e., conditioning plant species)) as the explanatory variables with plant growth measures as the response variables. Response variables were natural log ($\log_e$) transformed as required to meet assumptions of normality and equal variance. Foliar N was included as a covariate to account for potential soil nutrient depletion during the conditioning phase. Depth to soil from the top of the pot was also included as a covariate to account for variation in soil settling and potential effects on light availability. Significance of model terms was tested with Type III ANOVA. Seedling survival and percent colonization by root symbionts were assessed using binomial generalized linear models (link = logit) with the same explanatory variables and covariates. Treatment effects were evaluated with pairwise post hoc contrasts using the *emmeans* function with the Tukey adjustment for multiple comparisons (Lenth, 2020). Regressions of shoot biomass against root symbiont colonization and SRL were used to evaluate relationships between response variables for reclamation materials with and without forest soil additions.

For willow and redcedar high-throughput sequencing data, effects of conditioning treatment on root fungal community composition for each soil type were visualized using db-RDAs conditioned on the covariates (foliar N and depth to soil) using the *capscale* function (*vegan* package; Oksanen et al., 2019). PERMANOVA significance testing was done with the *adonis* function in *vegan* (999 permutations). FUNGuild assignments were filtered to remove ASVs with multiple functional guild assignments, that is, fungi that have varying life histories (Nguyen et al., 2016). FUNGuild provides useful insight into potential shifts in microbial community structure; however, it is important to note that only 50% of willow ASVs and 42% of redcedar ASVs remained after filtering unassigned and multi-guild fungi. Linear models of functional guild ASV richness and quasibinomial (link = logit) generalized linear models of functional guild ASV relative abundance were constructed with soil type × conditioning treatment as the explanatory variables along with the covariates described above. Post hoc pairwise testing with *emmeans* was used to test effects of conditioning treatments.

Indicator species analysis of spruce EM fungal morphotyping data as well as willow and redcedar high-throughput sequencing data was done using the *multiplatt* function of the *indicspecies* package (de Caceres & Legendre, 2009; Nguyen et al., 2016). FUNGuild assignments were used to support interpretations (multi-guild taxa were excluded from interpretations due to their unknown functional roles in the system).

3 | RESULTS

Seedling responses were generally consistent among the reclamation materials tested (tailings, subsoil, and tailings + subsoil). Combined results across all reclamation material types are presented except where a significant effect of reclamation material type occurred.

3.1 | Soil legacy effects on willow

Willow had lower germinant survival, shoot biomass, and root biomass in willow-conditioned soils compared to control soils in reclamation materials with and without forest soil additions ($p < .001$; Figure 2, Table 2). High-throughput sequencing of willow roots (forest soil, tailings, and subsoil treatments only) showed that fungal community composition was significantly different in willow-conditioned

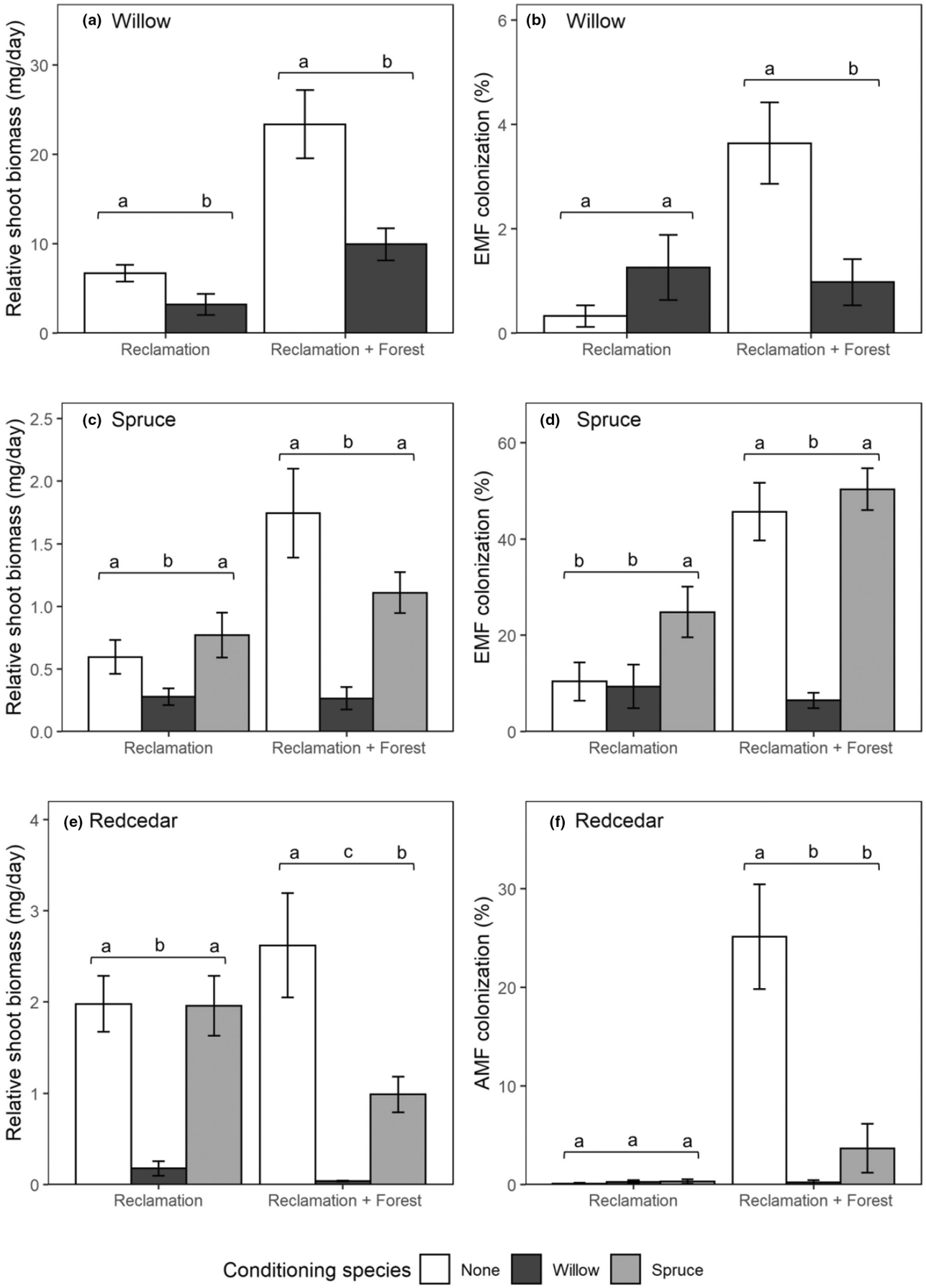

FIGURE 2 Shoot biomass (a, c, e) and percent root colonization by ectomycorrhizal fungi (EMF; b, d) and arbuscular mycorrhizal fungi (AMF; f) of willow (a, b), spruce (c, d), and redcedar (e, f) seedlings grown in control, willow-conditioned, and spruce-conditioned soils. Different letters indicate significant differences ($p < 0.05$) within each soil grouping: reclamation materials (tailings, subsoil, and tailings + subsoil) and reclamation materials mixed with 25% forest soil v/v.

treatments compared to controls for forest soil (PERMANOVA R^2 = .23, p = .001) and subsoil (PERMANOVA R^2 = .13, p = .043), and tended to be different for tailings (PERMANOVA R^2 = .18, p = 0.086; Figure S2). Relative abundance of ASVs of fungal pathogens was greater in willow-conditioned soils compared to controls (p = .018; Figure 3). Fungal pathogen ASV richness tended to increase with willow-conditioning in forest soil and tailings, although effects were not significant (p = .899; Figure S3). Indicator species analysis showed that plant fungal pathogens were maintained or gained in willow-conditioned soil: *Plectosphaerella cucumerina* was dominant in control and willow-conditioned subsoil and tailings (Table S2). Control forest soil was characterized by the pathogen *Neonectria candida*, while the pathogens *Moesziomyces aphidis* and *Plectosphaerella cucumerina* were indicative of willow-conditioned forest soil.

Fungal symbiont ASV richness decreased in the willow-conditioned treatments compared to the controls for forest soil ($p < .001$) but not subsoil or tailings (Figure S3). The fungal symbionts *Cadophora finlandica* and *Cadophora* sp. were indicator species of control and willow-conditioned forest soil, but *Tomentella sublilacina*, *Meliniomyces bicolor*, and *Phialocephala* sp. were indicative of control forest soil only (i.e., were not maintained in willow-conditioned forest soil; Table S2). Willow root EM fungal colonization was low (≤5%) and there was no difference in percent colonization between willow-conditioned and control soils for unamended reclamation materials (Figure 2). However, EM fungal colonization was lower in willow-conditioned soils compared to control soils in reclamation materials with forest soil additions (Figure 2). There was no relationship between willow shoot biomass and EM fungal percent colonization in unamended reclamation materials (R^2_{adj} = .074, p = .599) or reclamation materials with forest soil additions (R^2_{adj} = .047, p = 1.00). Colonization of willow roots by AM fungi was low (≤2%) and did not differ among treatments (Table 2). Conditioning treatment had no significant effect on willow root percent colonization by non-AM fungal endophytes (Table 2).

3.2 | Soil legacy effects on spruce

Spruce seedling shoot and root biomass were lower in willow-conditioned soils than control soils in reclamation materials with and without forest soil additions ($p < .001$; Figure 2, Table 2). A similar trend was observed for spruce germinant survival, which tended to be greater in control soils than willow-conditioned soils (87% vs. 65% in unamended reclamation materials and 89% vs. 82% in reclamation materials with forest soil), although the effects were not significant (Table 2). There was no difference in shoot biomass, root biomass, and germinant survival of spruce seedlings between spruce-conditioned soils and controls in reclamation materials with or without forest soil additions (Figure 2, Table 2).

Ectomycorrhizal fungal colonization of spruce roots was lower in willow-conditioned soils than control soils for reclamation materials with forest soil additions ($p < .001$), but not for unamended reclamation materials (p = .169; Figure 2). EM morphotype richness was low (average richness ≤1.3) and did not differ between willow-conditioned and control soils (Table 2). EM fungal colonization was greater in spruce-conditioned soils than controls in unamended reclamation materials (p = .002; Figure 2), although a significant interaction with reclamation material type (F_4 = 3.50, p = .003) showed this effect only occurred in subsoil and subsoil + tailings, not tailings. In reclamation materials with forest soil additions, EM morphotype richness (but not percent colonization) was greater in spruce-conditioned soils than control soils ($p < .001$; Table 2). Consistent with EM fungal colonization and richness results, indicator species analysis of EM morphotypes showed that EM indicator species were lost in willow-conditioned soil and maintained or gained in spruce-conditioned soils (Tables S3 and S4). *Wilcoxina rehmii* was dominant in control soil and maintained in spruce-conditioned soil, while *Thelephora terrestris* was characteristic of spruce-conditioned soils only. Willow-conditioned soil has no EM indicator species.

Across all conditioning treatments, there was a positive relationship between shoot biomass and EM fungal colonization in both unamended reclamation materials (R^2_{adj} = .091, p = .011) and reclamation materials with forest soil additions (R^2_{adj} = .225, $p < .001$). Additionally, there was a negative relationship between SRL and EM fungal colonization in reclamation materials with forest soil additions (R^2_{adj} = .389, p = .013), indicating that roots became thicker and less acquisitive when EM fungal colonization increased.

3.3 | Soil legacy effects on redcedar

Redcedar shoot biomass, root biomass, and survival were lower in willow-conditioned soils than control soils in reclamation materials with and without forest soil (Figure 2, Table 2). Redcedar shoot biomass, root biomass, and survival were also lower in spruce-conditioned soils than control soils in reclamation materials with forest soil, but not in unamended reclamation materials (Figure 2, Table 2). Effects of conditioning treatment on the root fungal communities of redcedar seedlings were generally limited to soils with sufficient biological activity, that is, treatments containing forest soil amendments: AM fungal colonization of redcedar roots was lower in willow-conditioned and spruce-conditioned soils compared to controls in reclamation materials with forest soil additions, but there was no effect in unamended reclamation materials where AM fungal colonization was low (≤4%; Figure 2). Similarly, the fungal community

TABLE 2 Mean ± standard error for each treatment group, with results combined across all reclamation materials (tailings, subsoil, and tailings + subsoil).

Legacy plant species	Forest soil addition	Conditioning plant species	Survival (%)	Relative shoot biomass (mg/day)	Relative root biomass (mg/day)	EM fungal colonization (%)	EM fungal richness	AM fungal colonization (%)	Fungal endophyte colonization (%)
Willow	No	None	$88.6^{a} \pm 3.1$	$0.9^{a} \pm 6.7$	$2.0^{a} \pm 0.3$	$0.3^{a} \pm 0.2$	–	$0.0^{a} \pm 0.0$	$23.7^{a} \pm 3.3$
		Willow	$37.5^{b} \pm 8.5$	$1.2^{b} \pm 3.2$	$1.2^{b} \pm 0.5$	$1.3^{a} \pm 0.6$	–	$0.3^{a} \pm 0.2$	$22.9^{a} \pm 3.4$
	Yes	None	$97.4^{a} \pm 1.7$	$3.8^{a} \pm 23.4$	$8.9^{a} \pm 1.3$	$3.6^{a} \pm 0.8$	–	$0.0^{a} \pm 0.0$	$35.5^{a} \pm 2.3$
		Willow	$64.3^{b} \pm 7.6$	$1.8^{b} \pm 9.9$	$3.6^{b} \pm 0.7$	$1.0^{b} \pm 0.4$	–	$0.0^{a} \pm 0.0$	$31.7^{a} \pm 3.3$
Spruce	No	None	$86.6^{ab} \pm 6.3$	$0.1^{a} \pm 0.6$	$0.2^{a} \pm <0.1$	$10.4^{b} \pm 4.0$	$0.8^{a} \pm 0.2$	–	–
		Willow	$65.4^{a} \pm 12.1$	$0.1^{b} \pm 0.3$	$0.1^{b} \pm <0.1$	$9.4^{b} \pm 4.6$	$0.7^{a} \pm 0.2$	–	–
		Spruce	$94.3^{b} \pm 3.3$	$0.2^{a} \pm 0.8$	$0.2^{a} \pm <0.1$	$24.8^{a} \pm 5.2$	$1.0^{a} \pm 0.2$	–	–
	Yes	None	$88.4^{a} \pm 4.9$	$0.4^{a} \pm 1.7$	$0.5^{a} \pm 0.1$	$45.6^{a} \pm 6.0$	$1.3^{a} \pm 0.2$	–	–
		Willow	$81.5^{a} \pm 8.2$	$0.1^{b} \pm 0.3$	$0.1^{b} \pm 0.0$	$6.5^{b} \pm 1.6$	$0.9^{b} \pm 0.2$	–	–
		Spruce	$92.1^{a} \pm 5.6$	$0.2^{a} \pm 1.1$	$0.4^{a} \pm 0.1$	$50.3^{a} \pm 4.4$	$2.0^{a} \pm 0.1$	–	–
Redcedar	No	None	$87.1^{a} \pm 5.6$	$0.3^{a} \pm 2.0$	$0.7^{a} \pm 0.1$	–	–	$0.1^{a} \pm 0.1$	$22.6^{a} \pm 3.4$
		Willow	$62.5^{b} \pm 13.9$	$0.1^{b} \pm 0.2$	$0.1^{b} \pm 0.1$	–	–	$0.3^{a} \pm 0.2$	$26.6^{a} \pm 5.0$
		Spruce	$85.6^{a} \pm 6.5$	$0.3^{a} \pm 2.0$	$0.8^{a} \pm 0.1$	–	–	$0.3^{a} \pm 0.2$	$12.8^{a} \pm 2.5$
	Yes	None	$87.5^{a} \pm 5.8$	$0.6^{a} \pm 2.6$	$1.0^{a} \pm 0.2$	–	–	$25.1^{a} \pm 5.3$	$37.2^{a} \pm 3.3$
		Willow	$47.8^{b} \pm 9.5$	$<0.1^{c} \pm <0.1$	$0.0^{c} \pm 0.0$	–	–	$0.2^{b} \pm 0.2$	$21.4^{a} \pm 3.2$
		Spruce	$82.4^{a} \pm 7.0$	$0.2^{b} \pm 1.0$	$0.4^{b} \pm 0.1$	–	–	$3.7^{b} \pm 2.5$	$27.7^{a} \pm 2.6$

Note: Different superscript letters denote significant differences in the results of the conditioning plant species treatments within each forest soil addition treatment group for each legacy plant species.

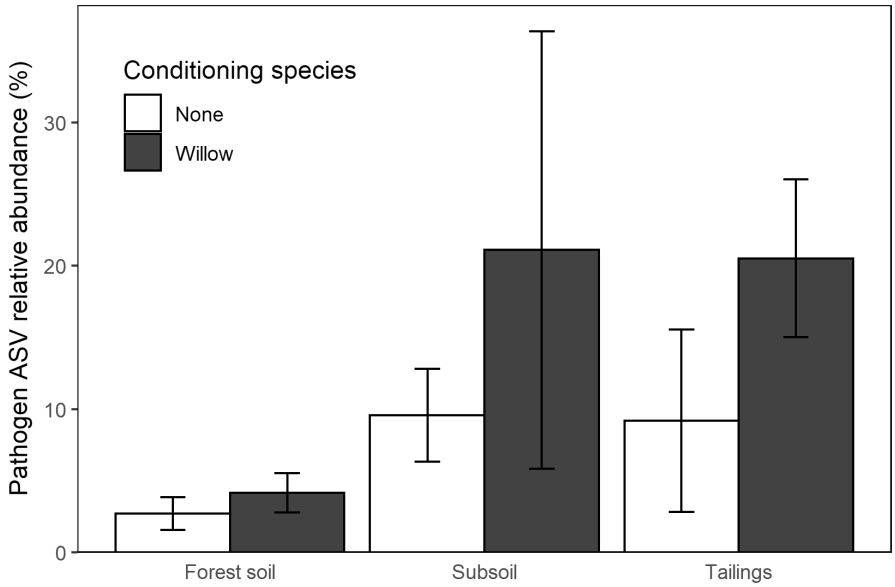

FIGURE 3 Mean willow root fungal pathogen amplicon sequence variant (ASV) relative abundance in forest soil (a), subsoil (b), and tailings (c) ± 1 SE. Pathogen relative abundance was greater in willow-conditioned soils than control soils ($Z = 2.36$, $p = .018$) across all soil types.

of redcedar roots differed with conditioning treatment in forest soil (PERMANOVA $R^2 = .40$, $p = .013$) and subsoil (PERMANOVA $R^2 = .35$, $p = .001$), but not in tailings, which had the lowest biological activity (PERMANOVA $R^2 = .19$, $p = .115$; Figure S4).

Across all conditioning treatments, there was a positive relationship between shoot biomass and AM fungal colonization in reclamation materials with forest soil additions ($R^2_{adj} = .438$, $p < .001$), but not unamended reclamation materials ($R^2_{adj} = -.003$, $p = .412$). Additionally, there tended to be a negative relationship between SRL and AM fungal colonization in reclamation materials with forest soil additions ($R^2_{adj} = .043$, $p = .072$), indicating that roots became thicker and less acquisitive when AM fungal colonization increased.

Conditioning treatment had no significant effects on percent colonization of redcedar roots by non-AMF fungal endophytes (Table 2). There were no significant changes in the relative abundance or species richness of fungal pathogens or non-AMF symbionts in the high-throughput sequencing results for redcedar roots. Indicator species analysis reflected this lack of clear shifts, as symbionts tended to be present in control and conditioned soil (*Cadophora luteo-olivacea* in control and spruce-conditioned tailings; *Cadophora* sp. in control, willow-conditioned, and spruce-conditioned forest soil; *Phalocephala* spp. in control and willow-conditioned forest soil; Table S2). The only pathogenic indicator species was *Olpidium brassicae* in control subsoil and tailings, and it was not indicative of any conditioned soils (Table S2).

4 | DISCUSSION

Understanding the processes underlying the recovery of vegetation communities in forest ecosystems following severe disturbances, such as mining, is critical for informing ecological restoration methods. This study showed that soil legacies mediated by soil microbes have the potential to influence plant community assembly and should be considered in ecosystem restoration and management.

4.1 | Soil legacies promote plant species turnover and persistence

We found that willow, an early successional shrub with low mycorrhizal dependence, had negative intraspecific legacy effects associated with increased fungal pathogen abundance, while spruce, a later successional EM conifer, had neutral to positive intraspecific legacy effects associated with increased mycorrhizal fungal colonization and diversity. These findings support our first hypothesis that soil biological legacies would have contrasting effects depending on plant nutrient acquisition strategy, with non-mycorrhizal plants (or plants with low mycorrhizal dependence) experiencing negative feedbacks and EM plants experiencing positive feedbacks (Teste et al., 2017). Our results align with results from studies in non-forested ecosystems showing that plant–soil feedbacks associated with soil biological legacies shifted from promoting plant species turnover in early succession to promoting stability as succession progresses (Bauer et al., 2015; Kardol et al., 2006).

While we found evidence of root fungal pathogen accumulation corresponding to willow's negative intraspecific legacy effects, other soil biota, such as root-feeding nematodes, may have also played a role as found by van der Putten et al. (1993) and Wilschut et al. (2019). Negative intraspecific legacy effects on willow also corresponded to decreases in EM fungal colonization and loss of EM fungal indicator species in reclamation materials amended with forest soil (but note in unamended reclamation materials where inoculum potential was low). Yet, there was no relationship between EM fungal colonization and willow shoot biomass, and mycorrhizal colonization rates on willow were low very low (≤ 5%), which supports pathogen accumulation as the dominant process. Our experimental design did not evaluate if pathogens were willow-specific or generalists, but our results are consistent with early successional plants that have low mycorrhizal dependence and explorative root systems being sensitive to pathogens and experiencing negative legacy effects (Cheeke et al., 2019; Cortois et al., 2016; Koziol &

Bever, 2015). Conversely, we found a positive relationship between spruce shoot biomass and EM fungal colonization. This is consistent with EM plants having greater mycorrhizal dependence and aligns with evidence that EM fungi can support tree recruitment (Seiwa et al., 2020) and persistence (McGuire, 2007) through positive soil biological legacies.

4.2 | Mycorrhizal fungi generate legacies

In partial support of our second hypothesis, we found neutral to negative legacy effects of EM plants on AM redcedar, which does not associate with compatible mycorrhizal fungi. EM spruce had negative legacy effects on AM redcedar growth, but only in treatments containing forest soil (i.e., only where spruce had negative legacy effects on AM fungal colonization). Since redcedar trees were present in the forest soil collection areas and AM inoculum was in the forest soil, our results suggest that negative legacy effects on redcedar occurred due to the AM inoculum potential of the soil not being maintained by EM spruce and/or the conditioning-phase conditions. In other scenarios where AM propagules are not initially present in the soil, effects on redcedar are expected to be neutral, as in the unamended reclamation materials. That AM fungi are drivers of the observed legacies is supported by the lack of spruce legacy effects on communities of fungal pathogens and non-AM fungal endophytes on redcedar roots. These findings align with research showing established EM trees to have negative effects on AM seedling recruitment (Booth, 2004; Dickie et al., 2002; Guichon, 2015; Weber et al., 2005). Similarly, Seiwa et al. (2020) found hardwood recruitment following thinning may be limited to seedlings forming the same type of mycorrhiza. Thus, mycorrhizal fungal compatibility is likely an important factor in tree recruitment in forest ecosystems dominated by mycorrhizal-dependent tree species.

Willow had negative legacy effects on spruce and redcedar seedling growth, which corresponded to negative legacy effects on mycorrhizal fungal colonization for both plant species, except in reclamation materials where inoculum potential was low. This was anticipated for AM redcedar because willow primarily associates with EM fungi, but no positive legacy effect on EM spruce contradicted our hypothesis. This may be due to the low mycorrhizal colonization observed in willow (i.e., willow and the conditioning-phase conditions did not maintain the EM inoculum that was initially present in the forest soil) and/or low compatibility of willow and spruce EM fungal taxa, which highlights the importance of plant–mycorrhizal species compatibility within mycorrhizal fungal guilds (Ke & Wan, 2020). While most EM fungi are generalists, plant taxa-specific EM fungi do occur (Massicotte et al., 1999) and a high proportion of host-specific EM fungi have been reported to associate with early successional temperate forest plants (Twieg et al., 2007).

Negative willow legacy effects on spruce and redcedar growth also occurred in uninoculated reclamation materials where mycorrhizal fungal inoculum potential was low and no legacy effects on mycorrhizal fungal occurred, suggesting an additional legacy mechanism unrelated to root fungal communities was present. Nutrient depletion in the conditioning phase is an unlikely explanation, given that foliar N was incorporated into the models as a covariate (Cesarano et al., 2017). Accumulation of a generalist pathogen that was not assessed, such as an unclassified fungal taxon or root-feeding nematodes, may have occurred. Additionally, willow produces salicylic acid, a phenolic compound implicated in plant defense responses. Salicylic acid has been shown to have allelopathic properties, reducing shoot growth in a variety of crop and weed species (Raskin, 1992). Allelopathy effects on next-stage successional plant species may be a consequence of willow initiating defense responses to pathogen accumulation and/or an adaptation to delay willow's replacement in succession. We suspect that the negative legacy effects associated with willow may be plant species-specific, especially if allelopathy is occurring, as other studies have found early successional plants to have neutral to positive legacies effects on co-occurring plant species (Kuťáková et al., 2020; van de Voorde et al., 2011). This highlights the complexity of the interacting biotic and abiotic properties that generate soil legacies, and the potential for species-specific inconsistencies with general ecological trends.

4.3 | Legacy effects occur in primary successional soils

Soil legacy effects were generally consistent in mine reclamation materials and mine reclamation materials mixed with forest soil, leading us to reject our third hypothesis that legacy effects would be weaker or neutralized in primary successional conditions where biological colonization of soils is minimal. The only evidence supporting our third hypothesis was spruce seedling legacies had neutral effects on redcedar growth and AM fungal colonization in unamended reclamation materials (when AM presence was negligible), but negative effects in treatments containing forest soil. In contrast, the capacity of mycorrhizal fungi to contribute to soil legacies in primary succession is supported by our result of positive intraspecific legacy effects on spruce EM fungal colonization in reclamation materials. Our results suggest that where mycorrhizal fungi are a dominant mechanism for biotic legacies, negative legacy effects may be reduced or eliminated in barren primary successional soils (i.e., there is no inoculum to be "lost"), but positive legacies can be initiated despite the low abundance of mycorrhizal fungal propagules. This is consistent with studies in gravel quarry soils (Kuťáková et al., 2020) and areas impacted by volcanic eruptions (Nara, 2006; Seeds & Bishop, 2009) that have shown accumulation of microbial mutualists to support initial plant establishment in primary succession.

The negative intraspecific legacy effect we found for willow in unamended reclamation materials aligns with research showing that soil-borne pathogen accumulation can still create negative legacies in primary successional soils, promoting turnover of early successional plants in foredune succession (van der Putten et al., 1993). Negative legacy effects of willow on spruce and redcedar in unamended reclamation materials indicate that the legacy mechanism,

potentially accumulation of generalist pathogens or allelopathy, can occur irrespective of soil developmental phase. Our willow findings contrast with Kuťáková et al. (2020) and Castle et al. (2016), who found early successional plants to create neutral to positive legacies for co-occurring plants in primary successional soils due to improvements in soil abiotic conditions (e.g., increasing nutrient levels). While our study focused on soil microbes and controlled for soil nutrient changes, results of the foliar nutrient covariate indicate that abiotic soil nutrient improvements may have occurred but did not shift net legacy effects. Variability in the results of studies in primary successional systems indicates that future studies should evaluate a broader scope of legacy mechanisms (e.g., allelopathy) to parse out the relative roles of biotic and abiotic mechanisms.

5 | CONCLUSION

We found negative intraspecific soil legacies in willow, an early successional shrub with low mycorrhizal dependence, associated with pathogen accumulation, but neutral to positive intraspecific legacies in spruce, a later successional EM conifer, associated with increased mycorrhizal fungal colonization and diversity. Our findings support research showing that soil legacy effects vary with plant nutrient acquisition strategy, with non-mycorrhizal plants experiencing negative feedbacks and EM plants experiencing positive feedbacks. Negative soil legacy effects of willow on next-stage successional species (spruce and redcedar) were negative due to mechanisms not studied here, potentially allelopathy, while EM spruce had neutral to negative legacy effects on AM redcedar, likely due to the trees not associating with compatible mycorrhizal fungal. This suggests positive legacy effects mediated by soil microbes may be limited to scenarios where mycorrhizal-dependent plants grow in soil containing legacies of compatible mycorrhizal fungal communities.

This study showed that soil legacies can influence plant survival and growth in mine reclamation materials both with and without forest soil additions, which suggests that initial restoration actions can exert effects on plant community composition (Wubs et al., 2019), even in primary successional soils with low microbial activity. This highlights the risks associated with "anything green is good" planting strategies or allowing invasive plants to establish (Dierks et al., 2019; Pickett et al., 2019), and supports restoration approaches that use native species to initiate natural successional trajectories. Consideration should also be given to revegetation with plants that build up communities of microbial mutualists that are relied upon by later successional plants. Our results indicate that revegetation plant selection in forest restoration can influence the successive plant communities that establish and show the importance of accounting for plant–microbe relationships in ecosystem restoration and management.

AUTHOR CONTRIBUTIONS

Katie McMahen: Conceptualization (equal); data curation (lead); formal analysis (lead); funding acquisition (equal); investigation (lead); methodology (lead); project administration (lead); writing – original draft (lead); writing – review and editing (lead). **Shannon H. A. Guichon:** Data curation (supporting); supervision (supporting); writing – review and editing (supporting). **C. D. Anglin:** Supervision (supporting); writing – review and editing (supporting). **Les M Lavkulich:** Supervision (supporting); writing – review and editing (supporting). **Susan J. Grayston** Supervision (supporting); writing – review and editing (supporting). **Suzanne Simard:** Conceptualization (equal); funding acquisition (equal); methodology (supporting); project administration (supporting); resources (lead); supervision (lead); writing – review and editing (supporting).

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DATA AVAILABILITY STATEMENT

High-throughput sequencing data are openly available through GenBank (accession number PRJNA714120). Sanger sequencing data are openly available through GenBank (accession numbers are provided in Table S3). Experimental data are openly available in the Dryad Digital Repository (DOI: https://doi.org/10.5061/dryad.7h44j0zxz).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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TECHNICAL MEMORANDUM

DATE 21 December 2022 **Reference No.** 22514095-091-TM-Rev0-31715

TO Mathieu O'Leary
Mount Polley Mining Corporation

FROM Jesse Maddaloni and Darryl Howard **EMAIL Jesse.Maddaloni@wsp.com; Darryl.Howard@wsp.com**

WATER TREATMENT UPDATE TO MINE PLAN AND RECLAMATION PROGRAM UPDATE 2022 – MOUNT POLLEY MINE

1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) has developed a Mine Plan and Reclamation Program Update 2022 (herein referred to as the 2022 MRP) that is being submitted to the Ministry of Energy, Mines, and Low Carbon Innovation (EMLI) in compliance with the conditions outlined in the amendment to *Mines Act* Permit M-200. As required in the *Mines Act* Permit M-200 amendment, the 2022 MRP is being provided to EMLI as an update to the 2017 MRP. This technical memorandum provides an update on water treatment activities and progression since the 2017 MRP and discusses water treatment for the remaining operating phase of the mine as well as water treatment during closure/post-closure. The 2022 MRP incorporates the planned disturbance and corresponding reclamation requirements associated with continued mining until September 2024.

This water treatment update memorandum provides:

- A brief overview of the water management and treatment components that currently exist at the mine.
- Predicted and observed water quantity and quality design criteria for water treatment during operations and closure/post-closure.
- A summary the Best Achievable Technology (BAT) assessment previously completed for the mine and the associated technologies that are currently used for operations and considered for closure/post-closure.
- An update on work completed to investigate and advance various treatment technologies.
- An update on anticipated future work to support water treatment during closure/post-closure.

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2.0 MINE WATER MANAGEMENT SUMMARY

A network of channels, ponds, and pumping systems is operated by MPMC for managing surface water at the mine. Contact and non-contact water systems are managed with the objective of avoiding the mixing of these waters.

The non-contact water system includes channels to divert runoff from undisturbed catchments away from mine infrastructure. Contact water from within the mine site is actively managed using on-site water management infrastructure and conveyed to the Tailings Storage Facility (TSF) or to the Perimeter Embankment Till Borrow Pond (PETBP) for re-use as part of mine operations or for treatment through the Water Treatment Plant (WTP) and subsequent discharge through a pipeline to Quesnel Lake. The ability to cycle water through the mine mill and back to the TSF or PETBP allows mill components to provide lime pre-treatment for precipitation of metals (copper) when required.

The mine has a positive water balance, with discharge required during mine operations to prevent year-on-year accumulation of water. The only currently permitted discharge of treated contact water from site occurs through the existing WTP and the Quesnel Lake pipe and diffusers. Water management during operations will continue per the current water management infrastructure. The existing WTP (Actiflo patented high-rate ballasted coagulation and flocculation process, with lime pre-treatment as required) is considered the BAT for treatment and discharge through assumed future operations (Golder 2015).

The design capacity of the existing WTP is 0.23 m^3/s. Additional temporary treatment capacity of 0.05 m^3/s has been recently added in 2022 to assist in treating and discharging surplus contact water currently on-site (rental system of the same Actiflo technology). The allowable maximum annual discharge volume from site is currently 10.59 Mm^3/year (average of 0.33 m^3/s), as per Environmental Management Act (EMA) Permit 11678. The design capacity of the WTP effluent pipeline and diffusers is 0.6 m^3/s (equivalent to the permitted maximum daily instantaneous rate).

The mine's water management plan assumes minimal storage of contact water on site, although during freshet (April through June) and extreme storm events, the volume of mine water runoff will exceed the discharge and treatment capacity, and temporary retention will be necessary to store water prior to discharge. Temporary water accumulation will occur in the TSF or in available pit volume(s). Temporary stored water will be discharged to the environment through the WTP following the freshet period or the storm event.

As the mine moves into closure and post-closure, the objectives of water management are to return the impacted land to pre-mining land functions. As the mine is constructed across a watershed divide, it is desired that during the post-closure period, drainages will be distributed back to their natural watersheds (i.e., to Bootjack Lake, Polley Lake, and Hazeltine Creek), provided that this can be achieved in an environmentally appropriate and permittable manner. MPMC has been proceeding with a program of evaluating and developing passive, semi-passive, and active water treatment technologies for their possible use during mine closure to support the goal of distributing discharge back into the pre-mining configuration. Two treatment options are considered the BAT for treatment during closure and post-closure: Option A – distributed passive/semi-passive treatment systems (applied to select sources), and Option B – pit-lake treatment followed by the centralized Actiflo plant (Golder 2016a). Option B is the current assumption for water treatment during closure/post-closure, but MPMC has also been progressing technology evaluations to support Option A.

3.0 WATER TREATMENT DESIGN BASIS

A Site-Wide Water Balance and Water Quality Model (SWWBM) was used to predict flow rates and water quality for mine contact water requiring treatment during operations, closure, and post-closure (Golder 2022a, Golder 2022b). The SWWBM uses a stochastic function to estimate the level of modeled precipitation. Out of 1,000 realizations, 90th percentile results represent the highest 10% of precipitation. The 90th percentile scenario was modeled for the remaining duration of the operational period, and the analysis showed that the existing WTP capacity provides sufficient treatment capacity for this period (Golder 2022a). For closure and post-closure, the model was again used to predict 90th percentile treatment flow rates for the period of 2025 to 2124. For the closure period of 2025 to 2034, results showed that an average treatment capacity of 0.19 m^3/s would be sufficient for the 90th percentile precipitation amount (Golder 2022a). For the post-closure period of 2035 to 2124, results showed than an average treatment capacity of 0.08 m^3/s would be sufficient for the 90th percentile precipitation amount (Golder 2022a).

3.1 Operations Water Quality

The SWWBM was used to predict water quality at the PETBP during operations (the current influent source to the WTP). Table 1 provides a list of constituents of interest determined following review of modeled water quality predictions during operations (Golder 2022b). Table 1 compares the current EMA Permit 11678 WTP discharge limits with the predicted 95th percentile parameter concentrations in the PETBP.

Table 1: WTP Influent Water Quality During Operations

Parameter	Unit	EMA Permit 11678 WTP Discharge Limit	PETBP 95th Percentile Predicted Concentrations
Major Ions			
Total Sulphate	mg/L	1,100	705
Nutrients			
Total Ammonia	mg/L (as N)	1.3	0.24
Total Nitrate	mg/L (as N)	34	21
Total Phosphorus	mg/L	0.09	0.04
Total Metals			
Arsenic	mg/L	0.028	0.002
Chromium	mg/L	0.004	0.001
Copper	mg/L	0.033	**0.273**
Iron	mg/L	1.0	0.62
Manganese	mg/L	3.4	0.70
Molybdenum	mg/L	0.36	0.19
Selenium	mg/L	0.075	**0.105**
Zinc	mg/L	0.059	0.019

Notes:

1) **Bold and underlined** values exceed permitted discharge limits. These EMA Permit 11678 discharge limits apply to the effluent of the WTP, and not to be PETBP (WTP influent). PETBP water quality predictions are shown to demonstrate the requirement for treatment of a water quality parameter.
2) The SWWBM was developed to predict water quality conservatively; where uncertainty exists in the model inputs, the inputs are selected such that under-prediction would be minimized. Thus, over-prediction is generally expected.

Table 1 shows that total copper and total selenium are predicted to require treatment during operations. Total Suspended Solids (TSS), not listed in Table 1, is also required for treatment during operations. The existing WTP has been shown to effectively treat both TSS and total copper for the majority of operating conditions (discussed in more detail in Golder 2022c). WTP influent and effluent quality were assessed over six years between 2016 and 2021, showing effluent TSS consistently below permit limit and effluent total copper only occasionally above permit limit, with high influent copper instances managed through temporary WTP recirculation without discharge and a Trigger Response Plan (Golder 2022c).

Total selenium is modeled to require treatment during operations, as predicted by the 95th percentile PETBP concentration shown in Table 1. Even though predictions show that PETBP total selenium concentration could be above the permit limit, monitoring data has shown actual total selenium in the PETBP consistently below the permit limit (Golder 2022c). The water treatment system during operations has not required selenium treatment and it is not anticipated to require selenium treatment for the remainder of operations.

3.2 Closure/Post-Closure Water Quality

The SWWBM was used to predict water quality at the PETBP during closure/post-closure. The PETBP may not collect all treatment influent water in the final post-closure water treatment configuration (particularly if distributed treatment and discharge can be permitted), but collection to this location has been assumed for the purposes of the 2022 MRP as it represents the currently permitted system configuration. Table 2 provides a list of constituents of interest and the 95th percentile predicted concentrations in the PETBP during closure and post-closure (Golder 2022b). Table 2 also compares predicted PETBP water quality to MPMC's current EMA Permit 11678 WTP discharge limits. These WTP discharge limits have been assumed for closure/post-closure as they represent the currently permitted treatment requirements. Distributed treatment during closure/post-closure may discharge to different receiving environments with different discharge limits than the existing EMA Permit, but the current limits have been assumed for closure/post-closure for the purposes of the 2022 MRP.

Table 2: WTP Influent Water Quality During Closure/Post-Closure

Parameter	Unit	EMA Permit 11678 WTP Discharge Limit	PETBP 95th Percentile Predicted Concentrations – Closure	PETBP 95th Percentile Predicted Concentrations – Post-Closure
Major Ions				
Total Sulphate	mg/L	1,100	654	282
Nutrients				
Total Ammonia	mg/L (as N)	1.3	0.24	0.027
Total Nitrate	mg/L (as N)	34	19	5.2
Total Phosphorus	mg/L	0.09	0.036	0.036
Total Metals				
Arsenic	mg/L	0.028	0.0018	0.0019
Chromium	mg/L	0.004	0.0014	0.0018
Copper	mg/L	0.033	**0.3**	**0.17**
Iron	mg/L	1.0	0.68	0.23
Manganese	mg/L	3.4	0.75	0.23
Molybdenum	mg/L	0.36	0.17	0.074
Selenium	mg/L	0.075	**0.078**	0.033
Zinc	mg/L	0.059	0.014	0.0067

Notes:

1) **Bold and underlined** values exceed permitted discharge limits. These EMA Permit 11678 discharge limits apply to the effluent of the WTP, and not to be PETBP (WTP influent). PETBP water quality predictions are shown to demonstrate the requirement for treatment of a water quality parameter.
2) The SWWBM was developed to predict water quality conservatively; where uncertainty exists in the model inputs, the inputs are selected such that under-prediction would be minimized. Thus, over-prediction is generally expected.

Table 2 shows that total copper and total selenium are predicted to require treatment during closure, with only total copper requiring treatment during post-closure. TSS, not listed in Table 2, is also required for treatment during closure/post-closure.

The assumed treatment system during closure/post-closure is pit-lake treatment followed by the centralized Actiflo plant (existing WTP), with the possibility of distributed passive/semi-passive treatment if systems are environmentally appropriate and permittable. TSS treatment is assumed to be required through closure and post-closure and will be achieved with the Actiflo plant. Total copper treatment is predicted to be required through closure and post-closure and will be achieved with a combination of the Actiflo plant (total copper removal through TSS removal), and future trimercapto-striazine trisodium salt (TMT) pre-treatment, if required (for dissolved copper precipitation).

Total selenium treatment is predicted to be required during closure, but not during post-closure. If required, the assumed method of selenium treatment is semi-passive pit-lake pre-treatment (active dosing of carbon source to pit-lake), followed by treatment by the Actiflo plant. It is not currently known whether selenium treatment will be required during the closure/post-closure phases, as existing monitoring data has consistently shown total selenium in site contact water to be below discharge limits. If selenium treatment is required, MPMC has been progressing the development of multiple treatment technologies that target selenium.

Details on modeled water quality concentrations for all parameters and various site locations (in addition to the PETBP) can be found in Golder 2022b.

4.0 WATER TREATMENT TECHNOLOGY DEVELOPMENT

MPMC has been progressing and evaluating multiple technologies to support the treatment of identified constituents of concern (COCs) and to support potential decentralized treatment and discharge during closure/post-closure. Various studies have been completed since 2017 to support these efforts as an important component of closure refinement. An inventory of treatment technologies and a summary of their development is presented in Table 3.

Good engineering practice typically requires a project to follow a standardized engineering design process for the selection and progressive refinement of the final project concept. A project progresses from a pre-concept phase for the identification of multiple treatment options, through concept, pre-feasibility, and feasibility phases to project execution. Generally, the engineering studies performed for each of these project phases are supported by test work that progresses from proof-of-concept and detailed bench-scale testing to pilot-scale and demonstration-scale test work. Some of the treatment technologies tested may not progress to the next stage of development. For example, a treatment technology may be eliminated if its treatment capacity is insufficient to treat the forecast volumes. This framework takes a staged approach, such that input assumptions, design, and cost for the total system can be refined as each stage is completed and the information that the plan relies on becomes more certain. This allows input assumptions to be less conservative as they become more accurate with accumulated knowledge. The technology development stages presented in Table 3 align with this approach. Additional details regarding this project development framework and how it aligns with the BC Ministry of Environment and Climate Change Strategy's BAT policy is provided in Golder 2020a.

This water treatment update technical memorandum assumes that the reader is familiar with the technologies in Table 3 and only provides updates on work completed by MPMC since 2017 to support the development of these technologies. Detailed descriptions of the technologies and associated process flow schematics can be found in Golder 2020a.

Table 3: Treatment Technology Inventory and Stage of Development

Technology / Stage of Development	Targeted COCs	Proof-of-Concept Bench-Scale Testing	Detailed Bench-Scale Testing	Pilot-Scale Testing	Demo-Scale Testing	Full-Scale Execution	Work Completed
Actiflo	TSS, total copper					→	Bench and full-scale testing.
Lime Treatment	Dissolved copper					→	N/A
TMT Treatment	Dissolved copper	→	→	→	→		Bench and full-scale testing. Toxicity evaluation.
Pit-Lake Treatment	Selenium, nitrate	→	→	→			Preliminary concept design and proof-of-concept bench-scale testing. Pilot-scale testing workplan.
Saturated Rock Fill (SRF)	Selenium, nitrate	→	→				Concept design, proof-of-concept bench-scale testing, detailed bench-scale testing workplan (in progress), and long-term substrate leach testing. Wight Pit SRF assessments.
Packed Bed Reactor (PBR)	Selenium, nitrate	→	→				Concept design, proof-of-concept bench-scale testing, and detailed bench scale testing workplan (in progress).
Biochemical Reactor (BCR)	Selenium, nitrate	—	—				Concept design and proof-of-concept bench-scale testing.
Submerged Sand Reactor (SSR)	Selenium, nitrate	—					Screening analysis.
Constructed Wetland Treatment (CWT)	Selenium, nitrate	→	→	→			Concept design, bench-scale testing, and on-site pilot scale testing (by others).

Implemented → Under Consideration → Eliminated/Paused —

4.1 Actiflo

Actiflo, the tradename of a technology supplied by Veolia, is the technology currently in use as the site's WTP and is considered the BAT for TSS removal during operations and closure/post-closure. The main targeted COC of this technology is TSS, with total copper removal also occurring via TSS removal. Polyaluminum chloride (PAC) is dosed into the influent water in the Actiflo process, which produces aluminum hydroxide precipitates that adsorb to copper complexes, thus removing copper during the solids-liquids separation step of the process. The Actiflo technology is currently implemented at full-scale on-site, as indicated in Table 3.

Concept design, bench-scale, and full-scale testing have been completed for the Actiflo technology, including assessment and optimization of PAC and various chelating agent dosages (including TMT) to assist copper removal (Golder 2016b, Golder 2017a, Golder 2018a, Golder 2019a, Golder 2019b, Golder 2020b).

Actiflo treatment is currently operating as the core component of the treatment system during operations and is currently assumed as the core component of treatment during closure/post-closure.

4.2 Lime Treatment

Active treatment with lime is currently in use at the site, where existing process plant infrastructure is used to raise contact water pH, resulting in the precipitation of metal hydroxides, particularly dissolved copper. The main targeted COC of this technology is dissolved copper. Lime treatment is currently implemented on-site, as indicated in Table 3, and used as a pre-treatment step of the Actiflo water treatment system to target dissolved copper removal. Use of this technology is well known to industry and technology development to support this has not been required.

Lime treatment, when required, is currently a component of the water treatment system during operations.

4.3 TMT Treatment

TMT is a chelating agent that aids with dissolved copper precipitation that allows copper treatment through TSS removal. The main targeted COC of this technology is dissolved copper.

Bench-scale test work completed showed that TMT is able to effectively precipitate dissolved copper (Golder 2016b, Golder 2017a, Golder 2018a) and the full-scale trials completed showed that the existing Actiflo treatment system was able to remove the copper bound with TMT to below the permit limit (Golder 2019a, Golder 2019b, Golder 2020b). Full-scale trials also showed that copper removal to lower concentrations (total copper <0.012 mg/L) was challenging for Actiflo with TMT treatment, not due to limitations in dissolved copper precipitation but due to limitations in TSS removal. TMT was effective in precipitating dissolved copper, but the Actiflo system was not effective in subsequently removing the precipitate to result in low effluent copper concentrations. The toxicity of TMT has also been evaluated and showed that its use would not result in an acutely lethal effluent (Golder 2018b).

TMT treatment is still being considered for full-scale implementation.

4.4 Pit-Lake Treatment

Pit-lake treatment targeting COCs of selenium and nitrate is an in-situ technology that requires nutrient and carbon source dosing to create conditions for biological treatment within the pit-lake.

A conceptual assessment of full-scale pit-lake selenium treatment was completed (Golder 2017b) and the technology was deemed a cost-effective approach to managing selenium and was recommended for further bench and pilot-scale testing. Proof-of-concept bench-scale testing for pit-lake selenium treatment was also completed and showed effective removal of selenium and nitrate, with further pilot-scale testing recommended (Golder 2019c). A pilot-scale study for pit-lake treatment was designed for Cariboo Pit (Golder 2020c), but the pit is being dewatered to support future mining activities and this work has not yet been completed.

Pit-lake treatment targeting selenium and nitrate is still being considered for full-scale implementation and is currently assumed as part of the treatment system during closure/post-closure if required.

4.5 Saturated Rock Fill (SRF)

SRF treatment is a fixed-film anaerobic system targeting the treatment of selenium and nitrate and ideally utilizes a mined-out open pit as a bioreactor operated in a horizontal flow configuration.

A concept study for SRF treatment was completed (Golder 2020d) and SRF was recommended for further bench-scale and pilot-scale testing. Proof-of-concept bench-scale testing for SRF was also completed (Golder 2021), which showed effective removal of selenium and nitrate, but also indicated metal leaching. Detailed bench-scale testing and waste rock SRF substrate metal leach testing was recommended following completion of the proof-of-concept work. Bench-scale leach testing using anticipated SRF substrate waste rock from site was completed (Golder 2022d – draft RevA), which monitored leached metals over a long-term test period of 52 weeks. Results showed that metal leaching varies over time and differs between metals and must be considered during the start-up phase of SRF implementation (and may lead to additional required polishing treatment steps downstream of the SRF). Detailed bench-scale testing for SRF has been proposed for 2023 and a test plan has been submitted in draft to MPMC (Golder 2022e – draft RevA). Geotechnical and geochemical substrate characterization for SRF media waste rock is currently ongoing and anticipated for completion in 2023. It is anticipated that geochemical substrate characterization will be conducted by MPMC's geochemical consultant SRK.

SRF treatment is still being evaluated for full-scale implementation and is currently considered a technology option for semi-passive treatment of selenium and nitrate during closure/post-closure if required.

4.6 Packed Bed Reactor (PBR)

PBR treatment is another fixed-film anaerobic system targeting the treatment of selenium and nitrate. PBR treatment differs from SRF treatment through the use of a vertical flow (top to bottom) reactor.

Proof-of-concept bench-scale testing was completed (Golder 2019d) and PBR treatment was shown to be effective in reducing selenium and nitrate. Further detailed bench-scale and pilot-scale testing was recommended following completion of the initial testing. Detailed bench-scale testing for PBR has been proposed for 2023 and a test plan has been submitted in draft to MPMC (Golder 2022f – draft RevA).

PBR treatment is still being evaluated for full-scale implementation and is currently considered a technology option for semi-passive distributed treatment of selenium and nitrate during closure/post-closure if required.

4.7 Biochemical Reactor (BCR)

BCR treatment is another fixed-film anaerobic treatment technology that consists of a lined pond filled with a submerged organic substrate media mix. The main targeted COCs of this technology are selenium and nitrate. BCR treatment is passive and does not involve continuous dosing of a carbon source to the media bed.

Proof-of-concept bench-scale testing was completed (Golder 2019d) and BCR treatment was shown to be effective in reducing selenium and nitrate, but redox sensitive metals were present in the BCR effluent.

Upon review of the BCR technology in comparison to other passive and semi-passive technologies, MPMC decided to not proceed with further development of this technology (MPMC 2021) for the following reasons:

- Limited lifespan of BCR passive treatment systems based on the availability of a carbon source that is encapsulated in the system during construction – this needs to be replaced periodically at significant cost.
- Emission of elevated levels of biochemical oxygen demand (BOD) from the system during commissioning and start-up of operation that exceed standards for discharge to the environment.
- Persistent emission of phosphorus from the BCR during operation that will likely exceed plausible standards for discharge to the environment.

BCR treatment is no longer being developed as a passive treatment technology option during closure/post-closure.

4.8 Submerged Sand Reactor (SSR)

SSR is similar to other anaerobic reactor technologies, with the use of the existing tailings as media for the bioreactor. The main targeted COCs of this technology are selenium and nitrate.

A concept study was completed for SSR (Golder 2020d), as well as proof-of-concept bench-scale testing (Golder 2019d). Use of MPMC tailings as SSR bioreactor media or use of the site's TSF as an in-situ SSR was not recommended for further investigation. Bench-scale testing resulting in metal release in the reactor effluent when using site tailings as the reactor media. The concept study also concluded that further investigation of SSR was not warranted, based on a review of literature, an evaluation of historical water quality monitoring data, and an evaluation of the feasibility of utilizing the TSF from a hydrogeological and permitting perspective.

SSR treatment is no longer being developed as a treatment technology option during closure/post-closure.

4.9 Constructed Wetland Treatment (CWT)

MPMC retained Ensero Solutions Inc. (Ensero), formerly known as Contango Strategies Ltd., to conduct a detailed assessment and evaluation of the feasibility of a CWT system for passive/semi-passive treatment during closure/post-closure. The main targeted COCs of this technology are selenium and nitrate.

Pilot-scale design, sizing, and testing for CWT was completed by Ensero (Ensero 2020), and the technology demonstrated promising results for treatment of targeted COCs; however other passive/semi-passive technologies have indicated improved treatment capability in comparison. MPMC may choose to proceed with demonstration-scale on-site testing of CWT once the pilot-scale results have been fully understood and if the performance of competing technologies (SRF and others) indicates an advantage for CWT.

CWT is still being evaluated for full-scale implementation and is currently considered a technology option for passive/semi-passive and distributed treatment of selenium and nitrate during closure/post-closure if required.

5.0 ANTICIPATED FUTURE WORK

The existing and assumed water treatment systems for operations, closure, and post-closure have been outlined in this memorandum; however, changes may still be implemented during all phases of the mine as knowledge and needs evolve. The water treatment system for closure/post-closure will continue to develop in more detail as MPMC better understands technology capabilities and refines their final approach to water treatment for the closure period.

Table 3 provides a summary of the development stage of the treatment technologies implemented or being considered for operations, closure, and post-closure. Future work is anticipated for any technology still under consideration that has not achieved full-scale implementation. The following items describe the priority treatment work anticipated over approximately the next three years, but do not exhaustively describe all potential remaining work for technologies still under consideration:

- Actiflo technology is a component of the operations and closure/post-closure BAT and a main component of the existing treatment system during operations and assumed treatment system during closure/post-closure. Further development of the technology is anticipated with respect to PAC and TMT usage, as well improving the solid-liquid separation in the process to address potential high-copper instances. Several recommendations for future system improvements have been outlined in Golder 2020b, including supporting bench-scale and field trials. Recommendations are mainly focused on improving removal of particulate copper from the WTP effluent and improving the effectiveness of PAC and TMT use.
- Pit-lake treatment is currently assumed as a component of the closure/post-closure treatment system. Pilot-scale pit-lake work was anticipated for Cariboo pit, but recent mine operational changes have resulted in the draining of both Springer and Cariboo pits and pit-lake treatment trials are no longer feasible at these locations. Operational changes have also resulted in Wight pit being filled. The previous pilot-scale study designed for Cariboo pit (Golder 2020c) could be redesigned for Wight pit if operational conditions in the near future are deemed appropriate, further advancing the development of this technology.
- Two options exist as the BAT for treatment during closure/post-closure: distributed passive/semi-passive treatment systems, and pit-lake treatment followed by the centralized Actiflo plant. Golder has proposed to undertake a treatment option life cycle cost comparison study between the two options, informed by the knowledge gained during recent technology development, to assess pros/cons and capital and operating costs between the options and inform future treatment program development decisions.
- SRF and PBR detailed bench scale testing have been proposed to MPMC and this work is expected for completion in the near future to continue the development of these technologies.

6.0 CLOSURE

The reader is referred to the Study Limitations section, which precedes the text and forms an integral part of this memorandum. We trust that the information provided herein is sufficient for your needs at this time. If you have any questions or need additional information, please do not hesitate to contact us.

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Appendix U

Annual Biosolids Management Plan

(Electronic format only)

Mount Polley Mining Corporation

an Imperial Metals Corporation
Box 12 • Likely, BC V0L 1N0 • T 250.790.2215 • F 250.790.2613

Biosolids Storage and Management Plan

Submitted to:

BC Ministry of Environment and Climate Change Strategy
Environmental Protection Division
South Interior Region – Cariboo

Prepared by:

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Prepared for:

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Appendix A - Permits

1 INTRODUCTION

The following describes the Biosolids Storage and Management Plan (the Plan) for the Mount Polley Mine (the Facility), which is located approximately 100 km northeast of Williams Lake, British Columbia (BC), near Likely, British Columbia (BC).

1.1 PLAN OBJECTIVES

This Plan is a guidance document for the storage and application of biosolids at the Facility apprising both the permitting requirements (Section 1.2) and the BC Ministry of Environment (MOE) Land Application Guidelines (BCMOE, 2008).

The objectives of the Plan are to:

- Meet the requirements of the M-200 (Section D-10) Approved Mine Plan and Reclamation Program, issued by the BC Ministry of Energy, Mines and Petroleum Resources pursuant to Section 10 of the *Mines Act* (1996) (MEMPR, 2020);
- Identify the requirements and specifications associated with the discharge of biosolids to tailings and waste rock disposal locations for the purpose of reclamation;
- Describe how the application of biosolids will be monitored;
- Describe inspection and maintenance procedures; and,
- Describe methods of monitoring and management actions based on monitoring and inspection results.

The Plan is a living document that may be periodically updated as new information becomes available or as authorizations and regulations change.

It is important to note that biosolids application has been previously completed at the Facility. Municipal biosolids of Grade A quality were sourced from Metro Vancouver and applied to three reclamation areas at the Facility in 2012 (Figure 1 and 2; SYLVIS, 2012). SYLVIS Environmental was retained by Metro Vancouver, as qualified professionals, to provide a certification of compliance with permitting requirements (Section 1.3) and to provide qualified professional services for the Mount Polley Biosolids Reclamation Program (SYLVIS, 2012). Refer to the Mount Polley Biosolids Reclamation Program prepared for Metro Vancouver for more information (SYLVIS, 2012).

1.2 PERMIT REQUIREMENTS

This Plan was developed by Mount Polley Mining Corporation (MPMC) to meet Biosolids Management requirements of the M-200 Permit (Section D-10) issued by the BC Ministry of Energy, Mines and Petroleum Resources (MEMPR, 2020).

This Plan is also developed by MPMC under the Amended Permit 15968 issued by the BC MOE under the *Environmental Management Act* (*EMA*), which authorizes MPMC to discharge biosolids to land for the purpose of mine site reclamation at the Mount Polley Mine under Section 120(3) (EMA, 2003).

In addition, any biosolids discharged at the Mount Polley Mine will meet or exceed the criteria specified in Division 3 of the Organic Matter Recycling Regulation (OMRR), BC Reg. 18, of the *EMA* and the *Public Health Act* (British Columbia, 2002).

1.3 PROVINCIAL AND FEDERAL REGULATIONS

Provincially, all phases of the mine life (e.g., construction, operation, decommissioning, and reclamation) are regulated under the *EMA*, the BC *Mines Act* (1996), the *Water Stainability Act* (2014), as well as other legislation implemented by the BC Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (MFLNRORD) (MPMC, 2017).

The M-200 Permit and the Amended Permit 15968 issued to MPMC requires that the quality criteria of biosolids discharged at the Facility must be equivalent to Class B (or better, Class A); refer to Section 3.1 for more information regarding characteristics of authorized discharge (British Columbia, 2002).

1.4 FACILITY DESCRIPTION

The Facility represents the permitted areas of the mine where most mine-related activities occur, as shown in Figure 1. The Facility generally includes:

- The tailings storage facility (TSF) and surrounding areas;
- The crusher and mill processing site; and,
- Operations areas (open pits, waste rock dumps, stockpiles, roads, etc.).

The Facility has been in Care and Maintenance since May 31, 2019. Care and Maintenance operations are focused primarily on general site maintenance and to ensure that all water and environmental management systems are functioning as intended. Eleven full-time employees work in 4 shifts, including day shifts and night shifts. Environmental monitoring and sampling activities continue to be followed during the Care and Maintenance phase, as required by all permits.

1.5 TSF AND SURROUNDING AREAS

The TSF at Mount Polley Mine consists of tailings material and a single embankment made up of three dams including the Main Embankment, the Perimeter Embankment, and the South Embankment (Figure 2). During the TSF dam failure that occurred on August 4, 2014, water (both supernatant and interstitial) was released from the TSF, resulting in much of the tailings within the TSF being exposed to the elements (i.e., no longer submerged).

The breach of the Mount Polley TSF resulted in the deposition of tailings between Polley Lake and Hazeltine Creek (known as the Polley Flats); for the purpose of this Plan, the impacted areas between Polley Lake and Hazeltine Creek are also referred to as the Surrounding Areas (see Section 2.4).

1.6 CRUSHER AND MILL PROCESSING SITE

The crusher and mill processing site includes the crusher and mill building and the coarse ore pile, tertiary pile, fine ore (mill feed) pile, and pebble pile (Figure 1). No crushing operations are conducted during the Care and Maintenance period.

1.7 OPERATIONS AREAS

Open pits at the Facility include the Wight, Cariboo and Springer Pits, while the waste rock dumps include the Temporary Northwest Potential Acid Generating (PAG) Stockpile, North East Zone (NEZ) Rock Dump, and the South East Rock Dump (SERD) (Figure 2). Mineral extraction activities are not occurring during the Care and Maintenance period.

The three reclamation areas that have received biosolids applications to date are located at the North Bell Dump, the East Rock Dump (East RDS), and the NEZ Rock Dump (Figure 2) The biosolids stockpile is located within a series of containment berms upslope of the TSF as per requirements under the OMRR (Section 10.6.6 of the BCMOES, 2008; Figure 3). Soil stockpiles are located throughout the Facility and are a suitable source of overburden for mixing with biosolids (Figure 4).

1.8 SURROUNDING AREAS

Surrounding Areas are defined as the areas outside the Facility (i.e., permitted mine area) that were impacted by the TSF embankment breach (Section 2.1), including Polley Flats and the Hazeltine Creek Corridor, which are now subject to ongoing remedial works and monitoring (Golder, 2017; MPMC, 2018). For the purpose of this Plan, the Surrounding Area will also refer to the primary road networks that connect to the Facility, such as the Morehead-Bootjack Forest Service Road (FSR), Gavin Lake Road, and Mitchell Bay Road.

The Surrounding Area is characterized by Interior Cedar Hemlock (ICH) biogeoclimatic (BEC) zone vegetation, which consists of Western red cedar, Douglas-fir, hybrid spruce, and subalpine fir, with a lesser presence of trembling aspen, black cottonwood, and paper birch (MPMC, 2018). Much of the area has been harvested in commercial logging operations and is also used for cattle grazing (MPMC, 2018).

1.8.1 Polley Flats

Polley Flats is located south of Polley Lake and east of the TSF embankment breach (Section 2.1). Prior to the breach, Polley Flats was an established wetland with a riparian vegetation community that encompassed approximately 900 m of the upstream portion of Hazeltine Creek, where it immediately drains from Polley Lake. The wetland, Hazeltine Creek corridor, and associated riparian vegetation were significantly impacted from the release of effluent and tailings during the TSF embankment breach. The release deposited large volumes of mine-related materials into the Polley Flats wetland area and Hazeltine Creek corridor, stripping the riparian vegetation and native soil (Golder, 2017). Since the breach, MPMC has been conducting ongoing remediation of Polley Flats, including removal of tailings, wetland reconstruction, earth mounding, soil placement, planting native seeds, shrubs, and trees, and installing coarse woody debris (CWD) (Golder, 2017; MPMC, 2018).

1.8.2 Hazeltine Creek Corridor

Hazeltine Creek (watershed code (WSC): 160-585700) commences from the southern point of Polley Lake (WSC: 160-585700) and subsequently drains southeast for 8.5 km before terminating at Quesnel Lake (WSC: 160). Edney Creek (WSC: 160-5857-038) is a tributary of Hazeltine Creek and is located approximately 1 km upstream of the confluence of Hazeltine Creek and Quesnel Lake (Pedersen, 1998;

Province of BC, 2021). Prior to the tailings dam failure Bootjack Creek (WSC: 160 5857 487) was a major tributary of Hazeltine Creek, which has since been diverted into Polley Lake.

Hazeltine Creek provided extensive spawning habitat for Sockeye Salmon and Rainbow Trout prior to the TSF embankment failure (Pedersen, 1998). Following the TSF embankment failure, Hazeltine and Edney Creek were re-channelized and armoured, and engineered log structures were installed to improve fish rearing habitat (Golder, 2017). Passive wetland (sediment settling) ponds were constructed near the Quesnel Lake confluence to improve water quality and increase wildlife forage (Golder, 2017). Rehabilitation of the riparian habitat was initiated by planting native trees, shrubs, and seeds, and by using landscape techniques to improve site growing conditions, such as mounding soil, spreading CWD, and adding mulch (Golder, 2017).

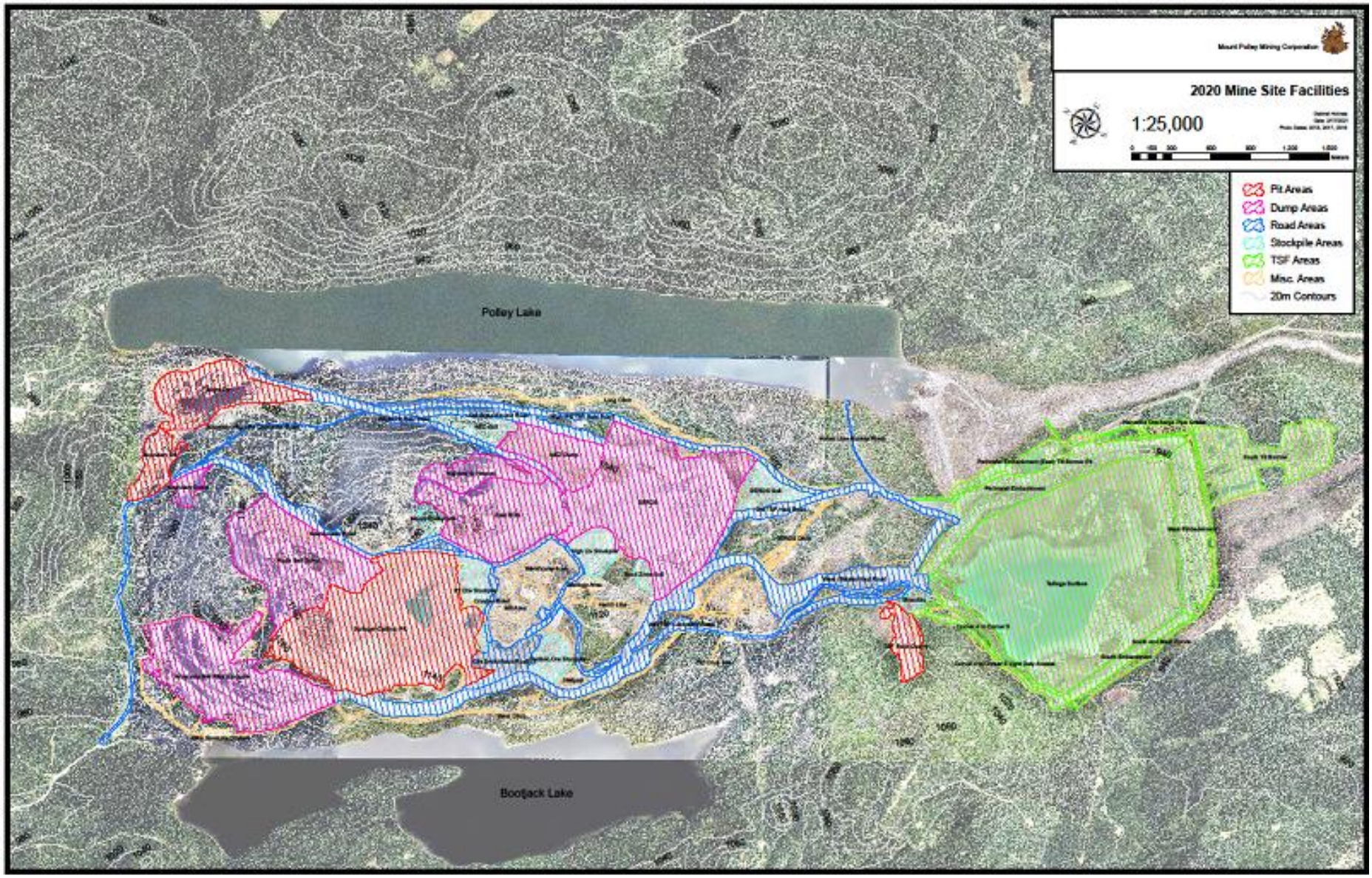

Figure 1. Mine Site Facilities.

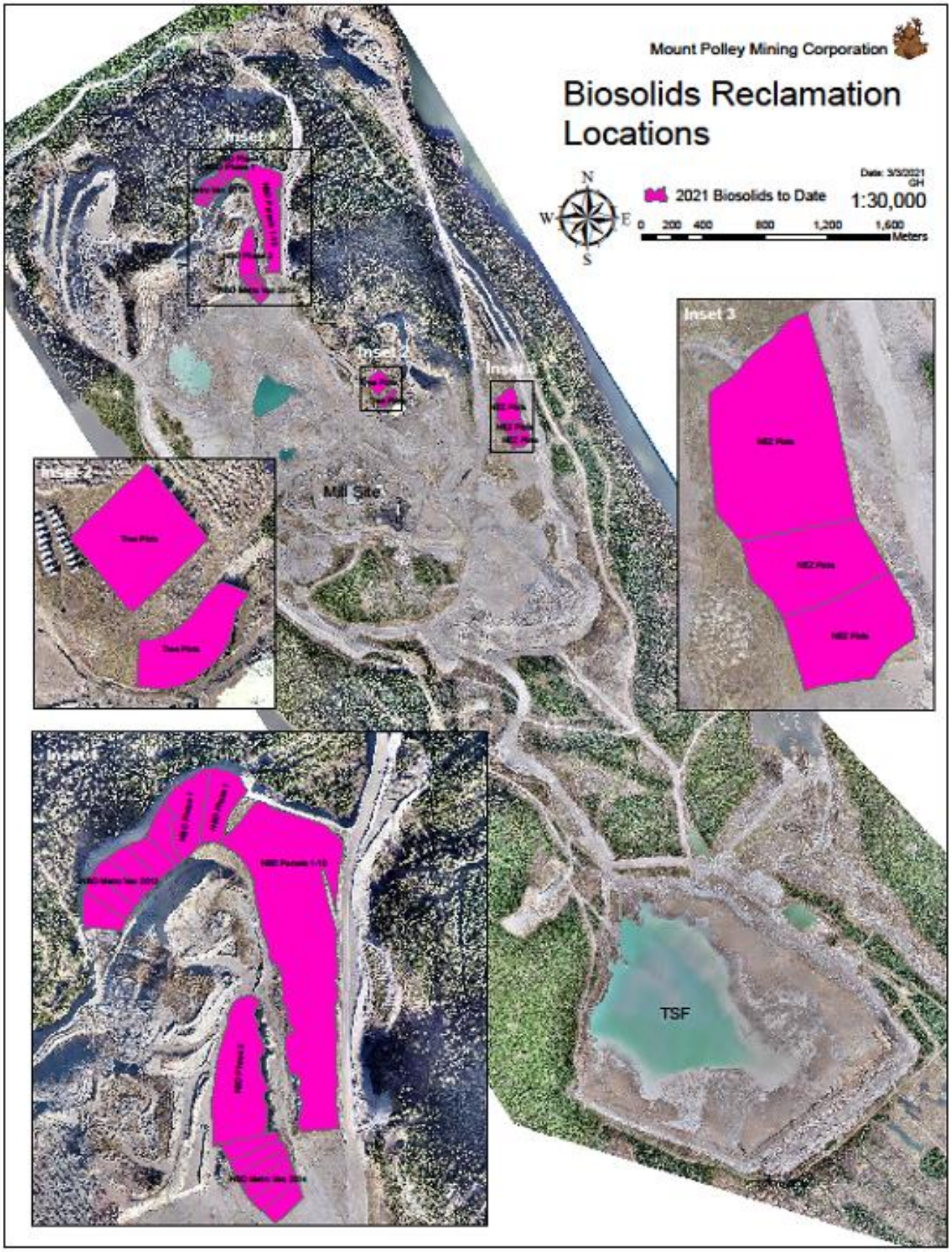

Figure 2. Areas of Biosolid Application Previously Completed.

Figure 3. Biosolids Stockpile at Tailings Storage Facility (TSF). The Stockpile is surrounded by a Berm.

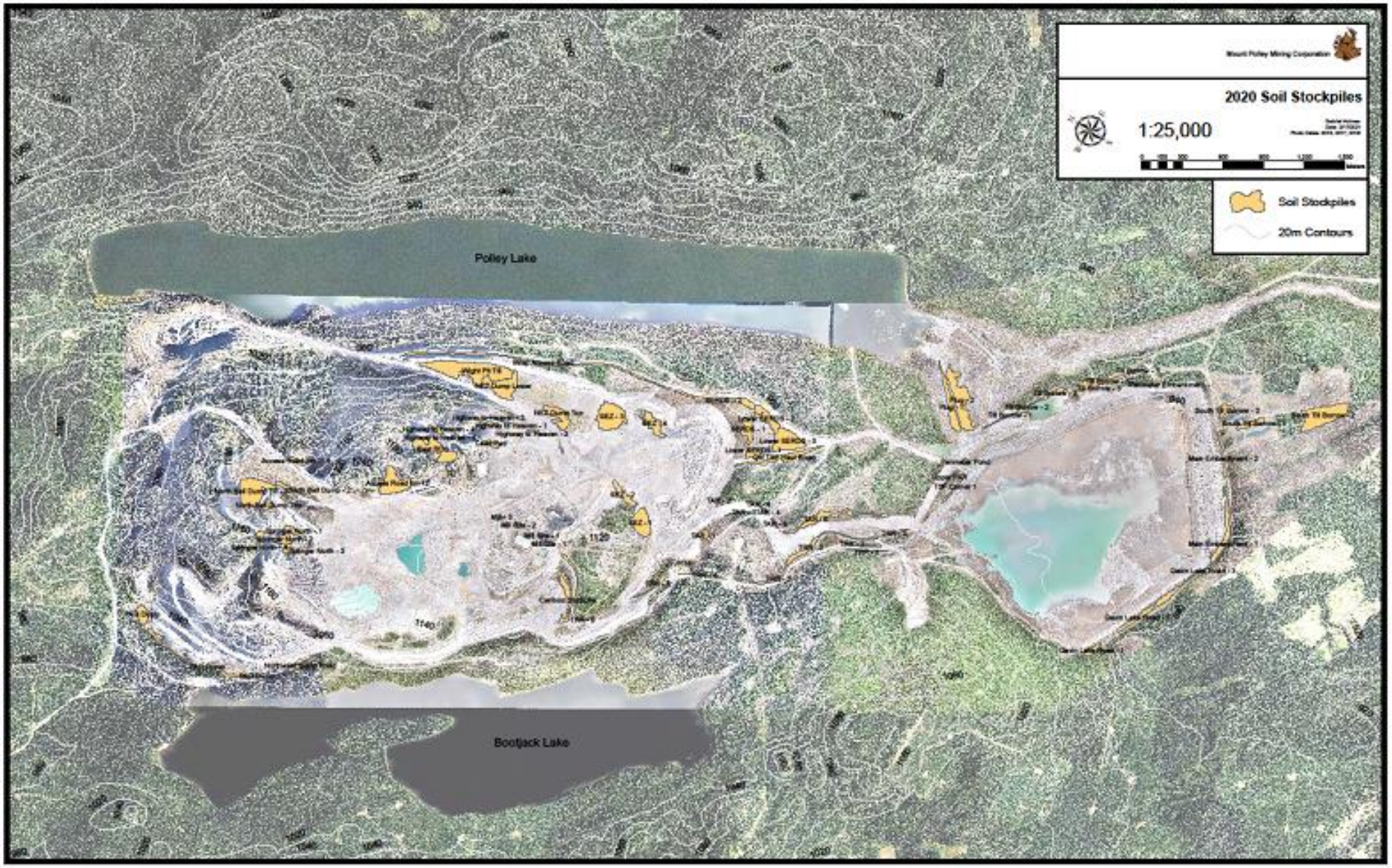

Figure 4. Soil Stockpiles, as of 2020, which are Available Throughout the Facility for Use and Incorporation during Biosolid Application.

2 BIOSOLIDS MANAGEMENT

MPMC has experience with biosolid application as part of an ongoing research program since 1998, which found biosolids to be an effective soil amendment to reclamation sites (MPMC, 2017). While biosolids promote initial tree establishment and root development, they can also increase understory growth that can cause competition with planted seedlings if improperly managed. To determine the most effective vegetation mix and biosolid application ratio to manage for invasive plants and noxious weeds, tree trials on two research parcels were established at the North Bell Dump at Mount Polley mine (MVRD, 2015). The trial design involved the analysis of control plots and treatment plots which included soil quality and nutrient status monitoring, pre-application overburden sampling, formal tree and shrub survival surveys, as well as ground cover and vegetation assessments (MVRD, 2015).

2.1 AUTHORIZED DISCHARGE

MPMC is authorized to discharge biosolids to tailings and waste rock disposal locations for the purpose of reclamation as per Section 1.1 of Permit 15968 (MOE, 2014). Application of biosolids under Section 1.1 is subject to the following terms and conditions:

- The maximum rate of discharge is 165 dry tonnes per hectare. The maximum cumulative discharge is 99,000 dry tonnes. Refer to Table 2 for historical applications of biosolids at the Facility.
- The characteristics of the discharge must be equivalent to Class B (or better, Class A) biosolids as specified in Division 3 of the OMRR (British Columbia, 2002).
    - **Class A** biosolids are the highest quality biosolid, contain low fecal coliform densities, and have lower trace element concentrations than **Class B** biosolids. **Class B** biosolids have less stringent trace element and fecal coliform requirements than Class A biosolids which results in more restrictions to application and distribution. See Table 1 for OMRR criteria for **Class A** and **B** biosolids.
- Biosolids will be stored and discharged within the area of permitted mine disturbance under *Mines Act* Permit M-200. Refer to Section 3.3 for additional biosolids storage requirements. Approximate locations of storage and application can be seen within the site plan in Figure 2 and Figure 3.

Table 1. Criteria for Class A and Class B Biosolids under OMRR Schedule 1,2,3 and 4 (BCMOE, 2008).

OMRR Criteria	Class A Biosolids	Class B Biosolids
Fecal Coliform (MPN/g)	<1,000	<2,000,000
Trace elements (µg/g)		
• Arsenic	75	75
• Cadmium	20	20
• Chromium	-	1,060
• Cobalt	150	150
• Copper	-	2,200
• Lead	500	500
• Mercury	5	15
• Molybdenum	20	20
• Nickel	180	180
• Selenium	14	14
• Zinc	1,850	1,850
Foreign Matter	<1%	<1%

*Class A and Class B biosolids are required to be sampled, analyzed and recorded under Schedule 5 and 6 of the OMRR.

Table 2. Historical Quantities of Biosolids Stockpiled and Applied at the Facility.

	Site ID	Date Stored/Applied	Total Biosolids Delivered/Utilized (dt)
Stockpiled	TSF	2009-2013	13,265
	NEZ	2008-2011	2,579
	North Bell	2012-2014	1178
Total			17,022
Applications	Tree Research Plots	2001/2001	56
	NEZ	2008	1,163
	North Bell Roadside Slopes	2011	1,416
	North Bell	2012	712
	North Bell Tree Trial Plots (Plots 2-6)	2013	269
	North Bell Tree Trial Plots (Plots 8-12)	2014	198
Total			3,813
Maximum allowable cumulative discharge = 99,000 dt Remaining allowable cumulative discharge = 95,187 dt Carry over stockpiled at TSF = 13,209 dt			

2.2 GENERAL REQUIREMENTS

Sections 2.1-2.6 of Permit 15968 outline general requirements that must be met for the application of biosolids at the Facility. These include:

- **Compliance**: MPMC will maintain security with the Minister of Finance as a condition of the Reclamation Permit (M-200; Section E-1) issued by the BC Ministry of Energy, Mines and Petroleum Resources (MEMPR, 2020).
- **Storage**: Biosolids will not be stored over winter unless in a designated storage facility. Storage facilities for biosolids will not be built within 100 meters upstream of any natural watercourse or ditch conveying non-mine influenced water and will be maintained to prevent biosolid escape. Refer to Section 3.3 for additional requirements for biosolids storage.
- **Application**: Biosolids will not be applied to reclamation sites during inclement weather conditions or during periods when the ground is frozen or snow-covered. Refer to Section 3.4 for more information on biosolids application.
- **Public**: Reclamation sites with public access will have warning signs posted at each application site entrance. The signs will describe the nature of the applied biosolids and must remain posted for at least 12 months from the most recent date of biosolids application to the reclamation site.
- **Professional Responsibility**: It is required by Section 2.6 of Permit 15968 (MOE, 2014) that MPMC will retain a suitable qualified professional, registered in BC under an appropriate professional organization, who will be responsible for the design, implementation, and monitoring of the program for the application of biosolids to land.

2.3 BIOSOLIDS STORAGE

MPMC currently has a biosolid stockpile located upslope of the TSF which is managed with the "Mount Polley Biosolids Stockpile Quality Control Protocols" (Figure 3). This biosolid stockpile has been in operation at the Facility since 2000 and is within a series of containment berms, as required under the OMRR (BCMOE, 2008). The biosolid stockpile has also been previously vegetated. Upslope and west of the biosolid stockpile is an unloading pad that is used for temporary storage to allow for sampling and analysis to determine if biosolids meet quality standards for Class A biosolids before incorporation into the pile; if sample analysis determines that biosolids do not meet Class A standards the material will be held until it can be removed from the site. The stockpile is visually inspected on a monthly basis, during snow-free conditions, to ensure no biosolids are escaping and impacting the surrounding environment.

The BC MOE Land Application Guideline provides no restrictions to stockpiles stored up to two weeks as long as movement from the stockpile does not occur (Section 10.6.6 of BCMOE, 2008). Biosolids can be stockpiled for up to nine months providing that the pile is greater than 30 m from surface water or wells and that the stockpiled biosolids are managed to prevent movement of material from the pile. It is recommended that the 30 m buffer from environmentally sensitive areas be applied to all stockpiled biosolid materials.

Storage of materials for longer than nine months must be in a permanent structure that is designed to prevent biosolid escape by leaching or run-off; a bermed area is sufficient for solid or dewatered residuals

(Section 10.6.6 of the BCMOE, 2008). Storage facilities for materials stored longer than nine months must be at least 15 m from watercourses and 30 m from wells. The Land Application Guideline also states that stockpiles will be covered in areas that exceed 600 mm in precipitation from October to March.

2.4 APPLICATION REQUIREMENTS

MPMC is required to retain a qualified professional to develop a monitoring plan for the biosolids application program that, at a minimum, provides information regarding the volume, quality and location of annual biosolids application which will be submitted no later than March 31, 2021 (as per Section 3.1 of the MOE Permit 15968 and Section D-10 of the M-200 Permit). MPMC will adhere to this plan and submit any updates to the Director within 30 days of implementation. MPMC will ensure that the shipment and use of biosolids at the Facility will be incorporated into their Annual Reclamation Report that includes volumes, material characteristics, storage locations, testing, and monitoring.

As part of each application, the biosolids, overburden, and receiving soil must be sampled independently to determine quality (i.e., biosolids, sampled on arrival) or existing condition of receiving soils (i.e., overburden, receiving soil) (BCMOE, 2008). These activities must be guided and performed by a qualified professional retained to oversee the applications. When sampling soils, including overburden, receiving soils or biosolids, samples will be taken in accordance with standard operating procedure MPMC-SOP-016 ABA and Soil Sampling (Quality Assurance/Quality Control Manual, MPMC, 2020) and work method MPMC-Work-016: ABA and Soil Sampling (Quality Assurance/Quality Control Manual, MPMC, 2020).

2.4.1 Pre-application

In accordance with the Mount Polley Biosolids Stockpile Quality Control Protocol (MPMC, 2013), municipal biosolids will be offloaded on a level unloading pad, located upslope and west of the biosolid stockpile, where they will be stored until an approved laboratory has determined that the biosolids meet Class A quality criteria (Table 1); laboratory analysis typically takes two weeks to process samples (MPMC, 2013). Upon verification from the laboratory that the samples meet Class A quality criteria (Table 1), biosolids will be loaded into the existing stockpile (MPMC, 2013). Refer to the Mount Polley Biosolids Stockpile Quality Control Protocol for more information on unloading and scheduling of biosolids deliveries (MPMC, 2013).

To determine baseline conditions of soil quality and nutrient status of reclamation areas, samples of both the receiving soil and the overburden material used to mix with the biosolids will be collected and tested prior to an application of biosolids, as required under the OMRR (Section 12.3 of the BCMOE, 2008).

In accordance with the BC MOE Land Application Guidelines, Grade A biosolids taken from the stockpile will be mixed in a test plot and sampled for trace element concentrations to confirm that the biosolids meet the quality criteria (Table 1) before their application to reclamation sites (BCMOE, 2008).

2.4.2 Application Methodology

2.4.2.1 Biosolids Application

As stated in Section 10.4 of the BC MOE Land Application Guidelines, the rate of discharge for each reclamation area will not only be dependent on the authorized discharge (Section 3.1; Table 2), but also the trace element concentrations, soil quality, and nutrient status present in both the receiving soil and the overburden material (BCMOE, 2008). Regulated residuals, or biosolids, are also required to have a defendable benefit to soil and vegetation (Section 10.4 of the BCMOE, 2008). Prior to application, the existing composition of the receiving soil and the overburden material must be determined in order to calculate the rate of discharge and the appropriate ratio for mixing of the overburden material and biosolids for each proposed reclamation area (BCMOE, 2008). Biosolid Soil Application logs will be recorded for scaling purposes to ensure compliance with the authorized discharge rate and for tracking in the event of an exceedance in trace element concentrations.

In past biosolids applications at the Facility, the reclamation mix was placed on receiving parcels and horizontally windrowed using a bulldozer (SYLVIS, 2012). Windrowing refers to the placement of reclamation mix horizontally across the application area to create rough, mounded surfaces with minimal compaction. Horizontal windrowing will minimize soil compaction and erosion potential as well as promote vegetation establishment with increased site diversity and soil water holding capacity (SYLVIS, 2012). The application of biosolids must be managed to ensure the use of non-competitive grass species and the reduction of seed densities (MPMC, 2017).

2.4.2.2 Revegetation

It is recommended to revegetate application areas following biosolids application. Well-established vegetative cover is one of the most effective methods of reducing erosion and stabilizing soils. Revegetation prescriptions (i.e., grasses, shrubs and deciduous and conifer tree planting) for areas at the Facility are outlined in Section 5.5 of the 2017 Reclamation and Closure Plan Update (MPMC, 2017). Any seed mix that is applied must meet grade of Canada No. 1 Forage Mixture or Canada No. 1 Ground Cover Mixture (as defined within the Seeds Regulation under the *Seeds Act*). Seed mixtures must also have a report of Seed Analysis to document their contents and ensure mixtures do not contain invasive species. Where surface erosion (e.g., compaction, rutting) is observed, additional best management practices will be employed to reduce erosion, as determined by the qualified professional.

2.4.3 Post-application

2.4.3.1 Soil Monitoring

Although not required by the OMRR, monitoring trace element concentrations in treated soil is recommended for due diligence to validate increases in productivity or soil/plant nutrient and to determine if there are negative environmental impacts as a result of biosolids application (Section 10.8 of the BCMOE, 2008). Areas that have received applications of biosolids should be sampled using the same sampling methodology as pre-application samples, to be tested for soil quality, nutrient status, and trace

element accumulations (Section 12.4.4 of the BCMOE, 2008). Post-application soil concentrations of trace elements should be compared with those present in the soil prior to application (BCMOE, 2008).

2.4.3.2 Vegetation Monitoring

Application of soil amendments can sometimes result in the accumulation of high nitrate levels within the foliage (e.g., 2500 to 3500 ppm) of vegetation established on the amended soils. This occurs most often with high nutrient amendments that are applied as a fertilizer (e.g., biosolids or manure). High nitrate levels within foliage can be toxic to livestock, and potentially wildlife, that forage on the vegetation in these areas. In addition, application of biosolids can sometimes result in elevated concentrations of Copper (Cu) in vegetation (i.e., biosolids), which at high concentrations, can be toxic to foraging livestock or wildlife (BCMOE, 2008). Elevated ammonia in biosolids have also been observed to cause root damage in planted seedlings (MVRD, 2015). It is recommended that vegetation monitoring be conducted to determine soil quality and nutrient status in areas that are revegetated as well as determine establishment success of vegetation (MVRD, 2015). The 2017 MPMC Reclamation and Closure Plan Update provides guidelines on vegetation monitoring (MPMC, 2017).

2.5 SAMPLING AND ANALYTICAL PROCEDURES

Sampling will be carried out in accordance with the British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples (Province of British Columbia, 2020a), or by suitable alternative procedures as authorized by the Director[1].

Analyses will be carried out in accordance with procedures described in the British Columbia Laboratory Manual (Province of British Columbia, 2020b), or by suitable alternative procedures as authorized by the Director.

As stated in Section 12.0 of the BC MOE Land Application Guidelines, samples will be collected by a qualified professional for every 1,000 dry tonnes (dt) of biosolids that are applied or on an annual basis; whichever is more frequent (BCMOE, 2008).

2.6 RISK MANAGEMENT TO HUMAN HEALTH AND ENVIRONMENT

All facility personnel and contractors working with or around biosolids will be briefed on the pertinent hazards or risks to human health and the environment that are associated with biosolids application by the qualified professional. Relevant staff training regarding the handling, sampling, and storing of biosolids will be conducted. The presence of emerging substances of concern (ESOC) in biosolids will be monitored and reported to manage their potential risk to microbial communities inhabiting the treated soil (LRCS, 2016). Source reduction initiatives will be implemented as a means of managing exposure pathways and mitigating toxicity of human waste to meet pathogen regulations (LRCS, 2016).

Biosolids will have limited human contact and will be immediately incorporated into the soil during application to reduce the exposure of humans to bioaerosols and odours resultant from biosolids

[1] "**Director**" means a person employed by the government and designated in writing by the minister as a director of waste management or as an acting, deputy or assistant director of waste management.

application, as well as to prevent grazing animals from ingesting the biosolids directly (LRCS, 2016). As seasonal precipitation can increase the risk of biosolids impact on aquatic ecosystems, biosolids applications will be avoided when the groundwater table is high and when there are concerns about potential runoff (LRCS, 2016).

2.7 REPORTING

Permittee will submit to the Director the data collected under the monitoring plan by April 30 of each year for the monitoring of the previous year as per Section 3.3 of Permit 15968 (MOE, 2014).

3 RESPONSIBILITIES

The following sections detail the responsibilities held by each of the employment levels at the Facility as they pertain to this Plan.

3.1 SENIOR MANAGEMENT REPRESENTATIVE: MINE MANAGER

The Senior Management Representative, or designate, is responsible for:

- Ensuring the required resources are in place to execute the Plan; and,
- Submitting the results of the Plan to all relevant Provincial agencies and Indigenous groups.

3.2 ACCOUNTABLE FACILITY REPRESENTATIVE: ACTING GENERAL MANAGER

The Accountable Facility Representative, or designate, is responsible for:

- Reviewing the effectiveness of the current biosolids management measures at the Facility;
- Scheduling and coordinating the implementation of the biosolids management measures; and,
- Training of site personnel and contractors on the Plan and best management practices to be implemented.

3.3 OPERATIONS SUPERVISOR: GENERAL FOREMAN

The Operations Supervisor, or designate, are responsible for:

- Reviewing the effectiveness of the current Plan;
- Maintaining documentation of schedules and logs;
- Implementing fugitive biosolids management measures; and,
- Forwarding biosolids observation reports from site personnel to the Accountable Facility Representative.

3.4 FACILITY PERSONNEL AND CONTRACTORS

All Facility Personnel and Contractors are responsible for:

- Following all biosolids management procedures that are currently in place; and,
- Reporting biosolids observations to appropriate supervisor.

3.5 TECHNICAL SERVICES SUPERINTENDENT

The Technical Services Superintendent is responsible for:

- Providing feedback on the effectiveness of the Plan at the Facility;
- Conducting internal audits of the biosolids management measures at the Facility;
- Coordinating external audits of the biosolids management measures at the Facility;
- Coordinating biosolids monitoring programs; and,
- Reporting results to regulatory authorities.

4 ADAPTIVE MANAGEMENT

The Plan will be continually adapted based on the results of ongoing biosolids monitoring programs, reclamation planning, incident and summary reports, and employee education programs. The adaptive management framework recognizes that new information obtained from these sources of information should be used to inform future planning, decision-making, mitigation, and program design to help MPMC maintain compliance. An annual review of the Plan will also be required to ensure adaptive management strategies can be successfully identified and integrated.

5 REFERENCES

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Appendix A

Permits

July 3, 2014

Tracking Number: 319721
Authorization Number: 15968

REGISTERED MAIL

MOUNT POLLEY MINING CORPORATION
SUITE 200
580 HORNBY ST
VANCOUVER, BC
V6C 3B6

Dear Permittee:

Enclosed is Amended Permit 15968 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the permit. An annual fee will be determined according to the Permit Fees Regulation.

This permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the permittee. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

…/2

Ministry of Environment
Environmental Protection Division
Suite 400 - 640 Borland St.
Williams Lake, BC V2G 4T1
Southern Interior Region - Cariboo
Telephone: (250) 398-4530
Facsimile: (250) 398-4214

Administration of this permit will be carried out by staff from the Southern Interior Region. Plans, data and reports pertinent to the permit are to be submitted to the Regional Manager, Environmental Protection, at Ministry of Environment, Regional Operations, Southern Interior Region, Suite 400 - 640 Borland St., Williams Lake, BC V2G 4T1.

Yours truly,

Shelley Metcalfe, P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Cariboo

Enclosure

cc: Environment Canada

MINISTRY OF ENVIRONMENT

PERMIT

15968

Under the Provisions of the Environmental Management Act

MOUNT POLLEY MINING CORPORATION

SUITE 200
580 HORNBY ST
VANCOUVER BC V6C 3B6

is authorized to discharge biosolids to land for the purpose of mine site reclamation at the Mount Polley Mine located near Likely, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may lead to prosecution.

This permit supersedes and amends all previous versions of permit 15968 issued under Part 2, Section 14 of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGE

1.1 This subsection applies to the discharge of biosolids to tailings and waste rock disposal locations for the purpose of reclamation.

1.1.1 The maximum authorized rate of discharge is 165 dry tonnes per hectare. The maximum authorized cumulative discharge is 99,000 dry tonnes.

1.1.2 The characteristics of the discharge must be equivalent to or better than Class B biosolids as specified in the Organic Matter Recycling Regulation.

1.1.3 The authorized works are storage facilities, a truck washing site, spreading equipment and related appurtenances.

1.1.4 The location of the storage areas and the discharge is within the area of permitted mine disturbance under Mines Permit M-200, located approximately as shown on the attached site plan.

Date issued: December 13, 1999
Date amended: July 3, 2014
(most recent)

Shelley Metcalfe, P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Cariboo

2. GENERAL REQUIREMENTS

2.1 The permittee must maintain security with the Minister of Finance as a condition of the Reclamation Permit issued by the Ministry of Energy and Mines.

2.2 Biosolids may not be stored over winter except at a designated storage facility.

2.3 The biosolids storage facilities must be constructed to the following specifications:

2.3.1 Biosolids may not be stored on site within 100 meters upstream of any natural watercourse or ditch conveying non mine influenced water.

2.3.2 The storage facility must be maintained in such a manner as to prevent the escape of biosolids.

2.4 Biosolids must not be applied to reclamation sites during inclement weather conditions or during periods when the ground is frozen or snow covered.

2.5 All reclamation sites which are accessible to the public must have warning signs posted at each gate or entrance to the application location. The signs must describe the nature of the biosolids that have been applied and must remain posted for a period not less than 12 months from the most recent date of biosolids application to the reclamation site.

2.6 The permittee must retain the services of a suitably qualified professional, registered in British Columbia with their appropriate professional organization, who must be responsible for the design, implementation, and monitoring of the program for the application of biosolids to land.

3. MONITORING REQUIREMENTS

3.1 Monitoring Plan

The permittee must retain a suitably qualified professional to develop a monitoring plan for the biosolids application program. This plan must at a minimum, address the volume, quality and location of biosolids applied each year. The permittee must comply with this plan. Updates to the monitoring plan must be submitted to the director within 30 days of implementation.

Date issued: December 13, 1999
Date amended: July 3, 2014
(most recent)

Shelley Metcalfe, P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Cariboo

3.2 Sampling and Analytical Procedures

Sampling is to be carried out in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2003 Edition (Permittee)", or most recent edition, or by suitable alternative procedures as authorized by the Director. A copy of the above manual is available on the Ministry web page at www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.
Analyses are to be carried out in accordance with procedures described in the "British Columbia Laboratory Manual (2009 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the Director. A copy of the above manual is available on the Ministry web page at www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.

3.3 Reporting

The permittee must electronically submit to the director the data collected under the monitoring plan by April 30th of each year for the previous year's monitoring.

Date issued: December 13, 1999
Date amended: July 3, 2014
(most recent)

Shelley Metcalfe, P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Cariboo

SITE PLAN

Date issued: December 13, 1999
Date amended: July 3, 2014
(most recent)

Shelley Metcalfe, P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Cariboo

PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES

PERMIT

APPROVING MINE PLAN AND RECLAMATION PROGRAM

(Issued pursuant to Section 10 of the *Mines Act* R.S.B.C. 1996, c. 293)

Permit: **M-200** Mine No: **1101163**

Issued to: **Mount Polley Mining Corporation.**
PO Box 12
Likely, British Columbia
V0L 1N0

for work located at the:

Mount Polley Mine

Issue Date

August 3, 1995 Approving Work System and Reclamation Program

This permit supersedes and amends all previous versions of Permit M-200 issued pursuant to Part 10 of the *Mines Act*. (All previously approved works systems are hereby transferred under this permit.)

Amended at Victoria, British Columbia this 10th day of December in the year 2020.

J. Lowell Constable, P.Eng.
Deputy Chief Inspector of Mines
Major Mines Office

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PREAMBLE

The *Mines Act* Permit application, and applications for changes to approved works and conditions to Permit M-200, have been submitted to the Chief Permitting Officer, in accordance with Sections 10(1), 10(6), 10(7), and 11(1) of the *Mines Act*, and Sections 10.1.2 and 10.1.18 of the Health, Safety and Reclamation Code for Mines in British Columbia (Code).

Where more than one version of information exists in the application, the most recent version shall be considered the approved version unless otherwise stated or determined by the Chief Permitting Officer.

1. Approving Work System and Reclamation Program (Issued August 3, 1995)

1.1 Report entitled "The Mount Polley Project Reclamation Plan" by Hallam Knight Piesold Ltd., dated March 1995.
1.2 Report entitled "Mount Polley Access Road Reconnaissance Report" by SNC Fenco Inc., dated April 1995.
1.3 Reports entitled "Tailings Storage Facility Design Report" Volumes I and II and "Tailings Storage Facility Site Inspection Manual", prepared by Knight Piesold Ltd., dated May 26, 1995.

Application Received: April 6, 1995
Gazetted: Williams Lake Tribune April 13, 2015; and BC Gazette April 12, 1995

2. Approving Name Change (Issued June 13, 1996)

2.1 Application dated May 23, 1996.

3. Approval to Construct Tailings Storage Facility to Elevation 934m (Issued September 23, 1996)

3.1 Letter entitled "Mt. Polley Project – Tailings Storage Facility" and accompanying drawings prepared by Knight Piesold Ltd., dated June 14, 1996.
3.2 Letter report entitled "Borehole Logs for PRW 96-1 to" prepared by Knight Piesold Ltd., dated July 30, 1996.
3.3 Letter report entitled "Geotechnical Information Obtained from 1996 Borehole Investigation" prepared by Knight Piesold Ltd., dated July 26, 1996.
3.4 Letter report entitled "CPT Investigations at Main Embankment" prepared by Knight Piesold Ltd., dated July 30, 1996.
3.5 Letter report entitled "CPT Investigation", prepared by Knight Piesold Ltd, dated July 29, 1996.

Application Received: June 17, 1996

4. Approving Amendment of Reclamation Permit and Approval to Construct Open Pits and Waste Dumps, and Traffic Control Plan (Issued July 11, 1997)

4.1 Application entitled "The Mount Polley Mine Project Reclamation Plan", prepared by Hallam Knight Piesold Ltd., dated April 1996.
4.2 Letter dated June 11, 1997 from Mount Polley mining Corporation to Brian McBride.
4.3 The Annual Reclamation Report dated March 31, 1997.
4.4 Application entitled "Approval to Construct Open Pits and Waste Dumps" dated July 23, 1996.
4.5 A Report entitled "Report of Geotechnical Investigation and Design of the Open Pits and Waste Dumps" prepared by Knight and Piesold, dated July 5, 1996.
4.6 The "Traffic Control Plan" enclosed in the application entitled "Approval to Construct Open Pits and Waste Dumps", dated July 23, 1996.

Applications Received: May 1, 1996 and July 23, 1996

5. Approving Amendment to Construct Tailings Facility to Elevation 940 Meters (Issued April 7, 1998)

5.1 Application letter entitled "Construction Approval Request for Tailings Dam Works", dated March 27, 1997.
5.2 Report entitled "Report on On-Going Construction Requirements (Ref. No. 10162/9-3)", prepared by Knight Piesold Ltd., dated December 2, 1997.
5.3 Report entitled "Operation, Maintenance and Surveillance manual for Stage Ib Embankment (E1.934m)", prepared by Knight Piesold Ltd., dated November 24, 1997.
5.4 Report entitled "Report on Stage Ia/Ib Construction (ref. No. 10162/7-5)", prepared by Knight Piesold Ltd., dated August 14, 1997.

Application Received: April 2, 1998

6. Approving Construction of Tailings Storage Facility to Elevation 944 Meters (Issued June 13, 2000)

6.1 Application Letter entitled "Mt. Polley Tailings Storage Facility Application to Construct to Elevation 944 Meters Amendment Permit M-200" including Drawings 11162-13-210, -215, -130, and 11162-12-120, -125, dated May 25, 2000.
6.2 Report entitled "Tailings Cyclone Sands Geochemical Evaluation" prepared by Mt. Polley Mining Corporation, dated December 2, 1998.
6.3 Report entitled "Tailings Storage Facility, Evaluation of Cycloned Tailings for Embankment Construction", prepared by Knight Piesold Ltd., dated June 16, 1999.

6.4 Report entitled "Report on Cycloned Sand Construction of Stage 3 and On-going Stages of the Tailings Storage Facility, Volumes I and II", prepared by Knight Piesold Ltd., dated December 13, 1999.

6.5 Report entitled "Tailings Cyclone Sand Geochemical Evaluation Update", prepared by Mt. Polley Mining Corporation, dated February 2000.

6.6 Report entitled "Addendum to Report on Cycloned Sand Construction of Stage 3 and On-going Stages of the Tailings Storage Facility", prepared by Knight Piesold Ltd., dated May 11, 2000.

Application Received: June 2, 2000

7. Approving Tailings Storage Facility and Amended Metal Leaching and Acid Rock Drainage Conditions (Issued August 2, 2000)

8. Approving Construction of Tailings Storage Facility to Elevation 945 Meters (Issued May 30, 2001)

8.1 Application entitled "Mt. Polley Tailings Storage Facility Application to Construct to Elevation 945 Metres Amendment to Permit M-200", dated April 30, 2001.

8.2 Drawings 11162-13-100 Rev 3, -102 Rev. 3, -104 Rev 1, -120 Rev. 3, -125 Rev. 3, -127 Rev. 1, -130 Rev. 3, -210 Rev. 4, -215 Rev. 4, -250 Rev. 2, -251 Rev. 2, -256 Rev. 3, -258 Rev. 2, and -259 Rev. 3, submitted May 16, 2001.

8.3 Report entitled "Tailings, Cyclone Sands Geochemical Evaluation" prepared by Mount Polley Mining Corporation", dated December 2, 1998.

8.4 Report entitled "Tailings Storage Facility, Evaluation of Cycloned Tailings for Embankment Construction" prepared by Knight Piesold Ltd., dated June 16, 1999.

8.5 Report entitled "Report on Cycloned Sand Construction of Stage 3 and On-going Stages of the Tailings Storage Facility, Volumes I and II", prepared by Knight Piesold Ltd., dated December 13, 1999.

8.6 Report entitled "Tailings Cyclone Sands Geochemical Evaluation Update" prepared by Mount Polley Mining Corporation, dated February 2000.

8.7 Report entitled, "Addendum to Report on Cycloned Sand Construction of Stage 3 and On-going Stages of the Tailings Storage Facility" prepared by Knight Piesold Ltd., dated May 11,2000.

Application Received: May 16, 2000

9. Approving Milling of Ore and Tailings Deposition from the International Wayside Bulk Sample (Issued February 16, 2004)

9.1 Application letter, dated January 16, 2004.

Application Received: January 14, 2004

10. Approving Mining and Reclamation Program for the Northeast Zone and Approving Mine Restart (Issued November 1, 2004)

10.1 Application entitled "Amendment Application Northeast Zone", dated July 30, 2004.

Application Received: August 10, 2004

11. Approving Tailings Storage Facility Stage 4 Construction (Issued May 25, 2005)

11.1 Application entitled "Mount Polley Mining Corporation, Mount Polley Mine, Design of the Tailings Storage Facility to Ultimate Elevation" prepared by Knight Piesold, dated March 14, 2005.
11.2 Letter entitled "Mount Polley Mining Corporation, Mount Polley Mine, Design of the Tailings Storage Facility to Ultimate Elevation" prepared by Knight Piesold Ltd., dated April 14, 2005.

Application Received: March 17, 2005

12. Approving Haulage Road Construction from Northeast Zone to TSF (Issued August 2, 2005)

12.1 Application letter entitled "Mount Polley Haulage Road", dated June 17, 2005
12.2 Report entitled "Mount Polley Mining Corporation, Mines Act Permit M-200 Amendment Application Northeast Zone" dated June 17, 2005

Application Received: June 20, 2005

13. Approving Mining of Southeast Zone (Issued November 24, 2005)

13.1 Application entitled "Mines Act Permit M-200 Amendment Application Southeast Zone", dated July 8, 2005.

Application Received: July 13, 2005

14. Approving Change of Name and Deletion of Requirement to Monitor Blasting (Issued August 2, 2006)

14.1 Application letter entitled "Mount Polley Mining Corporation (MPMC) and Mount Polley Holding Company Limited (MPHCL)", dated January 16, 2006.
14.2 Application letter entitled "Variance Request for Section 1,2,3 (Health and Safety) M-200, Permit Northeast Zone" dated February 6, 2006.

Applications Received: January 23, 2006 and February 10, 2006

15. Approving Tailings Storage Facility Stage 5 Construction (Issued August 2, 2006)

15.1 Application entitled "Mount Polley Mining Corporation, Mount Polley Mine, Stage 5 Design of the Tailings Storage Facility", prepared by Knight Piesold Ltd., dated June 12, 2006.

Application Received: June 23, 2006

16. Approving Northeast Zone Dump Extension (Issued March 29, 2007)

16.1 Application entitled "Mount Polley Mining Corporation, Amendment Application Northeast Zone Dump Expansion", dated December 21, 2006.

Application Received: January 8, 2007

17. Approving Copper Oxide Test Heap Leach Facility (Issued March 29, 2007)

17.1 Application entitled "Test Leach, Operations/Environment Monitoring Manual", dated June 28, 2006.
17.2 Report entitled "Report on Feasibility Design of Test Heap Leach Pad", prepared by Knight Piesold Consulting, dated October 20, 2006

Application Received: July 6, 2006

18. Approving Boundary Road (Issued August 31, 2007)

18.1 Notice of Work Application entitled "Boundary Road Application – Mount Polley", dated March 5, 2007.
18.2 Memorandum entitled "Mount Polley- Waste Dump and Haul Road", by Golder Associates, dated August 29, 2007.
18.3 Report entitled "Geotechnical Assessment of Proposed Boundary Haul Road", by Golder Associates, dated January 3, 2007.

Application Received: March 12, 2007

19. Approving Wight Pit High Wall Rehabilitation (Issued December 5, 2007)

19.1 Application entitled "Wight Pit High Wall Rehabilitation Program", dated October 17, 2007.

Application Received: October 19, 2007

20. Approving Tailings Storage Facility Stage 6 Construction (Issued February 19, 2008)

20.1 Application letter, entitled "Stage 6 Design Report for the Tailings Storage Facility – Mount Polley Mine" prepared by the Mount Polley Mining Corporation, dated July 4, 2007.
20.2 Report entitled "Stage 6 TSF Design of the Tailings Storage Facility" prepared by Knight Piesold, dated June 18, 2007.
20.3 Letter entitled "Mount Polley Stage 6 TSF Design" prepared by Knight Piesold, dated December 19, 2007.

Application Received: July 25, 2007

21. Approving Transfer of Road Use, Maintenance and Reclamation Obligations (Issued March 6, 2008)

21.1 Application entitled "Transfer of Road Use and Maintenance Obligations Under Permit M-200", dated January 31, 2008.

Application Received: February 14, 2008

22. Approving Mining and Reclamation Program for the Pond Zone (Issued July 8, 2009)

22.1 Application entitled "Pond Zone Permit Application to Amend M-200 - Mount Polley", dated January 30, 2009.
22.2 Document entitled "Response to MEMPR Comments Respecting the Pond Zone Pit Application Addendum I", dated May 4, 2009.
22.3 Report entitled "Pond Zone Waste Rock Management Plan, Mount Polley Mine", dated June 2009.

Application Received: February 10, 2009

23. Approving Mining of the C2 and Boundary Zone Pits (Issued August 15, 2011)

23.1 Application entitled "Mine Permit Amendment Application" dated November 1, 2010.
23.2 Report entitled "Revised Mine Permit Amendment Application", prepared by Mount Polley Mining Corporation, dated November 1, 2010.
23.3 Report entitled, "Item 1 – Tailings Storage Facility Calculation", prepared by Mount Polley Mining Corporation, undated, submitted December 22, 2010.
23.4 Report entitled, "A Review of the Stability of the Proposed Southeast Waste Rock Dump", prepared by Golder Associates, dated December 23, 2010.
23.5 Report entitled, "Technical Memorandum on Field and Laboratory Investigations (for West Dumps)", prepared by Golder Associates, dated December 1, 2010.

23.6 Report entitled, "ABA Sampling Procedure", prepared by Mount Polley Mining Corporation, received December 22, 2010.
23.7 Report entitled "Mount Polley Water Balance 2010 Update", prepared by Mount Polley Mining Corporation, undated.
23.8 Report entitled "Permit Conditions Response", prepared by Mount Polley Mining Corporation, received on December 22, 2010.
23.9 Report entitled "Detailed Site Plan" undated.
23.10 Email entitled "RE: Permit amendment application – geochem questions", from Mount Polley Mining Corporation received May 5, 2011.
23.11 Email entitled – "FW: Permit Amendment 5 questions", from Mount Polley Mining Corporation, received May 12, 2011.

Application Received: November 9, 2010

24. Approving Tailings Storage Facility Stage 8 Construction (Issued June 29, 2012)

24.1 Application entitled "Mount Polley Mine – 2012 Tailings Construction," dated April 3, 2012.
24.2 A report entitled "Tailings Storage Facility – Stage 8 2012 Construction Monitoring Manual" prepared by AMEC Environmental & Infrastructure, dated March 30, 2012.

Application Received: April 3, 2012

25. Approving Tailings Storage Facility Stage 8A Construction (Issued October 15, 2012)

25.1 Application to allow 2012 construction to the 965m elevation (Stage 8A Raise), dated September 18, 2012.
25.2 Report entitled "Tailings Storage Facility – Stage 8 2012 Construction Monitoring Manual," prepared by AMEC Environmental & Infrastructure, dated March 30, 2012.
25.3 Letter report entitled "2012 Stage 8A Tailings Storage Facility Construction Drawings and Stability Analyses for Embankment Raise to El. 965 m," prepared by AMEC Environmental & Infrastructure, and dated September 10, 2012.

Application Received: September 18, 2012

26. Approving Boundary Zone Underground Project (Issued March 25, 2013)

26.1 Application entitled "Boundary Zone Underground Project", dated August 23.

Application Received: August 30, 2012

27. Approving Processing 15000 Tonnes of Ore from Dome Mountain (Issued April 22, 2013)

27.1 Letter application entitled "Approval to Process a Total of 15,000 Tonnes of Ore from Dome Mountain", dated February 26, 2013

Application Received: February 26, 2013

28. Approving Northwest PAG Dump Expansion and South Haul Road (Issued July 25, 2013)

28.1 Application entitled "Mine Permit Amendment Application", dated November 1, 2012.

28.2 Report entitled "A Review of the Proposed Northwest Dump and the Tailings Ponds: Mount Polley Mine", prepared by Golder Associates Ltd, dated March 28, 2013.

28.3 Document entitled "Surface Erosion Prevention and Sediment Control Plan", prepared by Mount Polley Mining Corporation, dated 2010.

28.4 Document entitled "Environmental Management Plan for the Installation of a Culvert in Bootjack Creek", prepared by Mount Polley Mining Corporation, undated.

Application Received: November 1, 2012

29. Approving Tailings Storage Facility Stage 9 Construction (Issued August 9, 2013)

29.1 Application to construct the Stage 9 dam raise on the TSF submitted on April 18, 2013.

29.2 Report entitled "Tailings Storage Facility – Stage 9 2013 Construction Monitoring Manual," prepared by AMEC Environmental & Infrastructure, dated April 11, 2013.

29.3 Report entitled, "Mount Polley Mine Tailings Storage Facility Operation, Maintenance and Surveillance Manual", prepared by Mount Polley Mining Corporation, dated July 1, 2013.

29.4 2013 Site Water Balance, submitted by Mount Polley Mining Corporation on May 21, 2013.

Application Received: April 18, 2013

30. Approving Cariboo Phase 4 Expansion (Issued March 17, 2014)

30.1 Report entitled "Review of Cariboo Pit Slope Design", prepared by Golder Associates, dated January 31, 2014.

Application Received: February 17, 2014

31. Approving Change to Reclamation Security Schedule (Issued March 27, 2014)

32. Approving Waste Rock and Tailings Comingling Research Project (Issued June 24, 2014)

32.1 Application entitled "Mount Polley Mine Research Project: Co-Mingling of Waste Rock with Non-Acid Generating Tailings", dated March 18, 2014.

Application Received: March 18, 2014

33. Approving TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Freshet (Issued December 17, 2014)

33.1 Report entitled "2015 Freshet Embankment Design" (Application), prepared by Golder Associates, dated November 28, 2014.
33.2 Memo entitled "Site Water Management", prepared by Mount Polley Mining Corporation, dated December 10, 2014.
33.3 Memo entitled "Materials (PAG) Management", prepared by Mount Polley Mining Corporation, dated December 10, 2014.

Application Received: November 28, 2014
Application Referred: November 29, 2014
MDRC Meetings: November 5, 2015 and December 5, 2014

34. Approving Return of Restricted Restart of Operations (Issued July 9, 2015)

34.1 Report entitled "Permit Amendment Application, Mount Polley Mine Return to Restricted Operations Revision 1" Prepared by Mount Polley Corporation, dated March 20, 2015.
34.2 Letter entitled "Review of Acid-Base Accounting of Ore Materials", prepared by SRK Consulting Inc., dated June 18, 2015.
34.3 Report entitled "Acid-Base Accounting of Ore Materials", prepared by Mount Polley Mining Corporation, dated June 18, 2015.
34.4 Report entitled "Ore Stockpile Characterization Plan, Mount Polley Mine", prepared by SRK Consulting Inc., dated May 2015.
34.5 Report entitled "Closure Management Manual", prepared by Mount Polley Mining Corporation, dated May 27, 2015.
34.6 Report entitled "Ore Stockpile Geochemical Characterization Program Update", prepared by Mount Polley Mining Corporation, dated May 23, 2015.
34.7 Procedure entitled "Working Safely Around Water", prepared by Mount Polley Mining Corporation, dated May 21, 2015.
34.8 Report entitled "Mine Plan Synopsis", prepared by Mount Polley Mining Corporation, dated May 21, 2015.
34.9 Technical Memorandum entitled "Assessment of Groundwater Seepage Outflows from Springer Pit to Bootjack Lake at the Mount Polley Mine, BC", prepared by Golder Associates, dated May 8, 2015.

34.10 Report entitled "Erosion and Sediment Control Management Plan", prepared by Mount Polley Mining Corporation, dated April 30, 2015

Application Received: March 20, 2015
Application Referred: March 30, 2015
MDRC Meetings: March 31, 2015 and April 28, 2015

35. Approving Main Embankment Buttress (Issued October 22, 2015)

35.1 Report entitled "Mount Polley Tailings Storage Facility Elevation 970 m Embankment Stability Analysis and Buttress Design," prepared by Golder Associates, dated July 10, 2015.
35.2 Letter entitled "Tailings Storage Facility – Elevation 970 m Buttress Construction", prepared by Mount Polley Mining Corporation, dated July 31, 2015.
35.3 Report entitled "Mt. Polley Tailings Storage Facility Surficial Geology and Quaternary Geological Overview of the Mt. Polley Tailings Storage Facility (TSF) Area, British Columbia", prepared by Golder Associates, dated July 6, 2015.
35.4 Report entitled "2015 Geotechnical Investigation Factual Report Mount Polley Tailings Storage Facility, Likely, BC", prepared by Golder Associates, dated July 7, 2015.

Application Received: August 1, 2015
Application Referred: August 10, 2015

36. Approving Upstream TSF Construction and 2016 Freshet Water Management (February 25, 2016)

36.1 Application entitled "Amendment to Permit M-200 (Mount Polley Mine) – 2016 Freshet TSF Contingency Use", prepared by Mount Polley Mining Corporation, dated November 19, 2015.
36.2 Letter application entitled "Site Conditions Update (#5) – Site Water Management and Upstream Tailings Storage Facility (TSF) Construction", prepared by Mount Polley Mining Corporation, dated February 2, 2016.
36.3 Report entitled "Tailings Storage Facility Detailed Design to Elevation 970 m", prepared by Golder Associates Ltd., dated November 3, 2015.

Applications Received: November 19, 2015 and February 2, 2016
Application Referred: December 17, 2015
MDRC Meeting: February 4, 2016

37. Approving Springer Pit Lake Elevation Increase (Issued March 17, 2016)

37.1 Letter application entitled "Temporary Storage in the Springer Pit Above 1030 m asl Elevation" prepared by Mount Polley Mining Corporation, dated February 22, 2016.
37.2 Letter regarding "Site Conditions Update (#5) – Site Water Management and Upstream Tailings Storage Facility (TSF) Construction", dated February 2, 2016, prepared by Mount Polley Mining Corporation.
37.3 Technical Memorandum "Mount Polley Mine – Prediction of Water Level and Seepage from the Springer Pit and Bootjack Lake Water Quality", dated March 7, 2016, prepared by Golder Associates Ltd.

Applications Received: February 22, 2016
Application Referred: February 22, 2016
MDRC Meeting: February 4, 2016

38. Approving Extension to Restricted Restart of Operations and Corner 1 Buttressing (Issued April 29, 2016)

38.1 Letter application entitled "Extension to Restricted Operations", prepared by Mount Polley Mining Corporation, dated February 23, 2016.
38.2 Letter application entitled "Amendment to *Mines Act* Permit M-200 (Mount Polley Mine) – El. 963m Corner 1 Perimeter Embankment Buttress", prepared by Mount Polley Mining Corporation, dated April 19, 2016.
38.3 Memorandum entitled "Mount Polley Mine – Prediction of Water Level and Seepage from the Springer Pit and Bootjack Lake Water Quality", prepared by Golder Associates Ltd., dated March 7, 2016.
38.4 Letter entitled "Site Conditions Update (#6)", prepared by Mount Polley Mining Corporation, dated March 25, 2016.
38.5 Letter entitled "Water Treatment Plant (WTP) Capacity Increase Plan", prepared by Mount Polley Mining Corporation, dated March 31, 2016.
38.6 Technical Memorandum entitled "Update to the Assessment of Seepage Conditions near the Springer Pit – Mount Polley Mine – Rev 0", prepared by Golder Associates Ltd., dated April 26, 2016.
38.7 Report entitled "Tailings Storage Facility Detailed Design to Elevation 970 m", prepared by Golder Associates Ltd., dated November 3, 2015.

Applications Received: February 23, 2016 and April 19, 2016
Application Referred: March 11, 2016
MDRC Meeting: March 17, 2016 and April 15, 2016

39. Approving Return to Full Operation and Use of Tailings Storage Facility (Issued June 23, 2016)

39.1 Application entitled "Mount Polley Mine Return to Full Operations", prepared by Mount Polley Mining Corporation, dated November 6.

39.2 Report entitled "Mine Reclamation and Closure Plan Update November 2015" prepared by Mount Polley Mining Corporation, dated November 6, 2015.

39.3 Report entitled "Mount Polley Mine Return to Restricted Operations: Mine Plan Synopsis" prepared by Mount Polley Mining Corporation, dated May 21, 2015.

39.4 Report entitled "Tailings Storage Facility Detailed Design to Elevation 970m", prepared by Golder Associates, dated November 3, 2015.

39.5 Report entitled "Tailings Storage Facility Life of Mine Feasibility Design", prepared by Golder Associates, dated November 3, 2015.

39.6 Report entitled "Cariboo-Springer Pit Phase 4 Water Management Plan (TSF 970m Design)", prepared by Golder Associates, dated November 2, 2015.

39.7 Report entitled "Response to BCMEM Screening Comments – Quantitative Performance Objectives", prepared by Golder Associates, dated January 27, 2016.

39.8 Report entitled "Review of Cariboo Pit Slope Design" prepared by Golder Associates, dated January 31, 2014.

39.9 Report entitled "MPMC-SOP-016: ABA and Soil Sampling", prepared by Mount Polley Mining Corporation, dated March 23, 2016.

39.10 Report entitled "MPMC-WORK-016: ABA and Soil Sampling", prepared by Mount Polley Mining Corporation, dated March 23, 2016.

39.11 Report entitled "Water Management Plan and System Review", prepared by Mount Polley Mining Corporation, dated March 31, 2016.

39.12 Report entitled "Permit amendment application to discharge treated water to Quesnel Lake via Hazeltine Creek", prepared by Mount Polley Mining Corporation, dated September 25, 2015.

Applications Received: November 6, 2015
Application Referred: February 2, 2016
MDRC Meeting: February 4, 2016; March 17, 2016; April 15, 2016; and May 16, 2016

40. Approving TSF Upstream Drain Design Modification (Issued July 22, 2016)

40.1 Application entitled "Mount Polley Mine Tailings Storage Facility Embankment Construction to Elevation 970 m – Upstream Design Modification", prepared by Golder Associates Ltd., dated June 30, 2016.

Applications Received: July 4, 2016
Application Referred: July 4, 2016

41. Approving Security Schedule (Issued June 29, 2017)

41.1 Letter application entitled "Mount Polley Mine Reclamation Security Installment Schedule", prepared by Mount Polley Mining Corporation, dated June 22.

Applications Received: June 22, 2017

42. Approving Reclamation and Closure Plan (Issued December 10, 2020)

42.1 Application entitled "Mine Reclamation and Closure Plan Update January 2017", prepared by Mount Polley Mining Corporation, dated January 15, 2017.
42.2 Report entitled "ML/ARD Management Procedure Manual", prepared by Mount Polley Mining Corporation, dated January 5, 2016.
42.3 Report entitled "Actiflo – Operation & Maintenance Manual Mount Polley", prepared by Veolia Water Technologies Canada Inc., dated January 2016.
42.4 Report entitled "Mount Polley WWTP, BC – Operation and Maintenance Manual Volume 2" prepared by Veolia Water Technologies Canada Inc., dated January 2016.

Application Received: January 16, 2017
Application Referred: April 5, 2017

Mine Development Certificate 92-13 was issued for this project by the Minister of Energy, Mines and Petroleum Resources, with the concurrence of the Minister of Environment, Lands and Parkes under the authority of the former *Mine Development Act* on October 6, 1992. On June 30, 1995 the *Environmental Assessment Act* (the Act) came into force. Section 93(8) of the Act deemed that Mine Development Certificate 92-13 was issued under the Act and as such, the certificate continued to be in force as Project Approval Certificate M96-07 pursuant to the *Environmental Assessment Act* R.S.B.C 1996, C.119.

This permit contains the requirements of the Ministry of Energy, Mines and Petroleum Resources. It also is compatible, to the extent possible, with the requirements of other provincial ministries. However, nothing in this permit limits the authority of other provincial ministries to set other conditions, or to act independently, under their respective permits and legislation.

Decisions made pursuant to this permit by staff of the Ministry of Energy and Mines will be made following consultation with the Williams Lake First Nation, Xat'sull First Nation (Soda Creek Indian Band), other provincial ministries and federal departments and agencies, as appropriate, within reasonable timeframes.

The mine is located in the asserted traditional territory of the Williams Lake First Nation and Xat'sull First Nation. Representatives of the Williams Lake First Nation and Xat'sull First Nation participated in the CMDRC meetings and extensive discussions of the application.

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CONDITIONS

The Chief Permitting Officer hereby approves the Mine Plan and Reclamation Program as submitted in the Application(s), subject to compliance with the following conditions:

A. General

1. Compliance with *Mines Act* and Code

The Permittee shall ensure all work is in compliance with all sections and parts of the *Mines Act* and the Health, Safety and Reclamation Code for Mines in B.C. (Code), and the Permittee shall obey all orders issued by the Chief Inspector of Mines (Chief Inspector) or their delegate.

2. Permit Approval

(a) The Permittee is authorized under this permit (M-200) for development, including surface disturbance and works, encompassing approximately 1744 Ha (Figure 1 – Permitted Mine Area). The Permittee is not approved to develop borrow sources located outside of the permitted mine area.

(b) The Permittee is authorized under this permit (M-200) to conduct surface mining only in Cariboo-Springer Pit Phase 4.

(c) The Permittee is authorized under this permit (M-200) to conduct underground mining only in the Boundary, Zuke, and Halo Zones.

(d) The Permittee shall ensure that, on an annual average basis, the ore production rate does not exceed 22,450 tonnes per day.

3. Permit

This Permit is not transferable or assignable.

4. Maintenance of Mine

The Permittee shall maintain mine facilities and infrastructure in a manner to meet design objectives, environmental protection requirements and reclamation requirements.

5. Reports to be signed by a Qualified Professional

Unless otherwise approved in writing by the Chief Inspector or the Chief Inspector's delegate, the Permittee shall ensure all reports required to be submitted under this permit are signed by a qualified professional with applicable experience and registered in the province of British Columbia.

6. Responsibility to Reclaim

The Permittee shall assume responsibility for any outstanding reclamation associated with Exploration Permit MX-Gen-78 that exists within the permitted mine area for the Mount Polley Mine, defined in Figure 1, under the terms and conditions of this permit.

7. Information Sharing

Unless otherwise requested by the Chief Inspector or the Chief Inspector's delegate, the Permittee shall provide to the Williams Lake First Nation, Xat'sull First Nation, Cariboo Regional District, and the community of Likely through the Likely and District Chamber of Commerce all material reports and plans required to be submitted under this permit, including annual monitoring reports.

9. Compliance Status Report

The Permittee shall track compliance status of all permit conditions and inspection orders in a form acceptable to the Chief Inspector. The Permittee shall maintain an up-to-date tracking table on site. The Permittee shall ensure that the tracking table is available at the mine site at all times and to a Mines Inspector upon request. The Permittee shall prepare and submit an annual Compliance Status report to the Chief Inspector by March 31st and shall include a summary of outstanding non-compliance issues and an action plan, to the satisfaction of the Chief Inspector, for achieving compliance.

B. Health and Safety

1. Mine Emergency Response Plans (MERP)

(a) The Permittee shall update the Mine Emergency Response Plan (MERP). The Permittee shall submit the updated MERP by March 31, 2021, to the satisfaction of the Chief Inspector. The Permittee shall keep the MERP up to date, with updates filed with the Chief Inspector, and be made available at the mine site at all times.

(b) The Permittee shall ensure that mine site employees and contractors are knowledgeable and accountable for fulfilling the actions of the MERP.

C. Geotechnical

1. General

(a) The Permittee shall ensure that all geotechnical designs, specifications, work plans, monitoring requirements and reports required to be prepared under section (C) are:

(i) Signed by a Professional Engineer and are submitted to the satisfaction of the Chief Inspector; and

(ii) Maintained on site and made available to any Inspector of Mines, upon request.

(b) The Permittee shall ensure construction is completed under the supervision of a Professional Engineer and that sufficient field reviews have been conducted to ensure that facilities are built in general conformance with the design, accepted engineering practices, and the Code.

(c) The Permittee shall ensure recommendations by a Professional Engineer, relating to health and safety, geotechnical stability or environmental protection are followed, unless a suitable alternative course of action is approved in writing by a Professional Engineer.

(d) The Permittee shall submit an Advice of Geotechnical Incident form to the Chief Inspector for any geotechnical incident that is classified as a dangerous occurrence or any other incident as described in the current EMPR Advice of Geotechnical Incident form.

2. Underground Mine

(a) Design

The Permittee shall ensure underground development is conducted in accordance with the permitted design and recommendations prepared by a Professional Engineer.

(b) Operations

(i) Prior to commencing any rehabilitation, new development, or stoping, the Permittee shall ensure geological and geotechnical mapping is undertaken to verify and, if required, update the assumptions used in the preliminary support designs.

(ii) The Permittee shall install ground control in accordance with the recommendations of a Professional Engineer.

(iii) The Permittee shall dimension all excavations and pillars as per the recommendation of a Professional Engineer.

(iv) The Permittee shall not commence construction of any underground dams or bulkheads until Issued for Construction (IFC) drawings and specification are submitted to the Chief Inspector.

(v) The Permittee shall ensure that the following are assessed prior to re-commencing underground mining:

(i) Conditions and stability of all active areas of the mine;

(ii) Stability of all stopes and the potential for caving to impact mine infrastructure; and

(iii) Stability of the stope bulkheads and verify design assumptions related to water inflow/outflow and hydraulic head remain valid.

(c) Monitoring

(i) The Permittee shall develop, maintain, and implement a Ground Control Management Plan consistent with industry standards.

(ii) The Permittee shall ensure the Ground Control Management Plan is updated at minimum annually, or more frequently as conditions warrant, by a Professional Engineer.

(iii) The Permittee shall ensure that ground control monitoring is recorded in the Daily Examination and Record Book and ensure that the Daily Examination and Record Book are made available to any Inspector of Mines upon request.

(iv) The Permittee shall ensure that the Daily Examination and Record Book is read and signed each day by the shiftboss and the Mine Manager or mine engineer designated by the Mine Manager.

(d) Reporting

The Permittee shall ensure an annual review and inspection of the underground workings is undertaken, and observations and recommendations made during the review and inspection are summarized in a report. The Permittee shall submit this report to the Chief Inspector by March 31 of the year following the review and inspection.

3. Surface Pits

(a) Design

The Permittee shall ensure surface pit development is conducted in accordance with the permitted design and recommendations prepared by a Professional Engineer.

(b) Operations

(i) The Permittee shall ensure that the pit slope design is reviewed annually by a registered Professional Engineer with experience in the design of pit slopes.

(ii) The Permittee shall develop and implement a design for controlled production blasting to minimize blast damage at and near the final pit wall and all interim pit walls employing multi-benching, and all interim pit walls that will be left in place for more than 12 months.

(iii) The Permittee shall ensure that surface water is diverted away from the pit slopes.

(iv) The Permittee shall map geological units as they are exposed, and the Permittee shall ensure that the mapping is reviewed by a Professional Engineer to confirm and refine the recommended pit designs

(v) The Permittee shall carry out groundwater monitoring and depressurization of the pit walls during mining as required by the pit design engineer.

(c) Monitoring

(i) The Permittee shall ensure that the open pit monitoring plan is reviewed and updated annually in conjunction with the annual open pit inspection, or more frequently as conditions warrant.

(ii) The Permittee shall ensure that an open pit monitoring and instrumentation program is developed and implemented as soon as mining commences in the pits. The Permittee shall ensure that the monitoring and instrumentation program shall:

(a) Be designed to verify acceptable performance, detect early signs of instability, and confirm design assumptions;
(b) Include details of instrumentation, monitoring frequency, trigger thresholds, and trigger response criteria; and,

(c) Be developed in consultation with the pit design engineer and approved by the pit design engineer.

(iii) The Permittee shall maintain on-site inspection, monitoring, and instrumentation records and make such records available to an Inspector of Mines upon request.

(d) Reporting

The Permittee shall ensure an annual review and inspection of all surface pits is undertaken and observations and recommendations made during the review and inspection are summarized in an annual pit slope performance report. The Permittee shall submit this report to the Chief Inspector by March 31 of the year following the review and inspection.

4. Waste Rock Dumps

(a) Design

(i) The Permittee shall ensure waste rock dumps are developed in accordance with the permitted design and recommendations prepared by a Professional Engineer.

(ii) The Permittee is authorized to construct the Northwest (NW) Temporary PAG stockpile to a maximum elevation of 1150 m.

(iii) The Permittee is authorized to store a maximum of 3 million tonnes of ore in the High-grade Ore Stockpile (Caribou Stockpile) to a maximum elevation of 1110 m.

(iv) The Permittee is authorized to construct the Northeast Dump to a maximum elevation of 1066 m.

(v) The Permittee is authorized to construct the Southeast Rock Disposal Site (SERDS) to a maximum height of 140 m.

(b) Operations

(i) The Permittee shall ensure foundation preparation work for all waste rock dumps is completed as recommended by a Professional Engineer to provide a stable foundation for waste rock dump construction.

(ii) The Permittee shall ensure that a foundation inspection is completed by a

Professional Engineer prior to waste rock dump construction to confirm that unsuitable materials have been removed from the footprint area and the foundation is suitable and as required by the design.

(iii) The Permittee shall ensure that no weak, cohesive materials or snow is dumped on the outside edge of the waste rock dump platforms, unless approved by a Professional Engineer.

(iv) The Permittee shall ensure waste rock dump platforms are constructed with a slope that promotes surface water drainage away from the waste rock dump face.

(v) The Permittee shall ensure that a catch-bench of suitable width, or a designed impact berm, is established for boulder rollout protection in areas where waste rock dumps are to be constructed above active work areas or active roads.

(c) Monitoring

(i) The Permittee shall develop and implement a waste rock dump monitoring program for all waste rock dumps.

(ii) The Permittee shall ensure that the waste rock dump monitoring program includes:

(a) Quantitative performance objectives (QPOs);
(b) Tracking of advance rates in critical areas;
(c) Rock quality monitoring where required (i.e. bog crossing);
(d) Monitoring frequencies;
(e) Frequency of engineering review of data;
(f) Trigger-Action-Response plans (TARPs);
(g) Monitoring data storage procedures;
(h) Frequency of operational review and trigger threshold review;
(i) Frequency of 3rd party data auditing; and
(j) All other parameters recommended by the Professional Engineer.

(iii) The Permittee shall ensure that waste rock dump development and monitoring is completed in accordance with the waste rock dump monitoring program.

(iv) The Permittee shall ensure that the waste rock dump monitoring program is reviewed annually and updated as conditions warrant, or as directed by the Chief Inspector. The Permittee shall submit the waste rock dump monitoring program to the Chief Inspector when updates are made.

(d) Reporting

The Permittee shall ensure that waste dump design and stability performance for all dumps are reviewed annually and that this review includes an inspection of all dumps. The Permittee shall submit an annual report documenting the review of waste dump design and stability performance to the Chief Inspector by March 31st of the year following review and inspection.

5. Tailings Storage Facility

(a) Design

(i) The Permittee is authorized to construct the tailings storage facility (TSF) to an elevation of 970 m per the permitted design.

(i) The Permittee shall ensure that the Operations, Monitoring and Surveillance Manual includes quantitative performance objectives (QPOs) and Trigger Action Response Plans (TARPs).

(ii) The Permittee shall ensure that the required minimum freeboard is defined by the Engineer of Record and included in the QPOs. The Permittee shall ensure that the TSF Emergency Preparedness and Response Plan (EPRP) includes plans to restore normal operating pond level should it be exceeded.

(b) Operations

The Permittee shall ensure that the Tailings Storage Facility (TSF) is constructed, operated, maintained and monitored in conformance with the design, the specifications, the OMS manual, the Code, this Permit, and accepted industry practice.

6. Surface Water Ponds, Ditches and Diversions

(a) The Permittee shall not commence construction of surface water ponds and ditches that carry mine-influenced water until IFC drawings, signed by a Professional Engineer, are submitted to the Chief Inspector. This condition does not apply to temporary diversion channels required to facilitate construction.

(b) The Permittee shall ensure that surface water ponds, ditches and diversion channels are designed to convey the design flood without overtopping, without side slope failure, and with adequate armour or lining to prevent significant erosion.

(c) The Permittee shall design all surface water ponds and ditches that impound or carry mine-influenced water with a minimum 0.3 m freeboard under the design flood. The

Permittee shall choose the design flood with consideration of the consequence of failure and duty life of the structure but shall ensure no less than the 1:200 year peak flow event.

(d) The Permittee shall submit an "As-Built" report to the Chief Inspector for all surface water ponds, ditches and diversion channels by March 31 of the year following completion of construction. The Permittee shall ensure that the report certifies that each facility has been constructed in accordance with the design and the applicable guidelines.

(e) The Permittee shall ensure that all surface water ponds, ditches and diversion channels are inspected, at minimum, annually.

7. Soil, Overburden, Rock and Ore Stockpiles

The Permittee shall ensure that all soil, overburden, rock and ore stockpiles are constructed in accordance with designs prepared by a Professional Engineer and are constructed and inspected to ensure stability and erosion control is maintained, unless exempted in writing by the Chief Inspector.

8. Borrow Pits and Quarry Excavations

The Permittee shall ensure that borrow and quarry excavations are constructed in accordance with designs prepared by a Professional Engineer and are constructed and inspected to ensure stability and erosion control is maintained.

9. Mine Site Roads

(a) The Permittee shall ensure that mine roads are constructed in accordance with designs prepared by a Professional Engineer and are constructed and inspected to ensure stability and erosion control is maintained.

(b) The Permittee shall ensure that road cuts and fills in excess of 6 m height (if any) are designed by a Professional Engineer.

(c) Where necessary to ensure geotechnical stability, the Permittee shall ensure that the footprint of fill slopes are stripped of organics and topsoil and/or have the fill toe "keyed-in" to original ground. For slopes exceeding a gradient of 15 degrees, the Permittee shall ensure that the prepared foundation of fill slopes in excess of 10 m height are inspected by a Professional Engineer prior to fill placement.

(d) The Permittee shall ensure that "As-Built" drawings are prepared within three months of completion. The Permittee shall ensure that the "As-Built" drawings and records are filed on-site.

10. Mine Site, Plant, Shop, and Other Infrastructure

(a) The Permittee shall ensure that all building foundation designs address bearing capacity, potential settlement, and any necessary foundation preparation or treatment. The Permittee shall ensure that foundation designs and "As Built" records are filed on-site.

(b) The Permittee shall ensure an inspection of the prepared excavation prior to the placement of permanent foundations is completed with a record of the inspection filed on-site and made available to any Inspector of Mines upon request.

D. Protection of Land and Watercourses

1. Environmental Management System

(a) The Permittee shall implement an Environmental Management System (EMS) consisting of Environmental Management Plans (EMPs) and SOPs. The Permittee shall ensure the EMS reference relevant policies and establish proactive procedures to provide direction for effective operational management and monitoring on-site.

(b) The Permittee shall ensure the EMS is reviewed annually and revised as required. The Permittee shall make the EMS available at the mine site at all times and to an Inspector of Mines upon request. The Permittee shall include the findings of the annual EMS review in the Annual Reclamation Report.

(c) The Permittee shall ensure that mine site employees and contractors are knowledgeable and accountable to act consistently with the requirements of the EMPs and SOPs that form the EMS.

2. Environmental Site Management

(a) The Permittee shall ensure that a qualified Environmental Site Manager is assigned.

(b) The Permittee shall ensure that the Environmental Site Manager has authority to implement any remedial actions to ensure maintenance of environmental standards and permit requirements. If suspension of construction or operations occurs due to environmental concerns, the Permittee shall immediately notify the Chief Inspector.

3. Metal Leaching (ML) and Acid Rock Drainage (ARD)

(a) General

(i) The Permittee shall ensure the all materials with the potential to generate metal leaching and acid rock drainage (ML/ARD) are placed in a manner that minimizes the production and release of metals and contaminants.

(ii) The Permittee shall ensure that, unless otherwise approved, all plans for the prediction, and if necessary, the prevention, mitigation, and management of ML/ARD are prepared in accordance with the *Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia* (1998).

(iii) The Permittee shall not make changes to the criteria for ML/ARD definition, waste handling procedures, mitigation strategies, or materials monitoring programs without the written approval of the Chief Inspector.

(b) Definition of Potentially ARD Generating (PAG) and Metal Leaching (ML) Materials

(i) The Permittee shall calculate Neutralization Potential (NP) using total inorganic carbon (TIC).

(ii) The Permittee shall calculate acid potential (AP) using Total Sulphur (TS).

(iii) The Permittee shall classify all waste rock, quarry rock, borrow materials and tailings as potentially acid generating (PAG) if they have a NP/AP ratio of less than 2.0.

(iv) The Permittee shall consider all waste rock or borrow materials containing soluble metal levels (as determined by shake flask test) higher than the receiving water objectives as having a potential for metal leaching.

(c) Mine Materials Handling and ML/ARD Mitigation

(i) Waste Rock

(a) The Permittee shall only permanently dispose of PAG waste rock in the Cariboo, combined Cariboo/Springer, Wight, and Southeast Zone pits. The Permittee shall ensure that the PAG waste rock is permanently submerged beneath a water cover.

(b) The Permittee may store a maximum of 62 million tonnes of PAG waste rock in the Temporary NW PAG Stockpile.

(c) The Permittee shall permanently dispose of all PAG waste rock stored in the Temporary NW PAG dump by back filling the material into the Cariboo/Springer Pit, by December 31, 2027.

(d) The Permittee shall ensure that isolated pockets of PAG materials (less than 1,000 tonnes) are blended with non-PAG materials within the waste rock dumps, at a minimum non-PAG:PAG ratio of 20:1.

(ii) Quarry Rock

The Permittee shall only use quarry rock with a NP/AP greater than 2.0 and total Cu solid concentration less than 180 mg/kg for construction of the TSF.

(iii) Tailings

(a) The Permittee shall not cyclone PAG tailings to make sand for dam construction.

(b) The Permittee may cyclone tailings with an NP/AP ratio greater than 2.0

(c) The Permittee may only use cyclone tailings for construction of the following TSF components:

(i) The upstream and downstream faces of the Perimeter Embankment;
(ii) The upstream side of the Main Embankment; and
(iii) The maintenance of a till core in the Perimeter and Main Embankments.

(iv) Low-grade Ore

The Permittee shall develop and assess contingency reclamation plans for the ore stockpiles in the event they remain in place at closure. These plans shall be presented in detail in the Mine Plan and Reclamation Program update in accordance with permit condition E.13.

(v) Test Heap Leach Facility

The Permittee shall provide a report that includes a detailed plan and timeline for the removal of the test heap leach facility and all stockpiled sulphur by June 30, 2021, to the satisfaction of the Chief Inspector. The Permittee shall ensure the plan includes, but is not limited to, the removal and disposal of the leached ore, sulphur stockpile, waste rock, contaminated soil, reagents or chemicals, and all associated infrastructure.

(d) ML/ARD Operational Monitoring

(i) The Permittee shall implement the ML/ARD Management Procedure Manual (Document 42.2), including SOPs, as required.

(ii) The Permittee shall implement the quality assurance / quality control (QA/QC) program included in the ML/ARD Management Procedure Manual.

(iii) The Permittee shall ensure that all personnel involved in waste rock mining and handling, and tailings segregation and handling are trained and kept up to date on the content and implementation of the ML/ARD Management Procedure Manual.

(e) On-Site Laboratory and Confirmation Testing

The Permittee shall include QA/QC results from the on-site laboratory in the Annual Reclamation Report.

(f) ML/ARD Reporting

The Permittee shall report the results of all the ML/ARD analytical test work, detailed in the ML/ARD Management Procedure Manual in the Annual Reclamation Report. The Permittee shall assess any significant changes or trends in the results, compared to the overall dataset, discuss implications for materials handling, and propose changes to the ML/ARD Management Procedure Manual, if required.

4. Surface and Ground Water Management and Monitoring

(a) The Permittee shall develop and implement a Water Management Plan. The Permittee shall track changes to surface water, seepage, and groundwater quality and quantity on the mine site. The Permittee shall ensure that the program is capable of providing early warning about the onset of ML/ARD or an increase in contaminant loading. The Permittee shall ensure that the plan is submitted by March 31, 2021, to the satisfaction of the Chief Inspector.

(b) The Permittee shall not make any significant changes to the Water Management Plan without the written approval of the Chief Inspector. Significant changes include removal of monitoring sites, or changes to monitored parameters.

(c) The Permittee shall ensure that detection limits are sufficient to compare to water quality standards and permit requirements established by the British Columbia Ministry of Environment and Climate Change Strategy (ENV).

(d) The Permittee shall ensure that an effective QA/QC program for the surface water, groundwater, and seepage monitoring programs is included and implemented as part of the Water Management Plan. The Permittee shall ensure that this includes detection limits, performance criteria that define acceptable levels of precision and accuracy and reporting of any missed sampling events.

(e) The Permittee shall ensure that monitoring results of surface water, groundwater, and seepage quality and quantity are kept up to date in a dedicated database available for review by an Inspector of Mines upon request. The Permittee shall ensure that water quality monitoring results, including interpretation of results, are reported and assessed in the Annual Reclamation Report. The Permittee shall ensure that any significant changes or trends in water quality or quantity are discussed, and those that require additional evaluation and management are identified in the report.

(f) The Permittee shall include a table comparing relevant monitoring and test work data to source term concentrations used in water quality predictions in the Annual Reclamation Report. The Permittee shall ensure that the implications of the results to source term refinement, water quality mitigation, and adaptive management are discussed in the report.

5. Model Validation and Updated Water Quality Predictions

(a) During operations, the Permittee shall refine the inputs and assumptions for water quality predictions based on site-specific performance information.

(b) The Permittee shall update the water balance model, water quality model and groundwater model every five years, beginning in 2022, as part of the Mine Plan and Reclamation Program update required under condition E.13, or more frequently as necessary to inform mine planning and mitigation design and engineering.

6. Water Treatment

(a) Operation

(i) The Permittee shall ensure that no changes are made to the water treatment process without the approval of the Chief Inspector.

(ii) The Permittee shall update the WTP OMS Manual (Document 42.3 and Document 42.4) as procedures are modified. The Permittee shall submit updated versions to the Chief Inspector.

(b) Monitoring and Reporting

(i) The Permittee shall monitor, track and report, in the Annual Reclamation Report, information on the performance of the water collection and treatment system. The Permittee shall ensure that the information includes system performance, volume and water quality of drainage inputs and outputs of the water treatment system, volumes of reagents used, volumes and characteristics of waste generated, and information on any process changes.

(ii) The Permittee shall ensure that the Annual Reclamation Report includes a breakdown of all annual costs associated with operation of the Water Treatment Facility. The Permittee shall include all major cost items including labour, electricity, waste handling and storage, and all delivered costs for diesel, lime, reagents, etc. in the Annual Reclamation Report.

(c) Research

(i) The Permittee shall provide a workplan and implementation schedule for the research, development, piloting, and implementation of proposed closure water treatment system(s) for contact water at the Northwest Sump, 9K Sump, and South Toe Drain, by March 31, 2021, to the satisfaction of the Chief Inspector.

(ii) The Permittee shall ensure a detailed summary of all water treatment technology research, conducted each year, is provided on an annual basis in the Annual Reclamation Report. The Permittee shall ensure that this summary includes, but is not limited to, a description of each technology, results, and a discussion of the outcomes, recommendations, and next steps of the research.

7. Fugitive Dust Management

(a) The Permittee shall implement the Fugitive Dust Management Plan (Document 42.1) to the satisfaction of the Chief Inspector, to effectively control dust emissions from the Mine Facilities and access roads.

(b) The Permittee shall ensure that the Fugitive Dust Management Plan is reviewed annually and updated as procedures are modified to reflect site-specific considerations. The Permittee shall report annual updates and monitoring results in the Annual Reclamation Report and ensure that substantive changes provided to the Chief Inspector prior to implementation.

(c) In the event that airborne dust from the site is reported to be a nuisance, the Permittee shall implement immediate remedial action to mitigate the airborne dust.

8. Sediment and Erosion Control

(a) The Permittee shall implement the Erosion and Sediment Control Plan (Document 42.1).

(b) The Permittee shall ensure that the Erosion and Sediment Control Plan is reviewed annually, and updates reported in the Annual Reclamation Report. Substantive changes shall be provided to the Chief Inspector prior to implementation.

(c) The Permittee shall ensure inspections are conducted at stream crossings, contact and non-contact water management structures, snow dumps, and the tailings rock storage facility daily during rain events and the snowmelt period on the mine site. Where excessive sediment laden runoff is observed, the Permittee shall implement immediate remedial action.

(d) The Permittee shall appropriately characterize any significant releases of sediment-laden water, defined as an unauthorized discharge to the receiving environment, with respect to extent and loading, and report it to the Chief Inspector.

(e) The Permittee shall ensure the characterization of unauthorized discharges of sediment-laden run-off include, at a minimum, flow, total suspended solids, turbidity, pH, conductivity, temperature, dissolved oxygen, and total and dissolved metals, of both the effluent and the receiving water.

9. Soil Salvage and Stockpiling

(a) The Permittee shall by implement the Soil Management Plan (Document 42.1).

(b) The Permittee shall salvage and stockpile topsoil, overburden, and organic material, including large woody debris, for use in reclamation.

(c) The Permittee shall ensure that a Qualified Professional monitors and directs sampling, soil salvage, segregation, and stockpiling activities on-site.

(d) The Permittee shall ensure that materials salvaged for use in reclamation are segregated based on salvage origin and measured suitability for reclamation purposes. Prior to mixing with other sources and/or applying on-site, the Permittee shall characterize and evaluate the suitability for reclamation any materials with the potential to be contaminated.

(e) The Permittee shall maintain an inventory of stockpiles of salvaged soil, overburden, and organic matter, including large woody debris, specifying the locations, origins, and quantities of material. The Permittee shall report this information in the Annual Reclamation Report.

(f) The Permittee shall protect stockpiles from erosion, degradation, and contamination through revegetation and/or other practices.

(g) The Permittee shall ensure that stockpiles are clearly marked to ensure that they are protected during construction and mine operations.

(h) The Permittee shall not use soil suitable for use in reclamation as fill.

10. Biosolids Management

(a) The Permittee shall develop a Biosolids Storage and Management Plan. The Permittee shall submit the plan by March 31, 2021, to the satisfaction of the Chief Inspector.

(b) The Permittee shall ensure that the importation to site and use of biosolids are reported in the Annual Reclamation Report, including, but not limited to, volumes, material characteristics, storage locations, testing and monitoring.

11. Vegetation Management

(a) The Permittee shall implement the Invasive Plant Management Plan. (Document 42.1).

(b) The Permittee shall limit disturbance to vegetation to those areas approved by this permit (Figure 1).

(c) The Permittee shall manage and control weeds that establish on the site and shall ensure that weeds do not migrate from the site to adjacent areas. The Permittee shall consider using non-toxic means for weed control. The Permittee shall ensure that all seed used on-site is certified weed free.

(d) The Permittee shall not burn or dispose of woody debris suitable for use in reclamation.

12. Wildlife Protection

(a) The Permittee shall develop a Wildlife Management Plan. The Permittee shall submit the plan by March 31, 2021, to the satisfaction of the Chief Inspector.

(b) Pursuant to Part 1.6.9 of the Code, the Permittee shall incorporate in the mine safety program a no hunting and shooting policy for the mine permit area (Figure 1).

(c) The Permittee shall implement a policy of no fishing and hunting for all employees and contractors while on company business or while commuting to and from the mine.

(d) The Permittee shall ensure that, where wildlife exclusion fencing (e.g., electric fencing) is installed, it is maintained in effective working order at all times that people are present on site.

13. Archaeological Resources

(a) Prior to beginning any mechanized surface disturbance on undisturbed lands, the Permittee shall conduct field surveys consistent with archaeological and cultural heritage resources management procedures consistent with the provisions of the BC Heritage Conservation Act.

(b) For those sites which cannot be avoided, the Permittee shall contact the Archaeological Permitting Section of the Ministry of Forests, Lands and Natural Resource Operations and Rural Development and make arrangements to scientifically excavate and record findings.

14. Ongoing Reclamation Research

(a) The Permittee shall submit to the Chief Inspector by March 31, 2021, a Reclamation Research Program that includes details for achieving the research requirements outlined in this permit with a schedule for implementation and description for how results will be utilized and reported.

(b) The Permittee shall ensure a detailed summary of all research being conducted under this section is provided in the Annual Reclamation Report and the Mine Plan and Reclamation Program Updates, including description of activities, results, and outcomes.

(c) The Permittee shall conduct research to inform closure water management strategies and identify post-closure maintenance and contingency requirements.

(d) The Permittee shall conduct research to determine the viability of revegetation with native plant species, including culturally important species.

(e) The Permittee shall conduct research intended to develop an end land use plan for the post-closure landscape represented in the mine disturbance footprint that is based on pre-mining ecosystems and habitats. Where a discrepancy in the comparative areas represented by ecosystem types is identified, the Permittee shall develop mitigation options.

(f) The Permittee shall, at a minimum 60 days prior to the start of construction, complete mitigation planning procedures for pre-mining habitats (terrestrial and aquatic) identified in the permit boundary (Figure 1) that are predicted to be lost or substantially changed (physically or functionally) due to direct mining activities or subsidence. Contingency plans shall be developed as part of this mitigation planning process that can be implemented in the event that on-site mitigation options are deemed to not be feasible based on ongoing monitoring and research results.

(g) The Permittee shall conduct research intended to inform design of and to test potential mitigation options for restoring ecosystems and habitats that are predicted to be affected by mining activities.

(h) The Permittee shall establish test plots that will be used to evaluate the reclamation approaches and prescriptions applied to confirm that ecological trajectories consistent with the land use and capability targets are being achieved.

(i) The Permittee shall conduct research to inform the development of a soil replacement plan that is designed to achieve land capability and end land use objectives. If a shortfall of soil volumes is anticipated, the Permittee shall develop contingency plans, including the identification of potential sources of borrow material for use in reclamation. The Permittee must collect information on potential borrows including location, size, and soil characterization.

(j) The Permittee shall conduct research to inform reclamation prescriptions for the TSF, such that it will meet end land use and land capability objectives.

(k) The Permittee shall conduct research to assess decompaction methodologies to ensure that the severity of compaction that exists prior to commencing reclamation activities is effectively addressed in a manner intended to achieve end land use objectives and erosion control.

(l) The Permittee shall conduct geomorphic landform and run-off modeling assessments in order to identify opportunities to shape landforms in a manner that optimizes surface water pathways and soil moisture regimes, reduces infiltration through spoil materials, and enhances erosion control and habitat function and connectivity.

(m) The Permittee shall develop and implement a monitoring program designed to evaluate the success of revegetation, habitat restoration, soil development and erosion control. The Permittee shall include in this program ecosystem-specific sampling parameters and performance criteria, which the Permittee shall base on pre-mining ecosystem benchmarks.

(n) The Permittee shall develop and implement a monitoring program for evaluating metal uptake in exposed terrestrial and aquatic ecosystems, which specifies sampling requirements and performance criteria. Where harmful levels are found, the Permittee shall take any corrective action necessary to mitigate to ensure levels are safe for plant and animal life.

(o) The Permittee shall undertake study programs to evaluate the cumulative effects of fertilization on total nutrient loading and impacts to receiving waters.

15. Ecological Risk Assessment

The Permittee shall develop and implement a plan to conduct an ecological risk assessment to evaluate the pathways for uptake of metals for receptors relevant to the end land use objectives for the site and identify any closure remediation activities and long-term monitoring requirements needed to address potential risks identified. The Permittee shall ensure that this plan is developed in consultation with the Ministry of Environment and Climate Change Strategy, Williams Lake First Nation, and Xat'sull First Nation. The Permittee shall ensure that he ecological risk assessment results and interpretations are used to inform closure requirements and are included in the Mine Plan and Reclamation Program Update required under condition E.13.

E. Reclamation and Closure Program

1. Reclamation Security

(a) The Permittee shall maintain a total security for this permit of Thirty One Million Three Hundred and Fifty Thousand, Six Hundred and Eleven dollars ($31,350,611.00). The security will be held by the Minister of Finance for the proper performance of the approved program and all the conditions of this permit in a manner satisfactory to the Chief Inspector.

(b) Notwithstanding the security posted as a condition of this Permit, the Permittee remains responsible for covering all closure and reclamation costs associated with reclamation and environmental protection.

2. Land Use

(a) The Permittee shall ensure the land surface is reclaimed with the intent of re-establishing average pre-mining capability to the following end land use objectives: forest cover, wildlife habitat, hunting, trapping, guide outfitting, grazing recreation, and opportunities for traditional use of the land by the Williams Lake First Nation and Xat'sull First Nation.

(b) The Permittee shall ensure that compensation for loss of wetland habitat is provided by replacement with equivalent habitat capability.

(c) The Permittee shall reclaim all borrow pits and quarries belonging to the mine development and operations to the approved end land use, once no longer required.

3. Erosion Control

The Permittee shall achieve reduction of erosion through landform configuration, development of maintenance-free vegetation covers, and the development of stable, self-sustaining drainage control features and watercourses.

4. Re-vegetation

The Permittee shall ensure the land is revegetated to a self-sustaining state using appropriate and or native plant species including culturally important native species.

5. Growth Medium

(a) The Permittee shall monitor soil replacement operations to ensure the minimum depths are achieved and a confirmation sampling plan shall be developed to ensure quality of soil used for reclamation purposes will achieve end land use objectives. The Permittee shall report all results in the Annual Reclamation Report.

(b) With the exception of areas where closure plans require compaction prior to placement of growth medium in order to reduce infiltration and contact water, the Permittee shall ensure all areas to be reclaimed shall be decompacted to the minimum depth required to adequately address the severity of compaction prior to placement of soil and or vegetation, in a manner intended to achieve end land use objectives and erosion control.

(c) The Permittee shall conduct an assessment to identify contingency options (i.e., alternatives to soil previously stockpiled or salvaged from disturbance footprints approved in this amendment) that can be implemented in the event that available soil volumes on site are insufficient. The Permittee shall ensure that this includes a survey and assessment of additional resources of soil materials that could be used.

(d) The Permittee shall removal all PAG material from temporary waste rock and ore stockpile base pads, prior to placement of growth medium and revegetation.

(e) The Permittee shall include a plan to appropriately address soil quality deficiencies by application of organic or inorganic amendments in the Mine Plan and Reclamation Program update required under Condition E.13.

6. Contaminated Sites Assessment

(a) Prior to reclamation of the fuel and hydrocarbon dispensing and storage areas, Explosives Storage areas, and the temporary Ore and PAG Stockpiles, or other areas where contamination may have occurred during mining operations, the Permittee shall develop monitoring programs designed to assess soil contamination and inform remediation plans to ensure success of subsequent reclamation activities.

(b) At least 3 months prior to decommissioning contaminated areas, the Permittee shall develop, and submit to the Chief Inspector for approval, a closure plan that addresses the remediation requirements.

7. Surface Water Management Ponds and Channels

(a) The Permittee shall reclaim all surface water management ponds and water diversions to satisfy stability and erosion control requirements and the approved end land use, once no longer required.

(b) At least 3 months prior to decommissioning the water treatment facility, the Permittee shall develop and submit to the Chief Inspector for approval, a closure plan that addresses all non-contact and contact water management features that will no longer be required.

8. Tailings Storage Facility (TSF)

The Permittee shall conduct an assessment of reclamation and closure designs of the TSF. The Permittee shall ensure that the assessment evaluates options for maximizing long-term stability, minimizing long-term monitoring and maintenance requirements, and integrating site-wide land capability and land use objectives. The Permittee shall include the assessment and assessment results in the Mine Plan and Reclamation Program update required under condition E.13. The Permittee shall use the results to inform proposed reclamation prescriptions, post-closure monitoring programs, and the liability cost estimate.

9. Waste Rock Facility

(a) The Permittee shall slope waste rock dumps to a maximum of 2:1 (individual slopes) for final reclamation with appropriate slope breaks (benches) and other features for water management and creation of habitat and aesthetic features.

(b) The Permittee shall prioritize visual impacts and aesthetic values in the final reclamation designs of all waste rock dumps, due to the heavy recreational use of Bootjack Lake and Polley Lake. The Permittee shall include the methods used to reduce visual impacts and restore aesthetic values in the Mine Plan and Reclamation Program Update required by condition E.13.

10. Mine Facility

The Permittee shall conduct an assessment of the closure designs for the underground openings. The Permittee shall ensure that the assessment evaluates options for maximizing long-term stability, minimizing long-term monitoring and maintenance requirements, and consider end land use objectives. The Permittee shall include the assessment and assessment results in the Reclamation and Closure Plan required under condition E.13. The Permittee shall use the results to inform proposed closure prescriptions, post-closure monitoring programs, and the liability cost estimate.

11. Mine Roads

(a) The Permittee shall ensure all mine roads are reclaimed, in accordance with recommendations of a qualified professional, to satisfy the approved end land use objectives, including all reasonable effort to fully re-configure to conform to adjacent landscape where long-term stability is not compromised, unless permanent access is required.

(b) The Permittee may be exempted from the requirement for total reclamation of individual mine roads, required by permit condition E.11(a), if either:

(i) The Permittee can demonstrate that an agency of the Crown has explicitly accepted responsibility for the operation, maintenance and ultimate deactivation and abandonment of the road; or

(ii) The Permittee can demonstrate that another private party has explicitly agreed to accept responsibility for the operation, maintenance and ultimate deactivation and abandonment of the road and has, in this regard, agreed to comply with all the terms and conditions, including bonding provisions, of this reclamation permit, and to comply with all other relevant provincial government (and federal government) regulatory requirements.

12. Temporary Shutdown

If the mine ceases operation, including for seasonal closure, within one month of closure, the Permittee shall submit a Care and Maintenance Plan which describes, documents, and tracks key aspects of the ongoing mitigation, monitoring, and maintenance requirements for the care and maintenance of the site. The Permittee shall ensure the Care and Maintenance Plan documents the outstanding reclamation activities and closure requirements for the site and includes a trigger action response plan, which will be implemented to activate closure activities based on monitoring results and site conditions. The Permittee shall update the Care and Maintenance Plan as required and submit updates to the Chief Inspector.

13. Mine Plan and Reclamation Program Update

On or before December 31, 2022, and every five years thereafter, the Permittee shall develop and submit an updated Mine Plan and Reclamation Program, providing (but not limited to):

(a) The current status of the mine plan and reclamation obligations;
(b) Detailed mine plan for the next five years, and conceptually thereafter until the end of mine life;
(c) Life of mine closure plan and end land use plan;

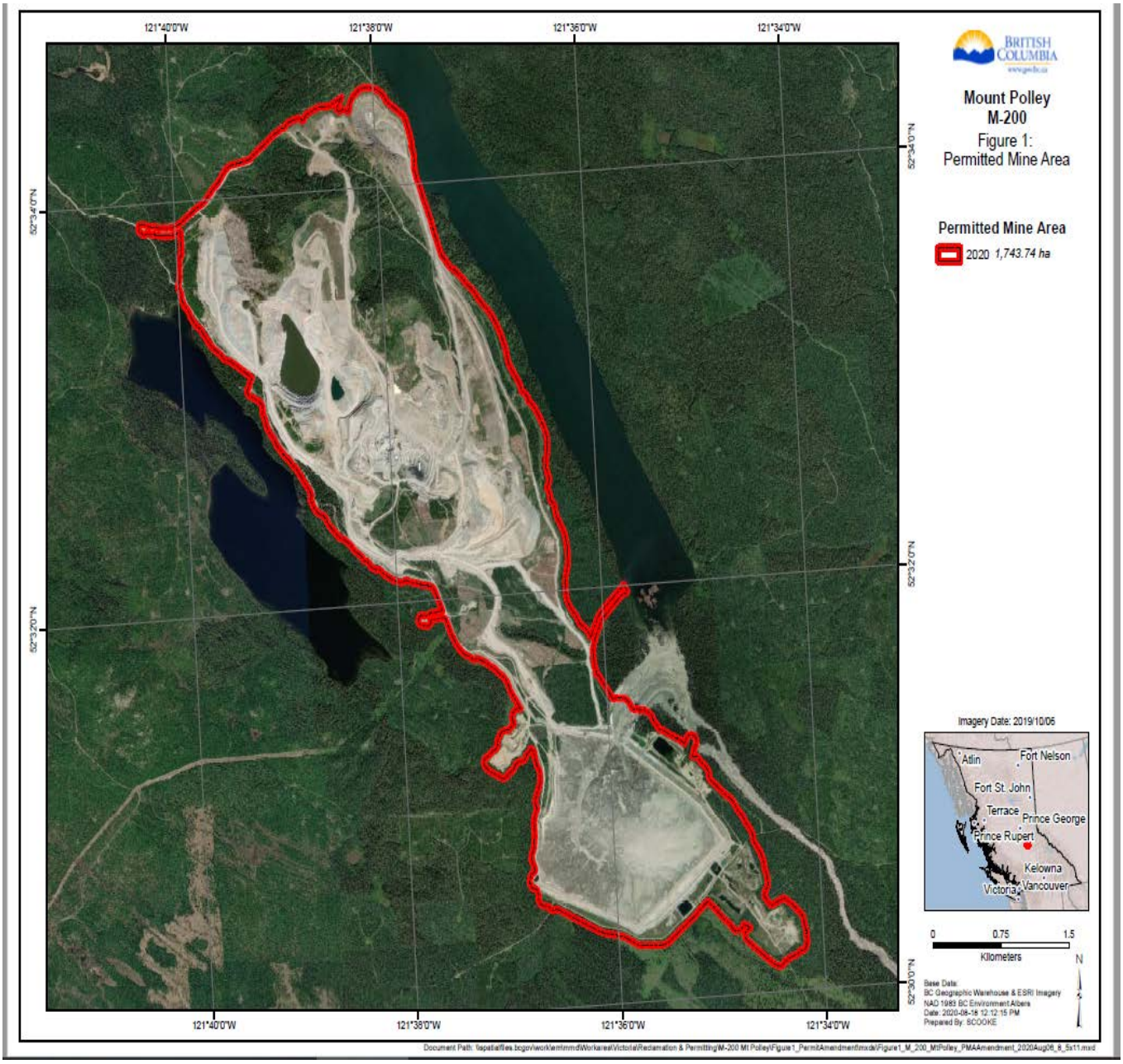
(d) A compilation and interpretation of all monitoring including ML/ARD prediction, water quality and quantity, modelling predictions, soil, vegetation and progressive reclamation programs;
(e) A compilation of ongoing maintenance activities;
(f) A compilation and interpretation of research programs;
(g) A compilation of ongoing contingency/remediation plans; and
(h) A breakdown of outstanding liabilities and associated costs for the approved mine plan.

14. Closure Plan

Twelve months prior to final closure, the Permittee shall develop and submit a Closure Plan describing (but not limited to):

(a) The current status of the mine plan and reclamation obligations based on the approved end land use;
(b) A compilation and interpretation of all monitoring for life of mine, including ML/ARD prediction, water quality and quantity, modelling predictions, soil, vegetation and progressive reclamation programs;
(c) Detailed closure objectives and criteria for each mine component;
(d) Detailed closure and maintenance activities;
(e) A compilation and interpretation of any research program used to inform closure planning strategies;
(f) Detailed contingency/remediation plans;
(g) Detailed schedule for completion of reclamation/closure works;
(h) A Closure Management Manual that details plans for monitoring and maintenance activities for post closure; and
(i) A breakdown of outstanding liabilities and associated costs including activities detailed for remediation and post closure.

Figure 1 – Permitted Mine Area



Appendix V

Metal Leaching and Acid Rock Drainage Management Procedure Update

(Electronic format only)

MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS CORPORATION

ML/ARD MANAGEMENT PROCEDURE MANUAL

OBJECTIVE

The objective of this Metal Leaching/Acid Rock Drainage (ML/ARD) Management Procedure Manual is to provide detail on how ML/ARD potential is considered in material management at the Mount Polley Mine (MPM). This document summarizes all the various procedures and considerations related to ML/ARD potential through mine life processes.

DOCUMENT REVISION HISTORY

This document replaces earlier versions of similar documents that directed ML/ARD Management at MPM in response to *Mines Act* Permit M-200 issued on August 3, 1995. This update reflects requirements outlined in the current M-200 Permit, amended May 3, 2023.

Document Update Summary

Revision Date	Author	Comment
June 30, 2016	Chad Cameron Ben Harding Katie McMahen Luke Moger Ryan Brown Stephen Day (SRK)	Original Document
August 04, 2022	Mathieu O'Leary Gabriel Holmes Aaron Zwiebel (DWB) Shauna Litke (SRK)	Added contacts, water treatment plant waste ML/ARD characterization, QA/QC sampling, and PAG misplacement action plan.
October 23, 2023	Mathieu O'Leary Gabriel Holmes	Updated NPR criterion for Springer Deep and WX Zones, and annual blast fractionation confirmatory sampling.

	Alicia Lalonde (DWB) Shauna Litke (SRK)	

KEY CONTACTS AND QUALIFIED PROFESSIONALS

Numerous personnel at Mount Polley are responsible for carrying out the procedures written in this plan. Key mine personnel and their contact information are as follows.

Name	Role	Phone	Email
Kelly Parker	General Manager	236-800-4771	kelly.parker@mountpolley.com
Don Parsons	Chief Compliance Officer	604-488-2652	don.parsons@imperialmetals.com
Mathieu O'Leary	Technical Services Superintendent	236-317-4938	mathieu.oleary@mountpolley.com
Gary Roste	Senior Mine Geologist	250-991-0438	gary.roste@mountpolley.com
Natalie Henderson	Senior Mine Geologist	236-700-6603	natalie.henderson@mountpolley.com
Gabriel Holmes	Environmental Coordinator	236-317-4939	gabriel.holmes@mountpolley.com
Bill Grieves	Foreman	236-602-3203	bill.grieves@mountpolley.com
Al Trottier	Mill Ops Foreman	236-602-3203	al.trottier@mountpolley.com
Scott Borneman	Assay Supervisor	236-800-3630	scott.borneman@mountpolley.com

Any update to this document is reviewed by a Qualified Professional (QP) in the area of practice of ML/ARD management, as required by *Mines Act* Permit M-200 Condition A.5. Qualified professionals reviewing this document are as follows:

Version	Qualified Professional	Phone	Email
June 30, 2016	Stephen Day, PGeo (SRK)	604-862-4097	sday@srk.com
August 04, 2022	Shauna Litke, PEng (SRK) Stephen Day, PGeo (SRK)	604-235-8542 604-862-4097	slitke@srk.com sday@srk.com
October 23, 2023	Shauna Litke, PEng (SRK) Stephen Day, PGeo (SRK)	604-235-8542 604-862-4097	slitke@srk.com sday@srk.com

BACKGROUND

Metal leaching and acid generation are naturally occurring chemical processes which may have negative impacts on the receiving environment. The potential environmental impact of ML/ARD will depend on their magnitude, the sensitivity of the receiving environment, dilution and/or attenuation, as well as any mitigation measures that are in place.

Metal leaching occurs as a result of weathering of metal-containing minerals (i.e., exposure to water and oxygen), drainage conditions that increase solubility, and flow of water through source materials. Acid generation occurs when minerals containing reduced sulfur (e.g., sulfide and elemental sulfur) are exposed

to the weathering effects of oxygen and water. In iron sulphide minerals (e.g., pyrite) acidity is also generated when ferric iron precipitates. Other minerals in the source rock, primarily calcium and magnesium carbonates can neutralize the acid. ARD occurs when the amount of acid-generation exceeds the ability of the source rock to neutralize this acid. Any surplus acid is entrained in water and can create acidic and metal-containing run-off.

Pre-mining and operational geochemical characterization has shown that ARD potential at MPM is restricted due to the abundance of acid-consuming carbonate minerals compared to acid generating sulphide minerals. In addition, the presence of natural carbonate and oxide copper minerals in the pre-mining weathering zone reinforce the expectation that weathering conditions are dominantly basic. However, due to the potential consequences of acid generation for long term management of the site, Mount Polley Mining Corporation (MPMC) actively manages waste rock based on its ARD potential as described in the following sections.

MPMC has focused on managing potential for ARD due to the link between acid generation and enhanced solubility of copper which is expected to be the primary concern for ML. Selenium leaching has also been identified as occurring at MPM. Selenium is released by oxidation of sulphide minerals, but leaching is not necessarily associated with pH depression. Selenium leaching occurs regardless of whether waste rock is classified as potentially ARD generating (PAG) or non-PAG (referred to as NAG at MPM).

UNDERSTANDING OF THE DISTRIBUTION OF ARD POTENTIAL

Like other alkalic porphyry deposits (e.g., Copper Mountain, Brenda), MPM lacks the strong hydrothermal alteration zoning that is commonly observed in calc-alkalic porphyry deposits (e.g., Highland Valley Copper, Island Copper, Gibraltar). In particular, phyllic alteration is absent at MPM. A common feature of calc-alkalic porphyry deposits is often a pronounced pyritic halo that surrounds the copper mineralization and is associated with phyllic and propylitic alteration. At MPM, discontinuous pyritic zones are present but do not appear to be mineralization halos. MPMC geological staff identified a pyritic zone in the south wall of the Springer Pit which extends into the adjacent Cariboo Pit.

This ML/ARD Management Procedure Manual applies to waste rock and ore stockpiles. Tailings are consistently NAG due to removal of copper sulphides by ore processing.

MANAGEMENT OF PAG ROCK

Best practice for management of PAG rock is subaqueous disposal in a configuration that provides permanent and low maintenance containment. At MPM, this has been implemented by disposing of waste rock in completed open pits that will subsequently fill with water. Mine planning is carried out at MPM such that the open pits have sufficient capacity that PAG material can be re-handled into the open pits and stored subaqueously at closure. The following pits are available for subaqueous disposal (in sequence):

- Cariboo Pit
- Bell Pit
- Pond Zone Pit

- Southeast Zone Pit
- Wight Pit
- Cariboo-Springer Pit.

For the Springer Pit, backfill locations are not currently available. The PAG rock is therefore stockpiled adjacent to the open pit in the Temporary Northwest PAG Stockpile for backhauling to the Cariboo-Springer Pit upon completion of mining.

For the small Pond Zone Pit, low sulfur PAG waste rock is layered with NAG waste rock.

Onset of acidic conditions in waste rock at MPM takes at least decades as shown by humidity cells, and the lack of acidification in the natural exposure of the deposit indicates that flooding of PAG waste rock does not need to be immediate. The current approaches of backfilling into dry pits and stockpiling following by backfilling allows PAG rock to be submerged before it acidifies.

DETERMINATION OF ML/ARD POTENTIAL

Waste rock on site is separated into two categories, NAG and PAG, using Neutralizing Potential Ratio (NPR) defined as:

$$NPR = NP/AP.$$

Acid Potential (AP) (in kg $CaCO_3$/t) is measured from:

- Total sulfur (%) x 31.25

Neutralizing Potential (NP) (in kg $CaCO_3$/t) is measured from total carbonate NP determined from:

- Total carbon (%C) x 83.33.

Due to the dominantly intrusive rock host at MPM, total carbon is an appropriate proxy for carbonate (SRK 2023a).

NPR CRITERION

A site-specific criterion (NPR) of 1.6 was developed by SRK for Springer Deep and WX Zones (SRK 2023b). To derive the NPR*, the stable rate of sulphate release was compared to the relative rate of acid neutralization by calcium and magnesium carbonate minerals, as well as potassium and sodium to account for cation exchange. The data showed a tendency toward consumption of approximately 1.6 moles of calcium, magnesium, sodium, and potassium per mole of sulphate released.

Rock sourced from other zones is defined as PAG when NPR $\leq$ 2.

BLAST FRACTIONATION

SRK was retained by MPMC to refine ABA procedures and understand the specific factors controlling ARD potential at MPM to support mining of the Springer Deep and WX zones. This work has led to the

development of site-specific ABA procedures for these particular geological zones. An excerpt from the summary report provided by SRK (2023b) is included below.

"Mineral partitioning during blasting can have an effect on the classification of waste rock ARD potential since fines tend to be more reactive. If carbonate minerals preferentially partition into the blast fines, the use of a bulk TIC-NP/AP classification factor can lead to misclassification of rock that will probably not generate acid as PAG. The reverse can also occur if sulphide minerals preferentially partition to the fines."

Review of SRK's results of blast fractionation for the Springer Deep and WX Zones showed:

- No difference in levels of total sulfur in the fine and bulk fraction.
- NP (calculated from TIC) was enriched in the fine fraction compared to the bulk fraction.

SRK (2023b) derived a regression for the NP/AP relationship between the fines and the bulk fraction.

An NPR* of 0.7 in the blast hole cuttings is used to determine dig limits for PAG rock because this is equivalent to an NPR* of 1.6 in the blast fines, which is the reactive component in the rock. For all other rock types, an NPR of 2 in the blast hole cuttings will be used to determine dig limits until a relationship is confirmed.

MATERIAL CHARACTERIZATION OVERVIEW

This section provides an overview of characterization procedures.

The MPM program characterizes all material types that will be handled during the mine life. Analysis is completed on site by Mount Polley's LECO™ instrument , allowing MPMC to best manage mine waste by directing it to suitable storage sites, or to construction usage when required (and if deemed suitable).

On each bench, a sample of cuttings is collected from each blast hole and analyzed for total copper, non-sulphide copper, iron, and gold. Areas of ore and waste are identified by interpolation of these assay results and the economic analysis of the resulting metal grades. Ore/waste boundaries are then established based on the calculated mill head values.

In areas which have proven to be consistently NAG on previous adjacent benches in blasthole samples, the waste tonnage in each blast is divided by 40,000 in order to determine the number of ABA samples to be submitted (i.e., one per 40,000 tonnes (t) of waste). However, in areas where PAG has been modelled through either exploration sampling, or results of previous blasthole sampling on other benches, (or where NAG and PAG may coincide), the sample density is doubled to one per 20,000 t. This approach results in greater sampling density in areas of suspected NAG/PAG boundaries, and increases the certainty of defining PAG. Typically structures at MPM are vertically oriented, and relatively continuous. This provides some assurance that blasthole samples from previously mined benches have relevance for determining where additional samples should be taken on new benches.

Any ore that will be stockpiled rather than processed immediately is sampled at a frequency of one (1) per 20,000 t to determine if it is classified as PAG or NAG. Millfeed ore areas are excluded from ABA analysis, as this material is processed through the Mill.

Composite tailings samples are collected and analyzed every month when processing of ore occurs to represent the tonnage of tailings deposited.

Water treatment wastes are quantified monthly and sampled quarterly, with material characterization performed to assess ML/ARD potential and contribute to a material inventory.

As a confirmatory sampling measure, the Environmental Department takes random weekly grab samples from the NAG waste dump when NAG is being dumped and/or used for construction, to verify that material is being appropriately characterized and handled.

In the event that a confirmatory sample or other activities result in the discovery of PAG material in a NAG-designated area, a QP is to be informed without delay, who will dictate the response actions in coordination with site contacts. Mount Polley is permitted to blend pockets of less than 1,000 t of PAG materials with non-PAG materials at a ratio of 20:1, as described in *Mines Act* Permit M-200 Section D.3.(c)(i)(d). If these conditions cannot be met, it may be necessary to remove PAG material from NAG areas.

Water chemistry monitoring of seepage from rock dumps, water treatment plant wastes, and contact water from the site water collection systems is also conducted by the Environmental Department to inform development of geochemical source terms and long-term water quality predictions. Similarly, tailings composites and monthly random drill pulp samples are sent to a third-party laboratory for metals analysis as an additional source of data for site geochemical models.

IN-PIT SEGREGATION

Blasthole Samples:

1. After the production drill has completed and moved away from the hole, the sample may be taken.
2. Using a tube sampler, the Driller will take a representative sample of the cuttings pile.
3. Samples are to be collected in a clean plastic sample bag.
4. The Driller is to complete a Blasthole Sample Tag, tearing off the tag once completed and inserting it into sample bag.
5. The sample bag is to be tied off using ribbon.
6. In the case where multiple composite samples are to be taken from a single hole, the remaining cuttings after the sample are to be removed by the Driller so a clean new pile of cuttings can be formed.
7. Completed samples are to be left on the drill by the Driller. At the end of shift, the Mine Operations Pit Supervisor (or designate) will collect all samples and deliver them to the Bucking Room.

Bucking Room:

1. Each sample is to be transferred from the sample bag to a clean metal tray. The Blasthole Sample Tag is to be kept with the sample.
2. The sample is to be dried at 105°C.
3. The sample is then to be crushed in the Primary Crusher.
4. The sample is then to be crushed in the Fine Crusher.
5. The sample is to be split until the sample size is approximately 200 g.

a. Reject from the sample is to be wasted.

6. The sample is then to be pulverized for 75 seconds.
7. The sample is to be placed in a pouch with the Blasthole Sample Tag stapled to the pouch.
8. If the pouch is a pit sample, it is to be sent to Assay Lab 1. If the sample is an ABA sample, it is to be sent to Assay Lab 2.

Assay Lab 1:

1. The Assay Lab is to run the sample through the atomic absorption analyzer which automatically transfers the copper (CU), non-sulphide copper (CUNS) and iron (FE) values into the LIMS database.
2. The samples for gold analysis are to be fire assayed and analyzed by atomic absorption which automatically transfers the gold (AU) value into the LIMS database.
3. The sample is then to be placed into storage. Pit samples are to be stored for 21 days.

Ore Control Technician 1:

1. Once assays have been entered into the LIMS database, the Ore Control Technician will review the data and roughly determine where in the blast any Mill Feed Ore will be located.
2. Once the Ore Control Technician drafts the Mill Feed Ore locations, the Ore Control Technician will evenly select holes in the non-Mill Feed Ore areas (including materials designated for ore stockpiles) at a ratio of one (1) sample per 20,000 t of rock. This equates to about one for every nine blast holes. Additional samples can be requested whenever additional data is desired for improving understanding of the geological conditions. An example of a sample layout is included as Figure 1.

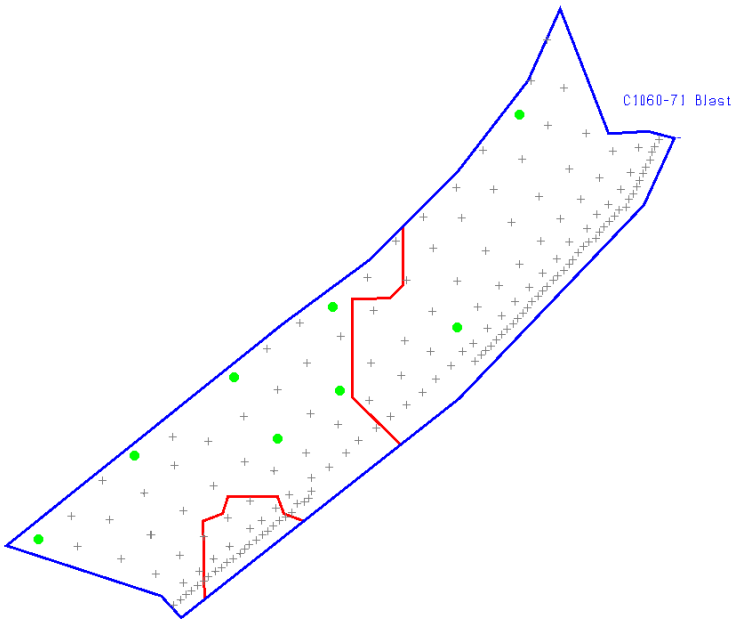


Figure 1: Location of ABA samples (green dots) within a blast. Red polygons denote mill feed ore, remainder is waste. The Ore Control Technician focuses sampling on areas which are designated waste and/or stockpile ore by the blasthole model. Reference blast = 149,173 t.

3. The Ore Control Technician is to then make an Analysis Request with the holes selected to the Assay Lab.

Assay Lab 2:

1. If the Assay Lab receives an Analysis Request, they will retrieve the sample pouch from storage, otherwise the sample will be delivered to the Bucking Room.
2. The Assay Lab will run the sample through the LECO CS230 Carbon Sulfur Analyzer.
3. Once analyzed, the machine transfers the carbon percentage (C%) and the sulfur percentage (S%) to a spreadsheet where NPR, NP and AP are calculated.
4. The NPR, NP, AP, C% and S% are transferred automatically to the LIMS database.
5. The sample is then to be placed into storage. ABA samples are to be stored for 14 days.

Ore Control Technician 2:

1. Once all the assays and ABAs have been entered into the LIMS database, the Ore Control Technician is to review the data and model the blast.
2. Modeling the blast
    a. The software used is MineSight.
    b. The model is based on a 5 metre (m) x 5 m x 12 m block system.
    c. The block closest to the ABA sample will closely match the sample.
    d. The blocks between the samples receive a weighted average of the sample carbon and sulfur grades.
    e. Once each block gets the weighted C% and S%, then the AP, NP and NPR is calculated for each block.
    f. Using the calculated NPR value, the model is to be coded as Ore/NAG/PAG by the Ore Control Technician and the resulting markup design is to be provided to the Surveyor.
3. The Ore Control Technician is responsible for the release of the final ore markup to the Surveyor. An example of a sample layout is included as Figure 2.

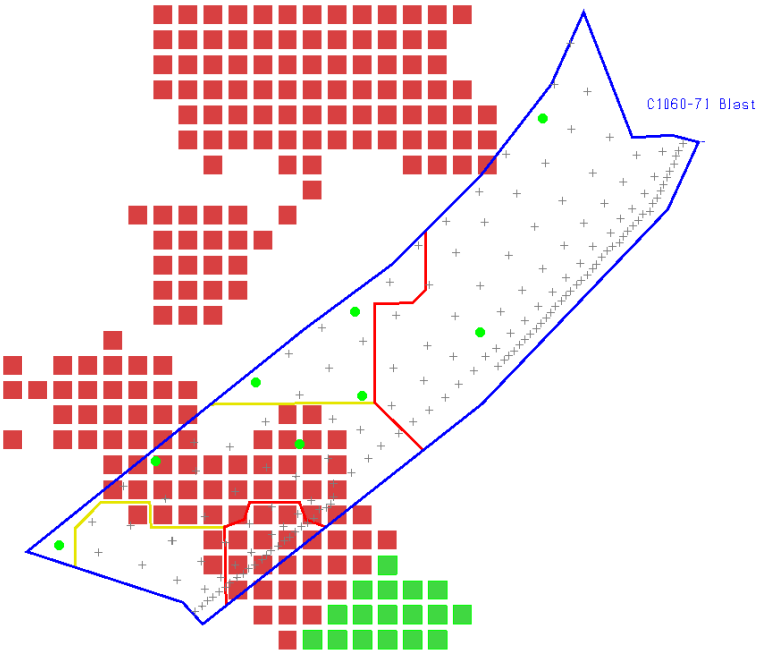


Figure 2. ABA results from samples shown in Figure 1 are used to update the blasthole PAG model item which identifies blocks which meet PAG criteria (red). The Ore Control Technician then marks up the PAG waste (yellow polygon) and the complete ore/waste markup is released to the Surveyor.

Surveyor:

1. The Surveyor will be responsible for the layout all Ore/NAG/PAG, as determined by the Ore Control Technician, in the field.

2. Using four (4) foot stakes spaced approximately 5 m apart, the Surveyor will mark out the contacts using marked placards.

    a. Red Placard = High Grade Ore
    b. White Placard = Super High Grade Ore
    c. Green Placard = Low Grade Ore
    d. Yellow Placard = PAG
    e. Blue Placard = NAG
    f. Pink Ribbon = High Grade Mill Feed Ore

3. Once complete, the Surveyor will print out maps of the area delineating material types for the shovel operator(s), and, if required, provide field verification of material types.

MATERIAL HANDLING

Shovel/Haul Truck Operators:

1. The Shovel Operator will mine the rock, following the contacts laid out by the Surveyor.

2. The Shovel Operator will ensure that all material contained within the contact stakes is routed as described by the markup and that any uncertainty in material classification is resolved by seeking the assistance of either the Pit Supervisor or the Engineering Department.
3. Upon loading a haul truck, the Shovel Operator shall direct the Haul Truck Driver as to the material type being hauled, and destination, using a horn sequence. The Haul Truck Driver will then take the material to the designated area.

IN-PIT MONITORING

Shovel Operator:

The Shovel Operator follows the staking of the Surveyor. Any material marked out as PAG is only to be hauled to approved locations. If a discrepancy is found, the Surveyor is to be called out to verify the material markup.

Pit Supervisor:

Throughout the shift, the Pit Supervisor will check in with the Shovel Operator and confirm the material type being loaded and that the destination is correct.

Haul Truck Driver:

If the Haul Truck Driver is uncertain of the material loaded, the Haul Truck Driver will confirm with the Shovel Operator or the Pit Supervisor.

Ore Control Technician:

The Ore Control Technician is to check Shovel Operator dig faces and confirm that the markup is appropriate and material is being routed appropriately.

Surveyor:

The Surveyor is to verify that material staking is visible and correct.

Environmental Department:

Once a month, the Environmental Department is to send a randomly selected drill hole pulp sample that MPMC analyzed for total sulfur and total carbon at the Assay Lab to a third-party laboratory (typically ALS Environmental in Burnaby, BC) for element analysis by ICP-MS following aqua regia digestion as an additional source of data to support site geochemical models.

Additionally, the Environmental Department takes water samples from all pit sumps to inform long-term geochemical predictions. Samples are collected as per MPMC-SOP-002: Surface Water Quality Monitoring. Monitoring locations and frequencies are regularly updated to reflect site developments and are summarized in the Comprehensive Environmental Management Plan.

TAILINGS MONITORING

Mill Metallurgy

1. The Mill Metallurgy Department is to take a monthly composite sample of the tailings generated through the month.
    - Slurry is to be sampled every two (2) hours and made into a composite for the shift.
    - The shift composite is then to be added to a monthly composite.
    - At the end of the month, the monthly composite is to be given to the Bucking Room and prepared for ABA total sulfur and carbon analysis.
2. The Environmental Department is to send the monthly tailings composite sample to a third-party laboratory (typically ALS Environmental in Burnaby, BC) for element analysis by ICP-MS following aqua regia digestion to provide data for site geochemical modelling.

WATER TREATMENT PLANT WASTE

Environmental Department:

1. Record the value on the waste line totalizer monthly when Water Treatment Plant (WTP) data are downloaded.
2. Collect samples of waste which has exited the WTP quarterly to characterize WTP wastes. Samples shall be taken of material that has exited the sludge line, to the West of the WTP and down-flow from where microsand is cycloned for re-use.
3. Sampling Method for liquid wastes (adapted from MPMC-WORK-002):
    - Record in-situ measures: pH, temperature, conductivity, and turbidity.
    - Take a water sample from the pipe outflow and send for lab analysis corresponding with other contact water samples as described in the Comprehensive Environmental Monitoring Plan, including but not limited to: physical parameters, pH, total and dissolved metals.
4. Sampling method for solid wastes (adapted from MPMC-WORK-016):
    - Take a composite sample of solids from the sludge pile adjacent to the WTP, with samples from at least 5 locations on the pile.
    - Send to an external laboratory for total sulfur, total inorganic carbon, elemental analysis by ICP-MS following aqua regia digestion and shake flask extraction testing to assess the ML/ARD potential of solids.
5. Review and archive lab data in a timely manner for use by personnel responsible for the Annual Reclamation Report.
6. The TSS concentration in wastewater will be used along with the waste line totalizer values to quantify the solids delivered to the TSF. The relationship between total and dissolved metals in the WTP waste line sample will be used to quantify the suspended (filterable) metals in this sample.
7. This information will be included in the MLARD materials inventory, and reported to EMLI in the Annual Reclamation Report as per Code Section 10.5.7 on water treatment wastes and by-products.

NAG Material Monitoring

Environment Department

1. As a confirmatory sampling measure, the Environmental Department is to take ABA grab samples from the NAG Dump and any area where NAG rock is used for construction on a weekly basis, while NAG dumping and/or NAG rock construction is occurring. Sampling will conform with MPMC-SOP-016: ABA and Soil Sampling. Two size fractions (+2 mm and -2 mm) will be analyzed for each sample collected. Sieving to be completed by lab once samples have been collected.
2. To assure data quality, as recommended in the BC Field Sampling Manual, a minimum of one in ten samples will be a duplicate sample, as written in MPMC-SOP-016.
3. Seeps and contact water collected on site are sampled to provide data for site geochemical modelling. Samples are collected as per MPMC-SOP-002: Surface Water Quality Monitoring. The frequency and locations of these monitoring sites are updated regularly to reflect changes to the mine site are summarized in the Comprehensive Environmental Management Plan.

Ore Control

1. As a blast fractionation confirmatory sampling measure, ten samples of blast muck will be collected each year. Blasts to sample will be selected based on mining activities and by targeting a range of sulfur contents.

Response to Finding PAG in NAG Areas

Environmental Department

1. Upon reviewing data indicating PAG material has been found in a NAG area, without delay contact one or more Qualified Professionals listed in this document, and the Pit Supervisor or designate to pass along the relevant data and sampling location.
2. Return to the location where PAG material was discovered and stake the sampling location. Note that material may have been dozed, buried or pushed down the dump face, in which case personnel are to mark as close as possible.
3. At the discretion of Qualified Professionals, undertake additional ABA sampling to assess the prevalence of PAG material.

Pit Supervisor:

1. Discuss NAG/PAG separation with shovel and haul truck operators and investigate the possibility of a loading or dumping mix-up. This is not a punitive activity but meant to identify potential causes and estimate material volume.
2. At the discretion of Qualified Professionals, organize the removal of PAG material from the non-PAG area.

ML/ARD Qualified Professional

1. Work with site contacts to develop an appropriate plan of action to address the situation.
2. If it is not possible to demonstrate that PAG material meets conditions outlined in M-200 Section D.3.(c)(i)(d), it may be necessary to remove recoverable PAG material.

REVIEW OF RESULTS AND PROGRAM EFFICACY

Data collected and corresponding interpretation regarding the ML/ARD program are included in the Annual Environmental and Reclamation Reports (AER and ARR, respectively), due annually to the British Columbia Ministry of Environment and Ministry of Energy and Mines on March 31 of each year, reflective of the previous calendar year. Personnel responsible for the AER/ARR may recommend updates to the ML/ARD program based on operational changes or findings of annual reporting. The AER/ARR include sections on: waste rock characterization and disposal; drainage water quality monitoring; and, updates to long-term predictions (kinetic testing).

REFERENCES

SRK Consulting (Canada) Inc. 2023a. Metal Leaching/Acid Rock Drainage Characterization and Monitoring Program – 2022 Annual Report. Prepared for Mount Polley Mining Corporation. SRK Project Number CAPR002434. March 2023.

SRK Consulting (Canada) Inc. 2023b. Evaluation of Acid-Base Accounting Procedures and the Criterion for Classifying ARD Potential of Waste Rock - Springer Deep and XY Zones. Prepared for Mount Polley Mining Corporation. SRK Project Number CAPR002434. October 2023.

Appendix W

Progress Reports

(Electronic format only)

Mount Polley Mining Corporation

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Submission in Compliance with Conditions of *EMA* Permit 11678 s 2.12

Water Treatment and Discharge Program

PROGRESS REPORT #12

PREPARED FOR

THE MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

PREPARED BY

MOUNT POLLEY MINING CORPORATION

June 29, 2023

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1. INTRODUCTION

Mount Polley Mining Corporation (MPMC) is submitting this progress report as required by Section (s) 2.12 of *Environmental Management Act (EMA)* Permit 11678, issued on December 1, 2022. This progress report provides an update on progress on all aspects of s 2.11 under a general heading titled *Water Treatment and Discharge Program*. Progress Report #12 covers the period between January 1, 2023 and June 30, 2023, and includes relevant past work that falls under the requirements of s 2.11.

The Mount Polley mine was in care and maintenance from May 2019 through October 2021. Mining operations resumed November 2021 with the mining of Springer Phase 4, beginning with the removal of the saddle between Springer Pit and Cariboo Pit. The crusher and concentrator were refurbished, milling operations began June 2022, as did operation of the Tailings Storage Facility.

MPMC is currently progressing towards lowering the phreatic surface within the tailings that were deposited in the Springer Pit in 2015/2016. Ore reserves are located beneath the tailings, which are expected to provide an additional 2 years of production. MPMC is pursuing further operational permits to extend the mine life to 2030.

2. BACKGROUND

This Progress Report #12 references the newest version of *EMA* Permit 11678 (Dec 2022), which extends the effluent discharge into Quesnel Lake to June 30, 2025. A permit amendment application is in the pre-application stage of permitting through the Major Mine Office to extend the discharge to Quesnel Lake for the operating period of Mount Polley Mine.

EMA Permit 11678 (Dec 2022) includes s 2.11.2, a Numeric Performance Metric (NPM) of 0.012 mg/L total copper. The NPM value is a treatment optimization target for effluent discharge, which differs from the permit limit of 0.033 mg/L total copper.

MPMC recently filed a 5-year update to the Mine Plan and Reclamation Update 2022 (MRP) (Golder 2022g) submitted to the Ministry of Energy, Mines and Low Carbon Initiative (EMLI) in compliance with sections in *Mines Act* Permit M-200 dated December 10, 2020. Excerpts from the MRP Appendix G – Water Treatment Update are extracted to provide the update on water treatment technology development.

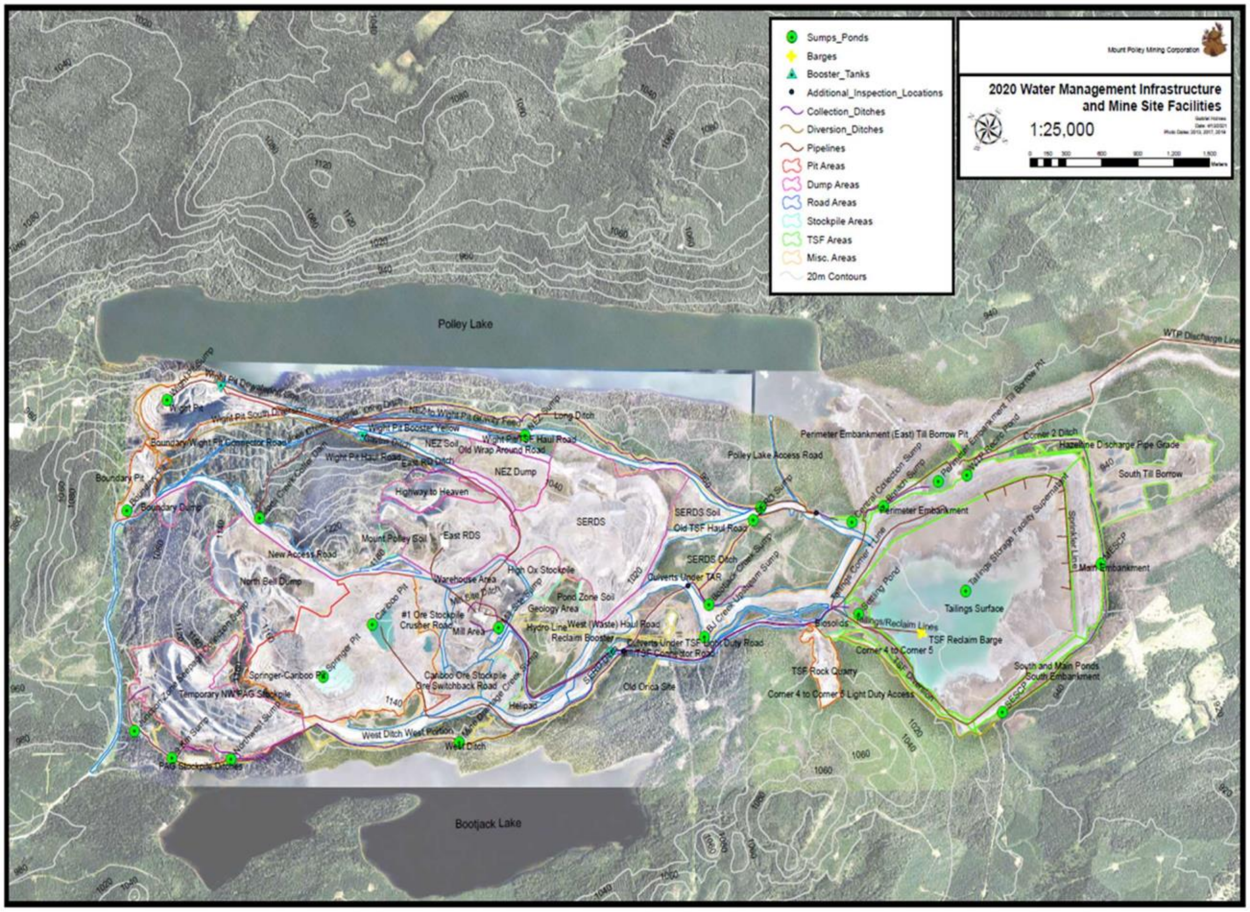


Figure 1. Water Management Infrastructure and Mine Site Facilities

3. WATER TREATMENT TECHNOLOGY DEVELOPMENT

Water treatment technology development is a cumulation of Best Available Technology (BAT) assessments through bench and pilot testing of treatment systems. This section of the report addresses Permit 11678 s 2.12(a) and s 2.12(b). What follows is an excerpt from the Mine Plan and Reclamation Update 2022 (MRP Appendix G) with updates of the results of BAT assessments, bench and pilot testing of treatment systems.

MPMC has been progressing and evaluating multiple technologies to support the treatment of identified constituents of concern (COCs) and to support potential decentralized treatment and discharge during closure/post-closure. Various studies have been completed since 2017 to support these efforts as an important component of closure refinement. An inventory of treatment technologies and a summary of their development is presented in Table 1.

Good engineering practice typically requires a project to follow a standardized engineering design process for the selection and progressive refinement of the final project concept. A project

progresses from a pre-concept phase for the identification of multiple treatment options, through concept, pre-feasibility, and feasibility phases to project execution. Generally, the engineering studies performed for each of these project phases are supported by test work that progresses from proof-of-concept and detailed bench-scale testing to pilot-scale and demonstration-scale test work. Some of the treatment technologies tested may not progress to the next stage of development. For example, a treatment technology may be eliminated if its treatment capacity is insufficient to treat the forecast volumes. This framework takes a staged approach, such that input assumptions, design, and cost for the total system can be refined as each stage is completed and the information that the plan relies on becomes more certain. This allows input assumptions to be less conservative as they become more accurate with accumulated knowledge. The technology development stages presented in Table 1 align with this approach. Additional details regarding this project development framework and how it aligns with the BC Ministry of Environment and Climate Change Strategy's BAT policy is provided in Golder 2020a.

This water treatment update technical memorandum assumes that the reader is familiar with the technologies in Table 1 and only provides updates on work completed by MPMC since 2017 to support the development of these technologies. Detailed descriptions of the technologies and associated process flow schematics can be found in Golder 2020a.

Table 1. Treatment Technology Inventory and Stage of Development

Technology / Stage of Development	Targeted COCs	Proof-of-Concept Bench-Scale Testing	Detailed Bench-Scale Testing	Pilot-Scale Testing	Demo-Scale Testing	Full-Scale Execution	Work Completed
Actiflo	TSS, total copper					→	Bench and full-scale testing.
Lime Treatment	Dissolved copper					→	N/A
TMT Treatment	Dissolved copper	→	→	→	→		Bench and full-scale testing. Toxicity evaluation.
Pit-Lake Treatment	Selenium, nitrate	→	→	→			Preliminary concept design and proof-of-concept bench-scale testing. Pilot-scale testing workplan.
Saturated Rock Fill (SRF)	Selenium, nitrate	→	→				Concept design, proof-of-concept bench-scale testing, detailed bench-scale testing workplan (in progress), and long-term substrate leach testing. Wight Pit SRF assessments.

Technology / Stage of Development	Targeted COCs	Proof-of-Concept Bench-Scale Testing	Detailed Bench-Scale Testing	Pilot-Scale Testing	Demo-Scale Testing	Full-Scale Execution	Work Completed
Packed Bed Reactor (PBR)	Selenium, nitrate						Concept design, proof-of-concept bench-scale testing, and detailed bench scale testing workplan (in progress).
Biochemical Reactor (BCR)	Selenium, nitrate						Concept design and proof-of-concept bench-scale testing.
Submerged Sand Reactor (SSR)	Selenium, nitrate						Screening analysis.
Constructed Wetland Treatment (CWT)	Selenium, nitrate						Concept design, bench-scale testing, and on-site pilot scale testing (by others).

3.1 Actiflo

Actiflo, the tradename of a technology supplied by Veolia, is the technology currently in use as the site's WTP and is considered the BAT for TSS removal during operations and closure/post-closure. The main targeted COC of this technology is TSS, with total copper removal also occurring via TSS removal. Polyaluminum chloride (PAC) is dosed into the influent water in the Actiflo process, which produces aluminum hydroxide precipitates that adsorb to copper complexes, thus removing copper during the solids-liquids separation step of the process. The Actiflo technology is currently implemented at full-scale on-site, as indicated in Table 1.

Concept design, bench-scale, and full-scale testing have been completed for the Actiflo technology, including assessment and optimization of PAC and various chelating agent dosages (including TMT) to assist copper removal (Golder 2016b, Golder 2017a, Golder 2018a, Golder 2019a, Golder 2019b, Golder 2020b).

Actiflo treatment is currently operating as the core component of the treatment system during operations and is currently assumed as the core component of treatment during closure/post-closure.

3.1.1 Flocculant Management Plan

Per Permit s 2.10, a Flocculant Management Plan (FMP) was prepared and outlines the methods for the settling of solids at the WTP using coagulant, flocculant and ballast, while preventing potential detrimental effects in the receiving environment. The FMP also outlines the procedures and equipment used for storage and dosing of the settling aids, including monitoring of the influent and effluent water quality (Golder 2023a). This document, provided by Golder, was appended to the 2022 Annual Environmental Report and submitted to ENV in March 2023.

3.2 Lime Treatment

Active treatment with lime is currently in use at the site, where existing process plant infrastructure is used to raise contact water pH, resulting in the precipitation of metal hydroxides, particularly dissolved copper. The main targeted COC of this technology is dissolved copper. Lime treatment is currently implemented on-site, as indicated in Table 1, and used as a pre-treatment step of the Actiflo water treatment system to target dissolved copper removal. Use of this technology is well known to industry and technology development to support this has not been required.

Lime treatment, when required, is currently a component of the water treatment system during operations.

3.3 TMT Treatment

TMT is a chelating agent that aids with dissolved copper precipitation that allows copper treatment through TSS removal. The main targeted COC of this technology is dissolved copper.

Bench-scale test work completed showed that TMT is able to effectively precipitate dissolved copper (Golder 2016b, Golder 2017a, Golder 2018a) and the full-scale trials completed showed that the existing Actiflo treatment system was able to remove the copper bound with TMT to below the permit limit (Golder 2019a, Golder 2019b, Golder 2020b). Full-scale trials also showed that copper removal to lower concentrations (total copper < 0.012 mg/L) was challenging for Actiflo with TMT treatment, not due to limitations in dissolved copper precipitation but due to limitations in TSS removal. TMT was effective in precipitating dissolved copper, but the Actiflo system was not effective in subsequently removing the precipitate to result in low effluent copper concentrations. The toxicity of TMT has also been evaluated and showed that its use would not result in an acutely lethal effluent (Golder 2018b).

TMT treatment is still being considered for full-scale implementation.

3.4 Pit-Lake Treatment

Pit-lake treatment targeting COCs of selenium and nitrate is an in-situ technology that requires nutrient and carbon source dosing to create conditions for biological treatment within the pit-lake.

A conceptual assessment of full-scale pit-lake selenium treatment was completed (Golder 2017b) and the technology was deemed a cost-effective approach to managing selenium and was recommended for further bench and pilot-scale testing. Proof-of-concept bench-scale testing for pit-lake selenium treatment was also completed and showed effective removal of selenium and nitrate, with further pilot-scale testing recommended (Golder 2019c). A pilot-scale study for pit-lake treatment was designed for Cariboo Pit (Golder 2020c), but the pit is being dewatered to support future mining activities and this work has not yet been completed.

Pit-lake treatment targeting selenium and nitrate is still being considered for full-scale implementation and is currently assumed as part of the treatment system during closure/post-closure if required.

3.5 Saturated Rock Fill (SRF)

SRF treatment is a fixed-film anaerobic system targeting the treatment of selenium and nitrate and

ideally utilizes a mined-out open pit as a bioreactor operated in a horizontal flow configuration.

A concept study for SRF treatment was completed (Golder 2020d) and SRF was recommended for further bench-scale and pilot-scale testing. Proof-of-concept bench-scale testing for SRF was also completed (Golder 2021), which showed effective removal of selenium and nitrate, but also indicated metal leaching. Detailed bench-scale testing and waste rock SRF substrate metal leach testing was recommended following completion of the proof-of-concept work.

Bench-scale leach testing using anticipated SRF substrate waste rock from site was completed (Golder 2022d – draft RevA, Golder 2023d), which monitored leached metals over a long-term test period of 52 weeks. A high-level summary of findings is below and the full report is included in Appendix A:

- The bench-scale SRF reactor used was very effective in removing total and dissolved selenium and nitrate.
- The use of mine waste rock as reactor media for SRF introduces the risk of leaching or release of metals into the SRF effluent. For this treatment technology to be implemented at full-scale as a viable option, the effects of metal leaching should be understood at specific reducing conditions that are required for SRF to achieve effective removal of selenium and nitrate.
- Metal leaching varies over time and differs between metals and must be considered during the start-up phase of SRF implementation (and may lead to additional required polishing treatment steps downstream of the SRF).
- SRF technology can provide copper removal during closure.

Detailed bench-scale testing for SRF has been proposed for 2023 and a test plan has been submitted in draft to MPMC (Golder 2022e – draft RevA). Geotechnical and geochemical substrate characterization for SRF media waste rock is currently ongoing and anticipated for completion in 2023. Golder has completed geotechnical laboratory testing of the SRF substrate and the analytical results will be used in the geotechnical settlement assessment of SRF bed geometrics. It is anticipated that geochemical substrate characterization will be conducted by MPMC's geochemical consultant SRK.

SRF treatment is still being evaluated for full-scale implementation and is currently considered a technology option for semi-passive treatment of selenium and nitrate during closure/post-closure if required.

3.5.1 DNA Analysis

Additionally, to investigate if the observed reduction in contaminants of concern in Wight Pit is facilitated by microbial activity, Golder sampled the effluent water of Wight Pit from the bench scale SRF to determine if the presence of genetic material could be used to indicate the presence of these bacteria and any favorable activity (Golder, 2023b). Microbial community composition and interactions were also studied using DNA analysis of the microbial communities from various locations on site. The analysis of samples collected from the site provided proof-of-concept for the

biological activity in terms of selenate and nitrate reduction in Wight Pit as several species that are potentially involved in selenium and/or nitrate removal were present in the microbial community in the pit (Golder, 2023b). Copper removal through precipitation as copper sulfide was also investigated and it was determined that although some sulfur/sulfide reducing bacteria were present, the sulfate reducing bacteria were not sufficient. The full report is included in Appendix B.

3.6 Packed Bed Reactor (PBR)

PBR treatment is another fixed-film anaerobic system targeting the treatment of selenium and nitrate. PBR treatment differs from SRF treatment through the use of a vertical flow (top to bottom) reactor.

Proof-of-concept bench-scale testing was completed (Golder 2019d) and PBR treatment was shown to be effective in reducing selenium and nitrate. Further detailed bench-scale and pilot-scale testing was recommended following completion of the initial testing. Detailed bench-scale testing for PBR has been proposed and a test plan has been submitted in draft to MPMC (Golder 2022f – draft RevA). PBR detailed bench scale testing has been postponed while focus is placed on immediate permit application priorities regarding the extension of the life-of-mine plan. Water balance, water quality and hydrogeological modelling as well as surface water infrastructure design are currently being completed to support permitting.

PBR treatment is still being evaluated for full-scale implementation and is currently considered a technology option for semi-passive distributed treatment of selenium and nitrate during closure/post-closure if required.

3.7 Biochemical Reactor (BCR)

BCR treatment is another fixed-film anaerobic treatment technology that consists of a lined pond filled with a submerged organic substrate media mix. The main targeted COCs of this technology are selenium and nitrate. BCR treatment is passive and does not involve continuous dosing of a carbon source to the media bed.

Proof-of-concept bench-scale testing was completed (Golder 2019d) and BCR treatment was shown to be effective in reducing selenium and nitrate, but redox sensitive metals were present in the BCR effluent.

Upon review of the BCR technology in comparison to other passive and semi-passive technologies, MPMC decided to not proceed with further development of this technology (MPMC 2021) for the following reasons:

- Limited lifespan of BCR passive treatment systems based on the availability of a carbon source that is encapsulated in the system during construction – this needs to be replaced periodically at significant cost.
- Emission of elevated levels of biochemical oxygen demand (BOD) from the system during commissioning and start-up of operation that exceed standards for discharge to the environment.
- Persistent emission of phosphorus from the BCR during operation that will likely exceed

plausible standards for discharge to the environment.

BCR treatment is no longer being developed as a passive treatment technology option during closure/post-closure.

3.8 Submerged Sand Reactor (SSR)

SSR is similar to other anaerobic reactor technologies, with the use of the existing tailings as media for the bioreactor. The main targeted COCs of this technology are selenium and nitrate.

A concept study was completed for SSR (Golder 2020d), as well as proof-of-concept bench-scale testing (Golder 2019d). Use of MPMC tailings as SSR bioreactor media or use of the site's TSF as an in-situ SSR was not recommended for further investigation. Bench-scale testing resulting in metal release in the reactor effluent when using site tailings as the reactor media. The concept study also concluded that further investigation of SSR was not warranted, based on a review of literature, an evaluation of historical water quality monitoring data, and an evaluation of the feasibility of utilizing the TSF from a hydrogeological and permitting perspective.

SSR treatment is no longer being developed as a treatment technology option during closure/post-closure.

3.9 Constructed Wetland Treatment (CWT)

MPMC retained Ensero Solutions Inc. (Ensero), formerly known as Contango Strategies Ltd., to conduct a detailed assessment and evaluation of the feasibility of a CWT system for passive/semi-passive treatment during closure/post-closure. The main targeted COCs of this technology are selenium and nitrate.

Pilot-scale design, sizing, and testing for CWT was completed by Ensero (Ensero 2020), and the technology demonstrated promising results for treatment of targeted COCs; however other passive/semi-passive technologies have indicated improved treatment capability in comparison. MPMC may choose to proceed with demonstration-scale on-site testing of CWT once the pilot-scale results have been fully understood and if the performance of competing technologies (SRF and others) indicates an advantage for CWT.

CWT is still being evaluated for full-scale implementation and is currently considered a technology option for passive/semi-passive and distributed treatment of selenium and nitrate during closure/post-closure if required.

4. ANTICIPATED FUTURE WORK

The existing and assumed water treatment systems for operations, closure, and post-closure have been outlined in this memorandum; however, changes may still be implemented during all phases of the mine as knowledge and needs evolve. The water treatment system for closure/post-closure will continue to develop in more detail as MPMC better understands technology capabilities and refines their final approach to water treatment for the closure period.

Table 1 provides a summary of the development stage of the treatment technologies implemented

or being considered for operations, closure, and post-closure. Future work is anticipated for any technology still under consideration that has not achieved full-scale implementation. The following items describe the priority treatment work anticipated over approximately the next three years, but do not exhaustively describe all potential remaining work for technologies still under consideration:

- Actiflo technology is a component of the operations and closure/post-closure BAT and a main component of the existing treatment system during operations and assumed treatment system during closure/post-closure. Further development of the technology is anticipated with respect to PAC and TMT usage, as well improving the solid-liquid separation in the process to address potential high-copper instances. Several recommendations for future system improvements have been outlined in Golder 2020b, including supporting bench-scale and field trials. Recommendations are mainly focused on improving removal of particulate copper from the WTP effluent and improving the effectiveness of PAC and TMT use.
- Pit-lake treatment is currently assumed as a component of the closure/post-closure treatment system. Pilot-scale pit-lake work was anticipated for Cariboo pit, but recent mine operational changes have resulted in the draining of both Springer and Cariboo pits and pit-lake treatment trials are no longer feasible at these locations. Operational changes have also resulted in Wight pit being filled. The previous pilot-scale study designed for Cariboo pit (Golder 2020c) could be redesigned for Wight pit if operational conditions in the near future are deemed appropriate, further advancing the development of this technology.
- Two options exist as the BAT for treatment during closure/post-closure: distributed passive/semi-passive treatment systems, and pit-lake treatment followed by the centralized Actiflo plant. Golder has proposed to undertake a treatment option life cycle cost comparison study between the two options, informed by the knowledge gained during recent technology development, to assess pros/cons and capital and operating costs between the options and inform future treatment program development decisions.
    - Golder initiated the treatment option life cycle cost comparison study between the two options in Q2 2023, with the associated draft report anticipated to be completed in Q4 2023.
- SRF and PBR detailed bench scale testing have been proposed to MPMC and this work is expected for completion in the near future to continue the development of these technologies.
    - SRF and PBR detailed bench scale testing have been postponed while focus is placed on immediate permit application priorities regarding the extension of the life-of-mine plan. Water balance, water quality and hydrogeological modelling as well as surface water infrastructure design are currently being completed to support permitting.

5. NUMERIC PERFORMANCE METRIC

5.1 Measurement of the Numeric Performance Metric

A Numeric Performance Metric for total copper has been specified in *EMA* Permit 11678 (Dec 2022), [s 2.11.2], expressed as follows:

a. *"Numeric Performance Metric" (NPM) means a measurable value that quantifies the outcome or result of water treatment and the ability of the treatment to remove specified chemical constituent(s). It forms the basis for a numeric comparison of untreated water, to water that has been treated by the treatment system.*

b. *The permittee must operate and optimize the design and performance of the WTP to target achievement of any prescribed NPM. The stated NPM target value represents WTP operation that achieves annual average effluent quality that is at or below any specified NPM. Assessment of the attainment of NPM values must be reported in an annual optimization update progress report appended to the annual report required in section 4.2. If the effluent qualify does not achieve an NPM value specified by the director, the permittee must identify and propose response actions to bring the effluent quality toward meeting the target value in the annual optimization update progress report. Response action may include treatment plant optimization and/or source control and/or water management improvements, and a schedule for implementing the response action must be included in the annual optimization update progress report.*

The following NPM is established:

Total copper 12 µg/L

c. *"Annual average effluent quality" means the effluent concentration of total copper based on a 52-week rolling average, using the average of the 52 grab samples at HAD-3 when the WTP is discharging.*

Progress reporting on the implementation of response action(s) for attainment of the NPM target value is a condition of Permit 11678 (Dec 2022) [s 2.12(c)]. Water quality samples of the Water Treatment Plant effluent identified as HAD-3 are taken weekly when the WTP is operating for analysis by a certified laboratory.

A graphical presentation of the weekly total copper concentrations (mg/L) of the Water Treatment Plant (WTP) effluent (HAD-3) discharge to Quesnel Lake is shown:

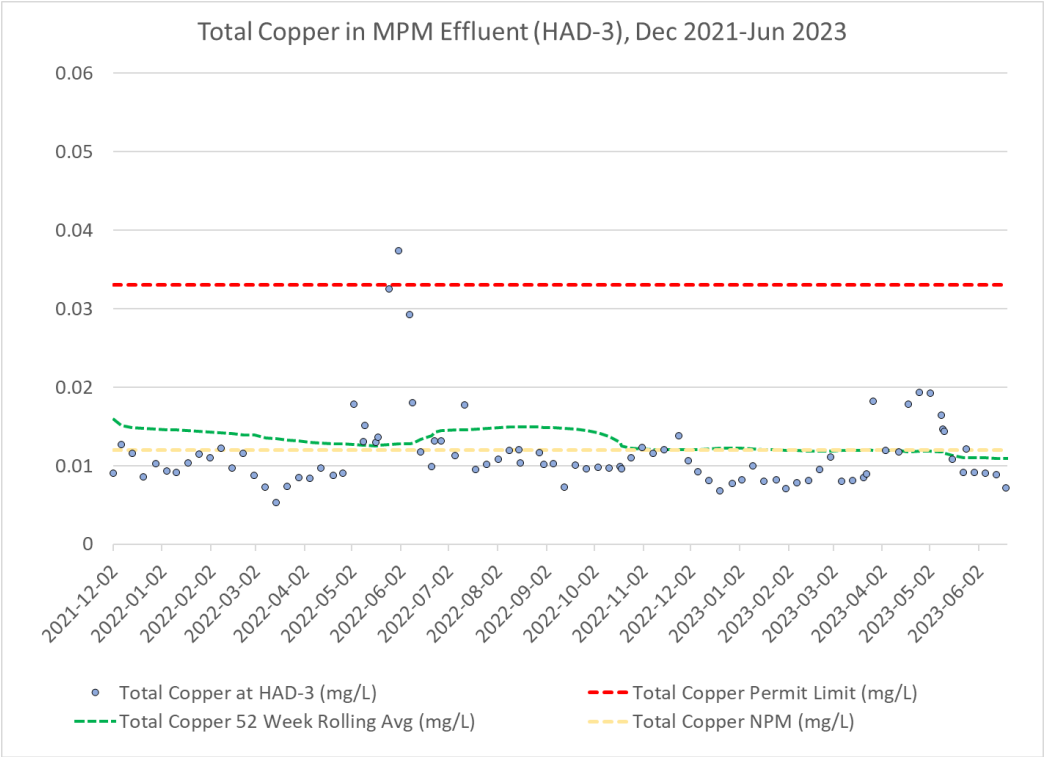


Figure 2. WTP effluent (HAD-3) total copper concentrations relative to the NPM (dashed yellow line), NPM annual average (dashed green line) and Permit 11678 end-of-pipe limit (dashed red line)

The NPM annual average of total copper is based on a 52-week rolling average, calculated using the average of 52 grab samples collected at HAD-3 when the WTP is discharging [s 2.11.2(c)].

To date in 2023, the NPM target has been achieved in 21/29 WTP samples or 72% of the time. In 2022, WTP samples achieved the NPM target approximately 69% of the time, in 38/55 samples. This represents an improvement over 2021 when the NPM was achieved 43% of the time, which is an improvement over 2020, when the NPM was achieved 23% of the time. The NPM annual average of total copper was 0.01217 mg/L as of December 13, 2022 and has continuously decreased to 0.01068 mg/L as of June 19, 2023.

The year-over-year improvement in reaching the NPM target is a result of improved WTP optimization with the addition of a second Actiflo WTP, and the establishment of pre-treatment processes developed as part of a water treatment train preceding the WTP; in-situ pit lake treatment, pre-treatment with sodium hydrosulphide and improved source control.

The operational response actions in achieving the NPM in 2023 are detailed in later sections of this Progress Report #12.

6. WATER TREATMENT PROGRESS (JANUARY – JUNE 2023)

The site has experienced a year-over-year reduction of water stored on site, from 7.01 Mm^3 on December 28, 2021 to 5.83 Mm^3 on December 27, 2022, a net reduction of 1.28 Mm^3. The return to milling operations in June 2022 and resulting tailings deposition into the tailings storage facility consumes free water into the void spaces of the tailings.

The volume of water treated shows a year-over-year increase in treatment capacity from 6.7 million cubic meters in 2021 to 7.0 million cubic meters in 2022. From January to June 27, 2023, 3.6 million cubic meters of water have been treated, the water stored on site is 4.14 Mm^3.

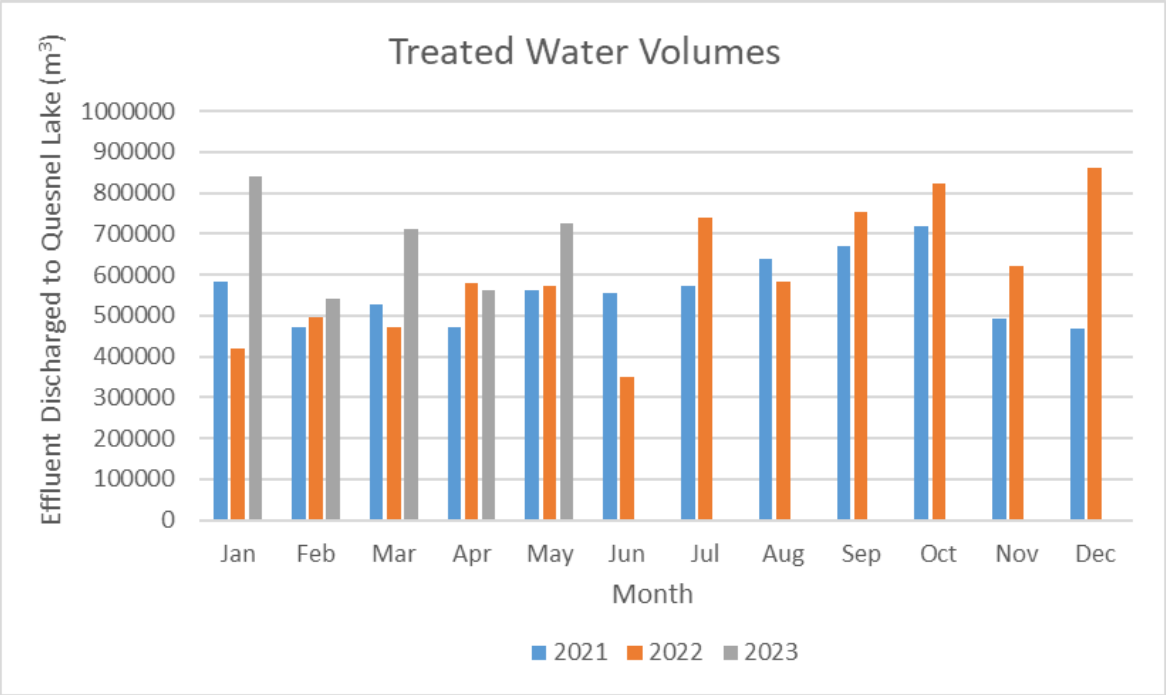


Figure 3. Treated Water Discharged over 2021, 2022 and 2023

6.1 Mobile Water Treatment Plant Installation

MPMC commissioned an interim rental Veolia Actiflo mobile water treatment plant (MWTP) to increase discharge throughput and assist with management of onsite water inventory, Commissioning of the MWTP began on March 16, 2022, by Veolia automation and process technicians and was completed on April 1, 2022. The MWTP began discharging to Quesnel Lake on April 9, 2022, after approval was granted by BC-ENV and was decommissioned on May 10, 2023 once the Mount Polley mine water balance reached a more manageable level. The HAD-3 sample results from April 12, 2022 to May 9, 2023 represent the combined effluent from both plants. To properly represent end-of-pipe conditions, the sample port was located downstream from the wye where effluent from both plants was mixed. Sample results from May 10, 2023 onward represent effluent from the permanent WTP only.

The MWTP assisted with the optimization of water treatment plant operations by allowing for higher throughput than the permanent WTP alone, with an increased retention time to allow for more complete particle settling, resulting in lower total suspended solids (TSS). Because the NPM

limit is in terms of total copper, a reduction in TSS is likely to be associated with lower copper and therefore a higher probability of NPM attainment.

6.2 Pit Lake Treatment

The Cariboo, Springer and Wight Pits have a combined 2.66 Mm^3 of stored water. The site has excess water stored in the pits currently. It is MPMC's objective to continue dewatering the site in 2023 so that mining can occur in the Springer and Cariboo Pits. A temporary mobile water treatment plant was commissioned in Q2 2022 to increase treatment capacity and was decommissioned in Q2 2023.

6.2.1 Cariboo Pit

The Cariboo Pit contains approximately 0.22 Mm^3 of stored water. The concentration of total copper and selenium have over time fallen below the *EMA* Permit 11678 limits of s 1.2.4, Column 2 of Table 1 for the Treatment Plant Outlet. In 2021, MPMC implemented a 'pit profiling' water column monitoring program to record changes in water chemistry at various water depths over time through seasonal temperature changes, lake turnover and ice cover. This data set is provided in Figure 4, supplemented by samples from E8, the regulatory site for Cariboo Pit which is analogous with surface water.

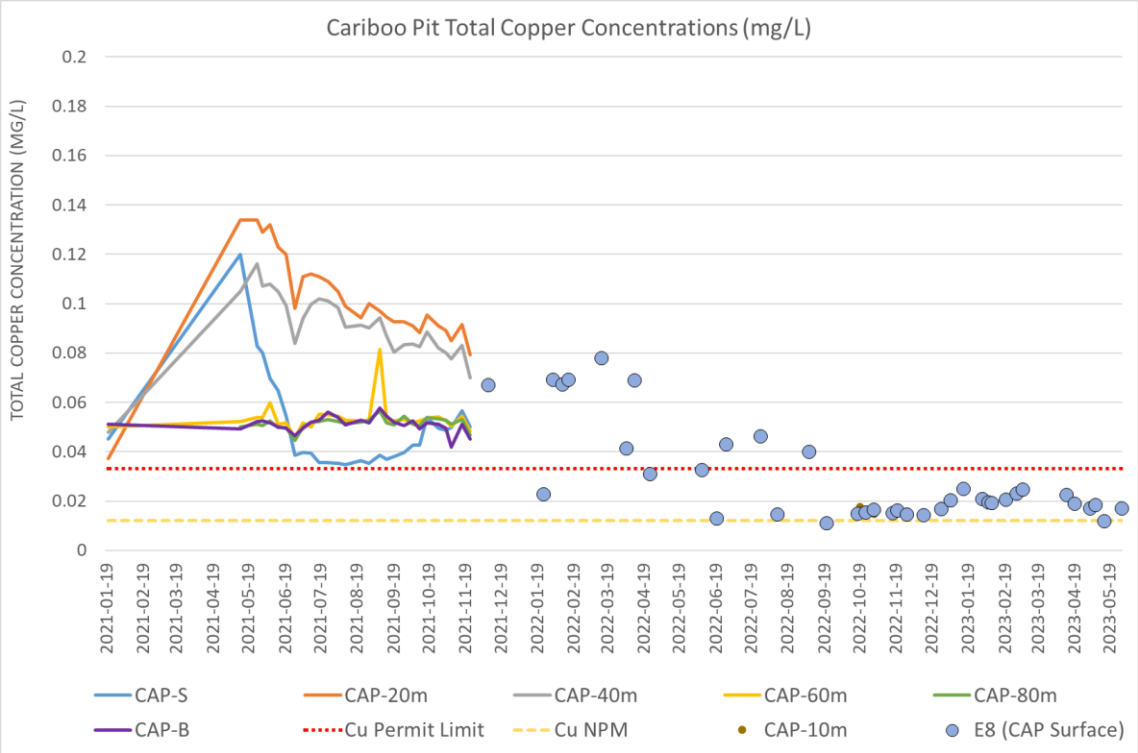


Figure 4. Cariboo Pit total copper concentration at 20 m depth increments 2021-Present.

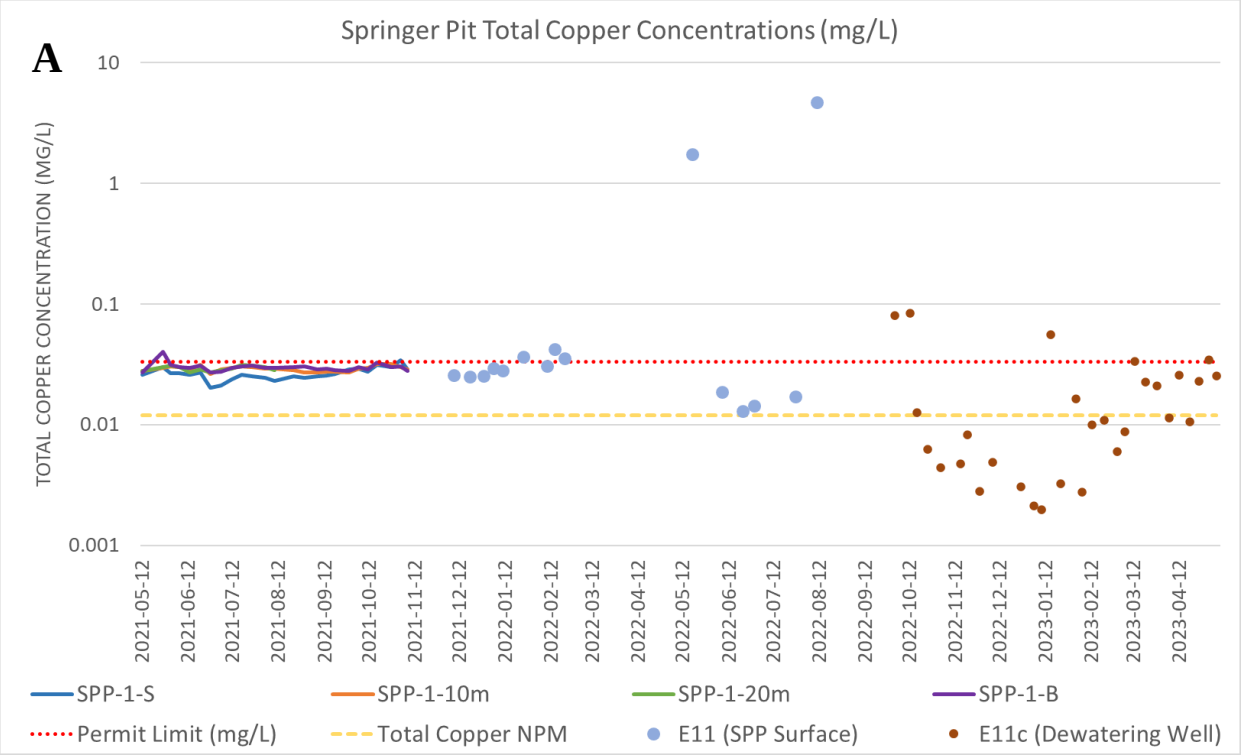
Copper concentrations in the Cariboo Pit trended downward in 2022, with a dramatic reduction of copper observed between January and May 2022. Historically, the highest copper concentrations have been found at the 20 and 40 m depths, while surface water and water from below 60 m depth contained less copper. In the profile taken May 11, 2022, the Pit Lake was mixed at all depths,

with a uniform total copper concentration of approximately 0.017 mg/L. Thus far in 2023, copper concentrations have been relatively constant with copper concentrations ranging from 0.012 mg/L to 0.0246 mg/L.

In-situ treatment processes contribute to this trend. In-situ treatments utilized in 2022 and 2023 include the settling of solids and in 2022 only, dosage with sodium hydrosulfide (NaHS) to sequester copper. More on sodium hydrosulfide treatment can be found in Section 6.3.

6.2.2 Springer Pit

Springer Pit is effectively dewatered to allow mining activities to proceed. During the ice-free season of 2021, passive treatment through settling has contributed to a reduction of total copper to less than the *EMA* Permit 11678 limits. The supernatant water meeting this threshold was removed and treated as a permit requirement through the water treatment plant.



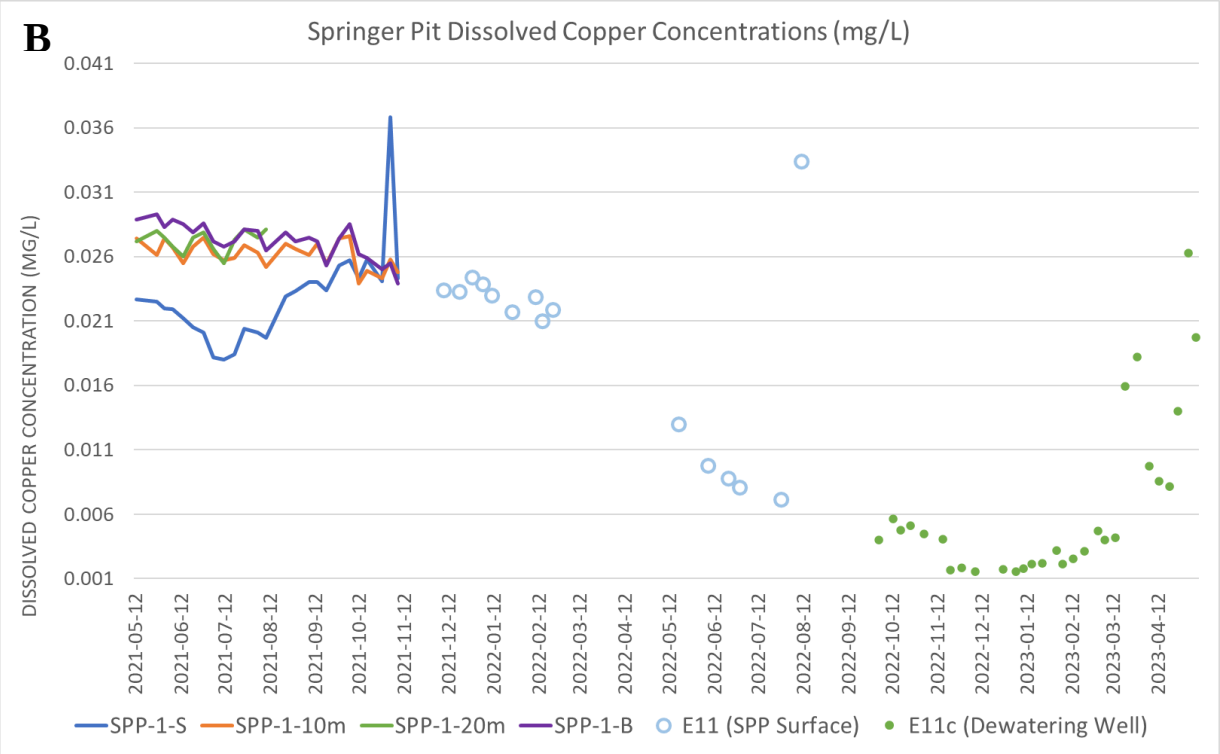


Figure 5. Springer Pit total (A) and dissolved (B) copper concentrations 2021-2023. The divergent trends in total and dissolved values may be a result of copper sequestration in sediment.

The last total copper and selenium concentrations in the Cariboo and Springer Pits are shown in Table 2. Note that due to dewatering and 2023 mining activities, it is no longer practicable to profile the Springer or Cariboo pits at depth. The Springer Pit water is represented by the regulatory site E11c, corresponding with interstitial water within and below the tailings pumped from three dewatering wells within the pit. Profiling the Cariboo Pit at depth intervals ceased in November 2022 due to ice formation on the pit lake resulting in accessibility and safety issues; therefore, the last profile of the Cariboo Pit was collected on November 1, 2022.

Table 2. Water parameters of interest as of November 1, 2022 in the Cariboo Pit and November 29,2022 in the Springer Pit

Sample ID	TSS (mg/L)	pH	Cu Total (mg/L)	Cu Diss (mg/L)	Se Total (mg/L)
Cariboo Pit					
Surface	<1.0	7.91	0.0138	0.0103	0.0507
10 m	1.6	7.94	0.0146	0.0104	0.0509
Bottom	1.2	7.94	0.0147	0.0103	0.0514
Springer Pit					
Interstitial Water	2.0	7.64	0.00279	0.00185	0.0076

6.2.3 Wight Pit

Wight Pit contains approximately 2.44 Mm^3 of stored water, sourced primarily from the dewatering of Cariboo Pit earlier in 2022. Investigations are underway to understand passive water treatment which is believed to have occurred in the Wight Pit. Golder was retained to study evidence of a naturally occurring biological reaction reducing nitrate, selenium and copper. A recent technical memorandum, entitled "Mount Polley Mine: Investigation of Potential Saturated Rock Fill at Wight Pit" was included with Progress Report #9 in December 2021 (Golder 2021b). In summary, Golder used multivariate analysis of water chemistry to investigate whether water quality improvement was due to dilution by infiltrating groundwater and found this was not the case (Figure 6). Treatment of the target analytes is occurring due to another process than dilution or displacement.

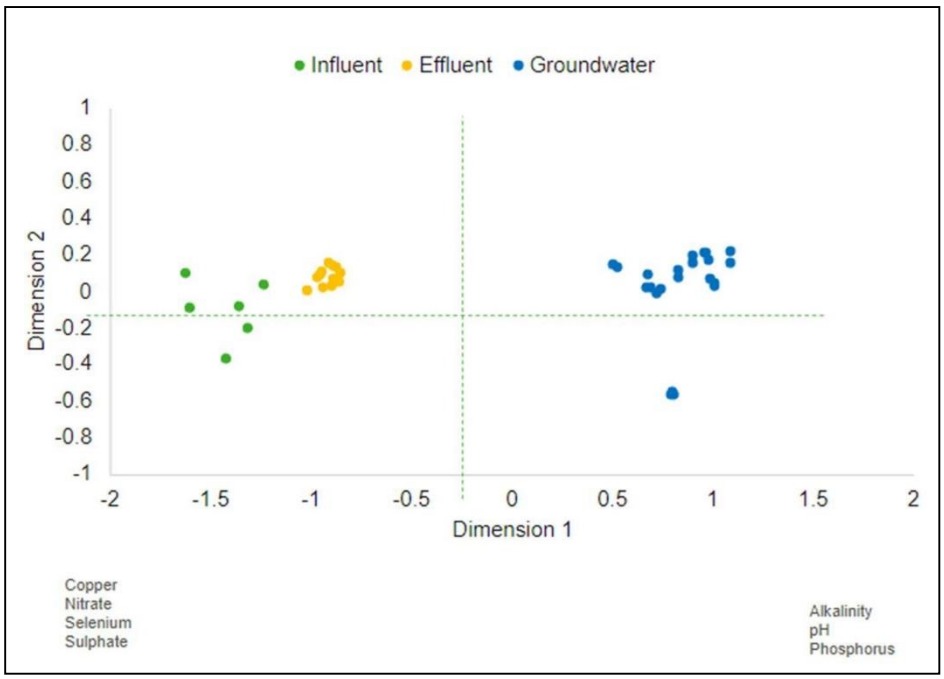


Figure 6. Visualization of Golder's Wight Pit multivariate analysis. Influent, effluent, and groundwater are dissimilar, which indicates a process other than source mixing

Work in the Wight Pit is most recently being expanded to include DNA analysis. Samples were collected from Wight Pit, the TSF, other water storage areas on-site in the winter of 2021-2022, and Golder's bench-scale reactor in the laboratory. Third party laboratory DNA analysis of the sampling was completed and results indicated the presence of several species that are potentially involved in selenium and/or nitrate removal in the pit. Copper removal through precipitation as copper sulfide was also investigated and it was determined that although some sulfur/sulfide reducing bacteria were present, the sulfate reducing bacteria were not sufficient. This, combined with the bench-scale investigation of SRF processes, discussed earlier in this report, will expand on the possibility of passive treatment in the Wight Pit.

6.3 Sodium Hydrosulphide Treatment for Copper

MPMC investigated the use of sodium hydrosulfide (NaHS) as an agent to reduce copper concentrations in water by precipitation of metal sulphides. NaHS is a water-soluble chemical used in the MPMC concentrator as a flotation activator for copper-oxide mineral processing. In the context of water treatment, it can be added to water with high concentrations of dissolved copper. Ionic minerals, including copper, will interact to form insoluble metal sulfides which can be removed from the water by settling, and therefore sequestered.

This process has been demonstrated to be effective at removing copper in bench and pilot-scale trials by MPMC personnel. A series of demonstration-scale trials were conducted in 2021 with favorable results indicating that NaHS could be a worthwhile component of the MPMC water treatment train. NaHS was used to treat water in the Cariboo Pit, Heap Leach Pad (HLP) leachate, and Tailings Storage Facility supernatant. A technical memorandum (Sterling 2021) summarizing these results was submitted with Progress Report #9 in December 2021. The positive results are attributable to NaHS dosage in conjunction with settling and clarification.

A further trial was held between January 24 and March 2, 2022, in which TSF water and HLP leachate were pumped to the Tailings Box in the mill and dosed with 10-100 ml/min of NaHS, then monitored while being pumped back to the TSF. This was designed to inform further NaHS treatment options for water sourced from other areas of the mine. These dosages appear to have been successful (Figure 7), with results from February 16 to March 2, 2022 showing a marked decrease in dissolved copper in mill discharge relative to TSF water.

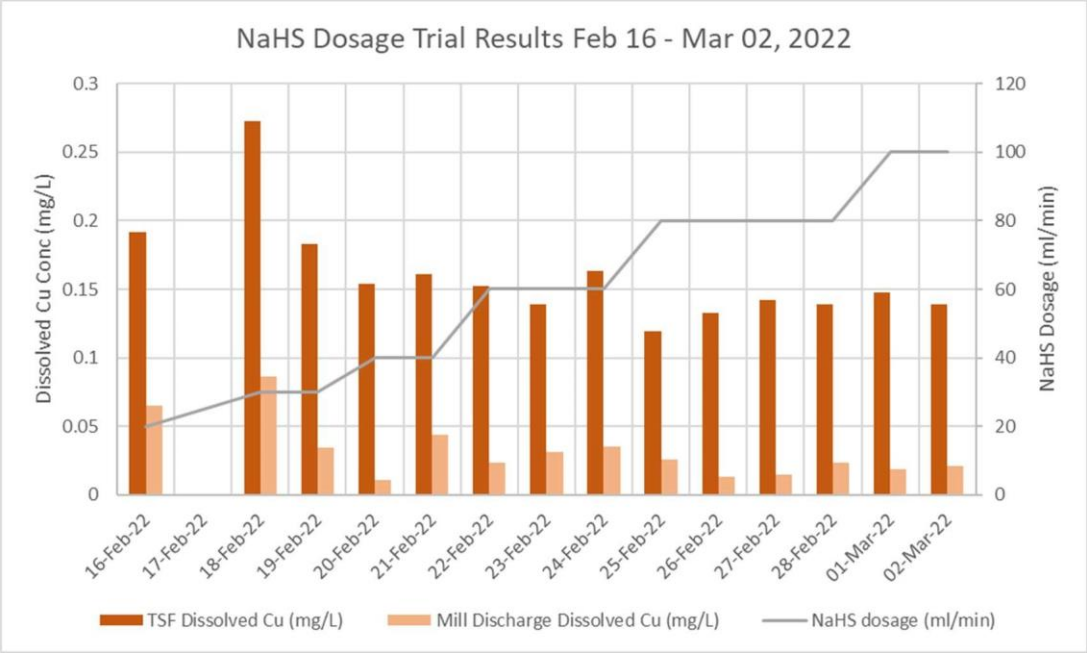


Figure 7. NaHS Dosage Trial Results Feb 16 – Mar 02, 2022. Dissolved Cu in Mill discharge water is lower than TSF source water. Dosages up to 80 ml/min appear to increase treatment efficacy.

The NaHS addition system was installed in the plant concentrator in 1997 during initial construction to assist with flotation of oxide copper minerals. The NaHS system remains in service for this purpose and can be used for future water treatment as required.

6.4 Grafta™ Treatment for Total Copper, Selenium and Other Metals

The newest treatment program being pursued by MPMC is the use of GRAFTA™ technology to remove elevated metal constituents from Northeast Zone (NEZ) seepage water. Water from the NEZ seeps have elevated concentrations of total copper and selenium, and as such NEZ seepage water has to be managed effectively on the mine site. Currently, NEZ seepage water is being pumped to the mill building for use in mineral processing or, in the event of a power outage onsite, transported to the Wight Pit where passive in pit treatment occurs.

GRAFTA™ is a nanotechnology-based adsorbent with several variations that are engineered to remove metals and organic compounds from water. GRAFTA Nanotech Inc. carried out GRAFTA™ lab-scale column adsorption test work at their laboratory in Toronto, ONT, using samples of NEZ seepage water that were shipped from the mine. The samples were used to test GRAFTA™ (fine and coarse) using a single column GRAFTA™ filter or chain of multiple GRAFTA™ filters, with which the influent (NEZ seepage water) was permeated through at a retention time of approximately 45 minutes (on average). The pH of the influent water was acidified in select tests to increase selenium removal. Functionalized GRAFTA™, that is GRAFTA™ with various reducing agents (GRAFTA™-F100 and GRAFTA™-F200), were also applied to select column tests to aid in metal reduction.

A high-level summary of findings is provided below:

- Upon testing different variations of GRAFTA™, it was concluded that the functionalized GRAFTA™-F200 was the most effective in removing both selenium and copper consistently to non-detectable levels. This was achieved through average hydraulic retentions times of approximately 45 minutes.
- Estimating the design parameters is recommended to be ensured through a larger-scale pilot to be implemented at the site and monitored for a longer period of time.
- It is estimated that the longevity of GRAFTA™-F200 should be significantly longer than what was experienced in the lab-scale tests. For an approximate 500 m^3/d flow rate of the contaminated water (i.e., NEZ seepage water), approximately 17 to 18 tons of GRAFTA™-F200 is estimated to be required which would be expected to remain active (until saturation of the adsorption sites) for several weeks to potentially months.
- Improvement in longevity at a lower retention time corresponding to lower GRAFTA™-F200 may also be possible which can be verified through onsite performance evaluation.

The findings in the technical memorandum (GRAFTA 2022) are subject to a confidentially agreement and are under review by MPMC. No further work is planned.

7. SOURCE CONTROL OPTIMIZATION STUDIES

Source control optimization is required to be performed at Mount Polley under *EMA* Permit 11678 (Dec 2022) [s 2.11.3]:

> *The permittee must undertake ongoing maintenance and surveillance of on-site water management systems and activities undertaken to increase source control of any potential contaminants of concern.*
>
> *(a) The permittee must undertake source control optimization yearly.*

MPMC undertakes ongoing maintenance, monitoring and improvements of water management systems and source control measures across the Mount Polley Mine site. This is a well-established part of operations at the Mine. MPMC's progress is described in the following sections.

7.1 Monitoring & Management Plans

Source control optimization is driven through ongoing collection and analysis of water quality and flow data per the Comprehensive Environmental Monitoring Plan (CEMP). Data is interpretated weekly to assess changing conditions and inform pre-treatment requirement, source control and discharge options. Pumping and conveyance systems are arranged to be flexible and stored volumes are managed to ensure water treatment capacity is utilized.

The environmental effects of the discharge to Quesnel Lake are monitored under the CEMP and governed by the Metal and Diamond Mining Effluent Regulations of Environment and Climate Change Canada.

Monitoring and management plans contribute to this effort, recent updates are listed;

- Comprehensive Environmental Monitoring Plan (2019) (CEMP) (MPMC 2019)
- Annual Discharge Plan
- Sediment and Erosion Control Management Plan
- ML/ARD Management Procedure Manual (Aug 2022) (MPMC 2022b)
- Water Management Plan (Nov 2020) (Golder 2020a)
- Water Balance Model (Golder 2022a)
- Water Quality Model (Golder 2022b)
- Flocculant Management Plan (Golder, 2023a)
- Erosion and Sediment Control Plan Review Report (Golder, 2023c)

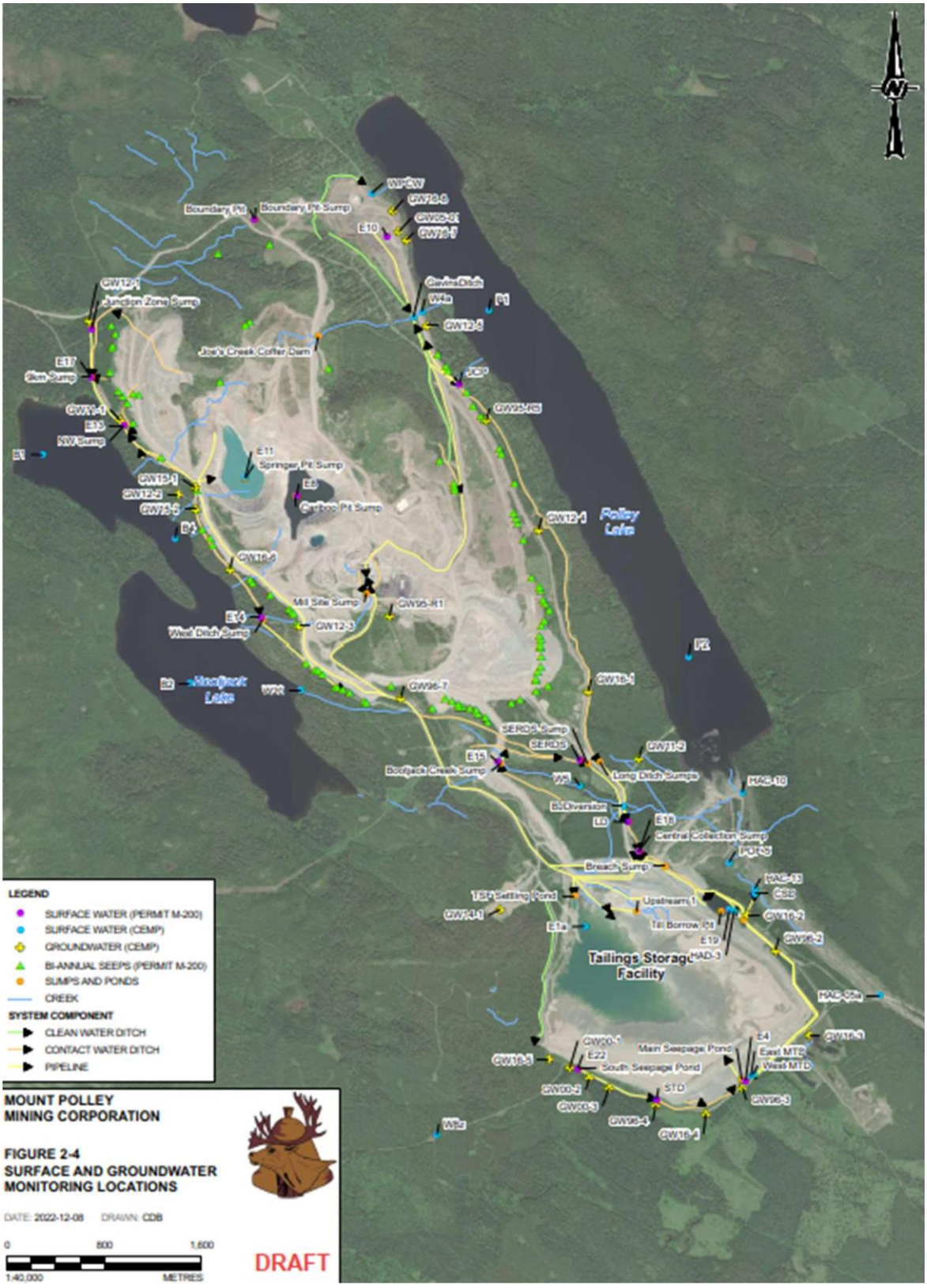
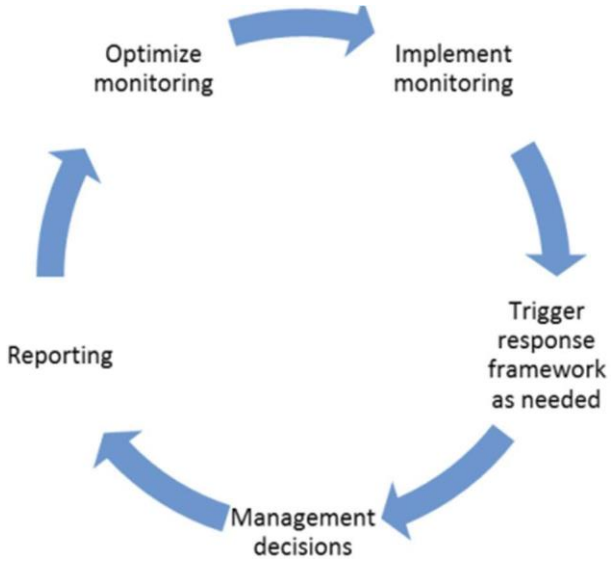


Figure 6. CEMP Monitoring Locations

EMA Permit 11678 (Dec 2022) [s 2.12(d)] requires reporting on source control optimization. Recent interpretative reports influencing treatment options and source control decisions;

- Phase 2 Environmental Effects Monitoring Program Interpretative Report (Minnow 2019)
- 2022 Annual Environmental Report for the Mount Polley Mine. BC Ministry of Environment and Climate Change Strategy. Mount Polley Mining Corporation.

Monitoring for a specific year will be verified in monitoring work plans following the adaptive management framework.



7.2 Booster Station Overflow Alarm System

The TSF Booster Station overflow valve is used to manage supernatant water in the TSF and achieve Engineer of Record specifications for water storage and beach width by sending water from the TSF to the WTP influent pond. Although this system is essential for safe management of the TSF, its use has the potential to overwhelm the water treatment capacity of the plant, and it has been associated with copper exceedances in the past, most recently on May 31, 2022.

A full investigation report was prepared which shed light on the May 2022 permit exceedance and the possible role of the TSF booster station during that event. One planned remedial action was to install an alarm which will alert mine managers and operators when the booster station valve is open, to limit the extent of release. The booster sump water levels and high-level alarm system is monitored by the Control Room operator in the concentrator building. The plant supervisor travels the reclaim and tailings pipeline system once per shift during operations.

7.3 Heap Leach Pad Decommissioning

The experimental lined Heap Leach Pad (HLP) and excessed stockpiled elemental sulfur was identified as a source of acid rock drainage in a report; An Investigation into Determining the

Source of Elevated Metal Concentrations in Seepage at the Mount Polley Mine (Litke 2019). The acidity has been neutralized by reaction with carbonate and silicate minerals in the waste rock, but it resulted in depressed pHs and occasional breakthrough of acidic waters to waste rock seeps. The removal of the elemental sulfur pile seems to have arrested the downward trend in pH and upward trend in copper. (SRK 2022a)

A plan was developed to decommission the infrastructure, drain down and treat the leachate by NaHS addition and dispose the excess sulfur and HLP construction materials in the Tailings Storage Facility.

The decommissioning plan (Sterling 2022) was submitted to the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) in April 2022. The disposal option for each material type was chosen based on geochemical characterization by qualified professionals at SRK Consulting. EMLI commented on the plan in a letter on October 13, 2022. MPMC responded to comments on May 12, 2023 after a meeting with EMLI on May 4, 2023. The decommissioning plan will be finalized once the comment period is completed.

Currently the elemental sulfur has been relocated to the HLP and contained above the HDPE liner. Precipitation on the HLP contributes to leachate production which in managed by intermittent pumping to the concentrator for NaHS treatment and discharge to the TSF. The Northeast Zone seeps at the toe of the Rock Disposal Site is collected and pumped to the concentrator for use as process water.

7.4 Review of Geochemical Source Terms

To support water quality prediction and waste management planning, Mount Polley operates kinetic tests on waste rock and tailings. This work is undertaken by SRK Consulting, with the most recent result from this test reported in a March 22, 2022 memo (SRK 2022a).

While not directly relating to water treatment, this work provides information on site water chemistry and is helpful to understand and predict water quality arising from contact water and rock dump seepage.

In 2022, the Mine Site's geochemical source terms were reviewed by SRK, as a basis for extending MPMC's *EMA* Permit 11678 permitted discharge period. SRK found that no update to the source terms was required (SRK 2022a). The SRK memo indicated that seepage from RDSs has been mostly stable for key parameters over the monitoring period, except for localized influences from sulphuric acid water likely originating from the Test Heap Leach. (Golder 2022g)

7.5 Erosion and Sediment Control Plan Review and Update

In accordance with Permit 11678 s 2.6.2, MPMC's Erosion and Sediment Control Plan (ESCP) was reviewed and an ESCP Review Report provided. Modifications recommended in the review report are currently being applied to MPMC's ESCP. The ESCP Review Report provided by Golder was appended to the 2022 Annual Environmental Report submitted in March 2023. The updated ESCP is anticipated to be completed and submitted in Q3 2023.

8. REVIEW OF DISCHARGE ALTERNATIVES

EMA Permit 11678 (Dec 2022) s 2.11.4 requests the permittee to review discharge alternatives to Quesnel Lake:

> *The permittee must review discharge alternatives for direct discharge of treated mine water on and around the mine site including considering the following mine phases: operations, care and maintenance, closure, and post-closure.*
>
> *The review of discharge alternatives must include consideration of:*
>
> *(a) Passive and semi-passive water treatment options for distributed discharges across the mine site informed by the Water Management Plan dated November 27, 2020, and most recent Reclamation and Closure Plan for the site,*
>
> *(b) Physical (geomorphological and hydrological), chemical and biological characteristics of potential receiving environments, and*
>
> *(c) The capacity of the proposed discharge locations to receive the additional discharges of treated water and meet applicable environmental benchmarks.*
>
> *(d)* This section of Progress Report #12 addresses *EMA* Permit 11678 (Dec 2022) s 2.12 I*(e) summary and discussion of proposed alternative discharge locations that have the capacity to receive the treated water and changes from the previous progress reports,*

The Mine Plan and Reclamation Program Update 2022 (MRP) (Golder 2022g) s 5.2.4 addresses subjects related to water treatment, water balance and water quality for the periods of operations, closure, and post-closure. Further context is provided in MRP Appendices G, H & I.

The MRP s 5.2.4 discusses the approach to alternative discharge locations;

Currently, one objective for the active and post-closure phases of the Mine Site's life cycle is the development and implementation of a decentralized passive/semi-passive water treatment system. Given that the Mine Site was developed on a watershed divide, it is desired that such a system returns water to its respective pre-development watersheds – an objective consistent with the Environmental Assessment and input from local communities and First Nations. Ultimately, this decentralized system will be achieved using passive/semi-passive technologies developed through bench scale and pilot testing. The status of current research towards this end is discussed in Section 4.4. (*this report Section 3*)

While a distributed system is desired for active and post-closure, there are several challenges that will need to be overcome. For instance, the ability of the receiving environment to accommodate the post-closure flows needs to be carefully assessed. Given that runoff from disturbed areas is higher than runoff from forested areas (the pre-mine case), the flow volumes during early post-

closure may be too great to be accommodated without damaging the existing receiving environment and their associated habitats. Further, water quality receiving environment targets are likely to become more stringent, given the lower assimilative capacity of these receiving environment. Although distributed passive/semi-passive treatment and discharge is a desired closure outcome, these technologies have not yet been fully developed to full scale and face permitting uncertainty. The assumed treatment configuration for active and post-closure is pit lake pre-treatment followed by centralized Actiflo treatment (one the closure BAT options identified (Golder 2016c). Figure 5 1 and Figure 5 2 provide the current models for active closure and post-closure water management. Appendix H and Appendix I provide discussion on predicted water balance, water management, and water quality at closure. Figure 5 3 shows the anticipated catchments for the post-closure environment.

End of Excerpt from the MRP (Golder 2022g)

9. CONCLUSION

Environmentally responsible water management, treatment, and discharge are priorities at Mount Polley Mine. Effluent treatment, and interrelated monitoring and optimization activities, conform with the requirements of Permit 11678, including Sections 2.11 and 2.12. MPMC is actively pursuing the following water treatment or discharge optimization technologies: Actiflo optimization, lime treatment, pit lake treatment, saturated rock fill (SRF), packed bed reactor (PBR), constructed wetland treatment (CWT), and source control improvements.

Attainment of the NPM is becoming more prevalent over time, with 70% of WTP samples collected from January 1 to June 6, 2023 below this threshold. Discharge total copper measured 0.01075 mg/L over a 52-week rolling average to June 6, 2023. This represents superior discharge performance relative to previous 6- month update periods.

As MPMC restarts and builds capacity, treatment actions are being continuously improved. The decommissioning of the Heap Leach Pad with BC-EMLI approval following a staged approach is being planned. Mount Polley strives for continual improvement and adaptive management, in collaboration with technical experts, local communities, First Nations, and regulators.

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11. CONCORDANCE TABLE

Table of Concordance Water Management Progress Reporting

EMA Permit 11678 s 2.12	Requirement Description	Reference
2.12 (a)	Results of all BAT assessments	MPMC 2014 Golder 2015 Golder 2016a MPMC 2021 MPMC 2022
2.12 (b)	Bench and pilot testing of treatment systems,	Golder 2016b Golder 2017a Golder 2017b Golder 2019a Golder 2019b Golder 2019c Golder 2019d Golder 2020b Golder 2020c Golder 2020d (concept) Golder 2021a (concept) Golder 2021b Golder 2022d Golder 2022e Golder 2022f GRAFTA 2022 Golder 2023b Golder 2023d
2.12 (c)	Progress on implementation of response action(s) for attainment of the NPM target value,	Sterling 2021
2.12 (d)	Source control optimization studies	Litke 2019 MPMC 2019 MPMC 2022b Golder 2020a Golder 2022a Golder 2022b Golder 2022c SRK 2022 Sterling 2022

2.12 (e)	Summary and discussion of proposed alternative discharge locations that have the capacity to receive the treated water and changes from the previous progress reports,	Golder 2022g

EMA Permit 11678 s 2.12	Requirement Description	Reference
2.12 (f)	Documentation that the testing and piloting programs are relevant for all the different types of mine influenced water on site and	Golder 2022g
2.12 (g)	Any other studies related to the Water Treatment and Discharge Program outlined in section 2.11.	N/A

Appendix A

REPORT

Mount Polley Mining Corporation

Bench-scale Leaching Test Report

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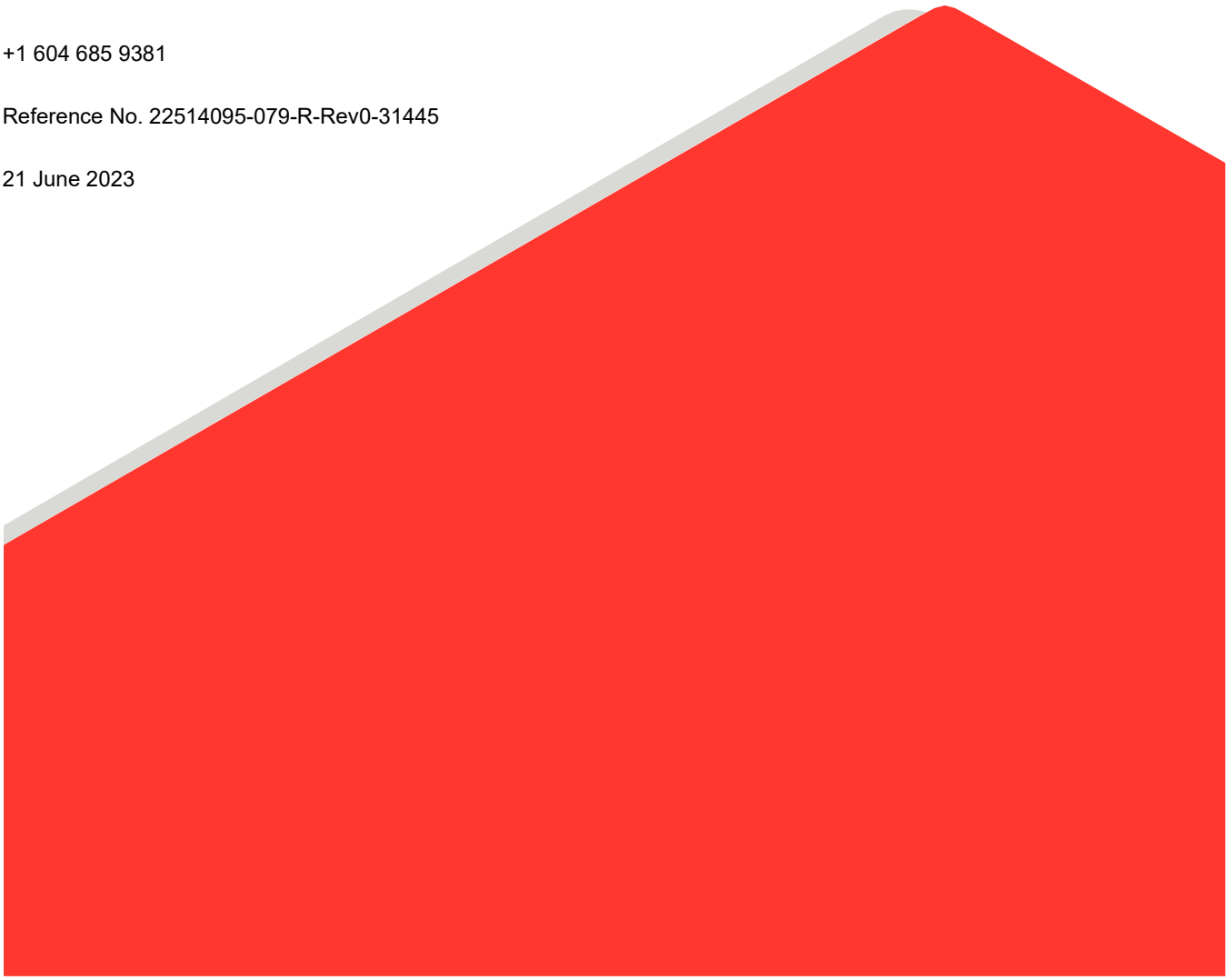
21 June 2023



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Executive Summary

Mount Polley Mining Corporation (MPMC) retained WSP Canada Inc. (WSP) to carry out a long-term bench-scale leaching test in a saturated rock fill (SRF). The objective of the leaching test was to evaluate the extent to which leaching of metals occurs from the waste rock material in an SRF reactor under reducing conditions. The leaching study also provided information on the duration of time before the onset of leaching is observed after a period of continuous operation as well as the period that is needed for leaching to stabilize in the system. Metal leaching is a common issue in all in situ anaerobic remediation technologies where a media is used as support for the attached growth of bacteria in the system including packed bed reactors (PBR), biochemical reactors (BCR), and SRF. The findings of this long-term leaching test emphasized the importance of studying metal leaching behaviour in attached growth systems which rely on creating an anaerobic zone in an aquifer for contaminant removal. The industries considering the implementation of these systems for full-scale water treatment purposes must consider and plan for the potential release of leachable metals such as arsenic, manganese, and iron.

To achieve these objectives, a custom-fabricated SRF cell, that was previously used in the proof-of-concept work (Golder 2021), was used to conduct the bench-scale tests. The SRF was filled with a representative source of rock that was retained from the Site. The bench-scale test work was conducted for a duration of 52 weeks and included 3 main phases: Initial Batch Phase (Inoculation), Start-up, and Continuous Testing.

Acetic acid and phosphoric acid were used as carbon and phosphorous sources for growth of microorganisms in the SRF. The stoichiometric molar ratio of acetate was calculated for the reduction of all nitrate and selenate in the feed. To avoid limiting carbon situation, 2 to 5-times stoichiometric carbon source was added to the SRF throughout the test. The amount of dosed carbon source was adjusted based on the oxidation reduction potential (ORP) in the effluent of SRF to be within the targeted optimum range of ORP for selenium (Se) and nitrate (NO_3) removal. To monitor the concentrations of selenium, nitrate, and leachable metals especially copper, arsenic, manganese, and iron, samples were taken from the influent feed water and the effluent of the system. Two types of sampling were conducted, bench parameter monitoring (in-house) and laboratory analytical monitoring (ALS).

The results of the bench-scale test work provided insights on the extent and timeline for leaching of metals from the rock media. To understand the effect of reducing conditions on metals leaching from the media in the SRF under study, the total and dissolved concentrations of metals were monitored during the bench-scale trial. The leaching behaviour varied for different metals; some were removed, some did not change, and some were leached in the effluent of the bench-scale SRF reactor system. Overall, none of the metals being leached into the SRF effluent were above site-specific treatment targets except for iron.

For the metals that leaching occurred in the system, leaching was observed during inoculation and start-up of the test and generally the rate of leaching decreased over the course of testing. Some of the metals including copper, and molybdenum that were leached, were later removed in the system during continuous testing. Leaching of arsenic stopped during continuous testing but after approximately 120 days, the concentration of arsenic in the bench-scale SRF reactor system increased slightly. For other leachable metals such as iron and manganese, leaching continued until the end of the test.

Selenium and nitrate reductions were also monitored during the long-term bench-scale test work. The bench-scale SRF reactor demonstrated excellent performance in selenium and nitrate removal with average percentage removal of 98% and 96%, respectively. The SRF technology was evaluated as a cost-effective alternative to an active treatment system and was shown to perform reliably in terms of Se and NO_3 removal. Due to the diversity of the microbial community in the system, this technology was also resilient in response to changes in the influent water chemistry and operational condition such as ORP. However, the leaching data confirmed that proper monitoring and management of metal leaching is critical in operating SRF treatment systems.

Study Limitations

WSP Canada Inc. (WSP) has prepared this document in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warranty, express or implied, is made.

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1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) retained WSP Canada Inc. (WSP) to conduct a long-term bench-scale leaching test to provide insights to the client on the extent to which leaching occurs from a waste rock material collected from the site as a potential media for saturated rock fill (SRF) treatment.

This bench-scale leaching test work followed the “proof-of-concept” test works in which it was demonstrated that packed bed reactor (PBR) (Golder 2019) and saturated rock fill (SRF) (Golder 2021) technologies are capable of selenium (Se) and nitrate (NO_3) removal from mining influenced water (MIW). However, WSP identified elevated concentrations of metals including copper (Cu), iron (Fe), arsenic (As), and manganese (Mn) in the effluent of the proof-of-concept SRF system (Golder 2021). This raised a concern that the metals may have been released from the waste rock under reducing conditions which is required for the reduction of Se and NO_3 in bioreactors. Consequently, a long-term leaching test was conducted to evaluate the extent to which leaching occurs from the waste rock material in an SRF reactor under reducing conditions. The leaching study also provided information on the duration of time before the onset of leaching is observed after a period of continuous operation as well as the period that is needed for leaching to stabilize in the system. The leaching of metals from SRF media needs to be appropriately managed through selection and characterization such as the testing presented herein and consideration of polishing treatment technologies, if necessary, downstream of SRF to ensure compliance with discharge criteria.

2.0 OBJECTIVES AND SCOPE OF WORK

The objectives of the bench-scale leaching test were as follows:

- Understand the extent of metals leaching from the rock media in the SRF reactor under reducing conditions.
- Understand the timeline for onset and stabilization of leaching effects.
- Monitor the concentrations of Se, NO_3, Cu, and some leachable metals such as As, Fe, Mn over the duration of the test.

The scope of work included the following tasks:

- Procurement of necessary test materials and supplies, some of which were supplied by MPMC.
- Design of experiment and execution of bench-scale test work.
- Preparation of a report (current document) that summarizes the results of the bench-scale test work and includes recommendations for implementation of detailed bench-scale treatment systems.

3.0 SYSTEM DESIGN AND CONSTRUCTION

A block flow diagram of the bench-scale testing is provided in Figure 1. The leaching test took place in a bench-scale reactor designed to simulate the anaerobic conditions in a full-scale SRF. The process for the bench-scale leaching test is based on the “proof-of-concept” bench-scale process for SRF (Golder 2021) without the aeration cell and the settling cell.

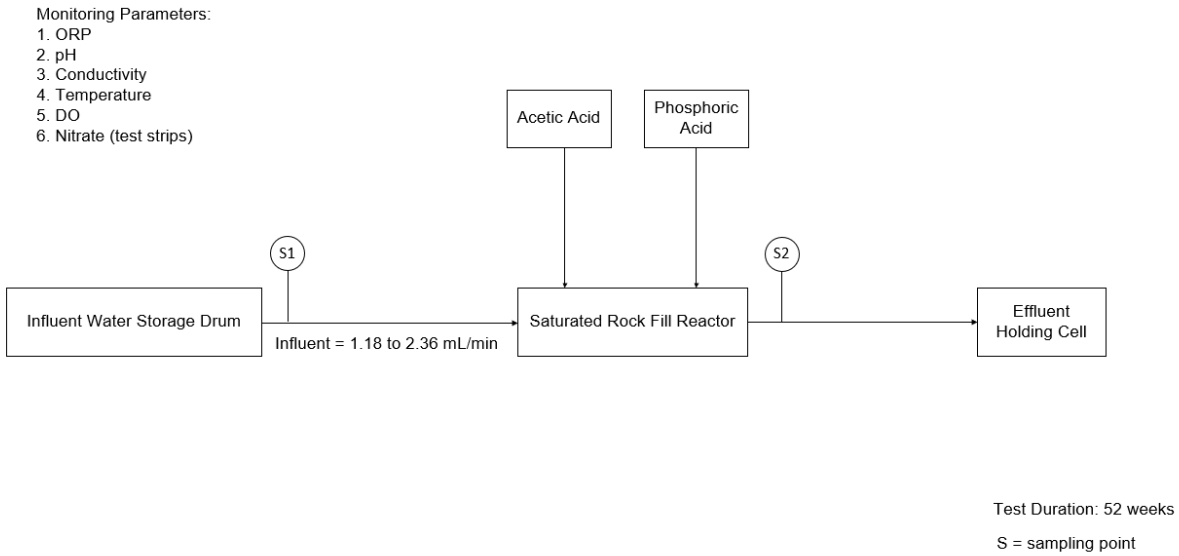


Figure 1: Block Flow Diagram for Bench-Scale Testing of SRF Leaching Test

3.1 Saturated Rock Fill Reactor

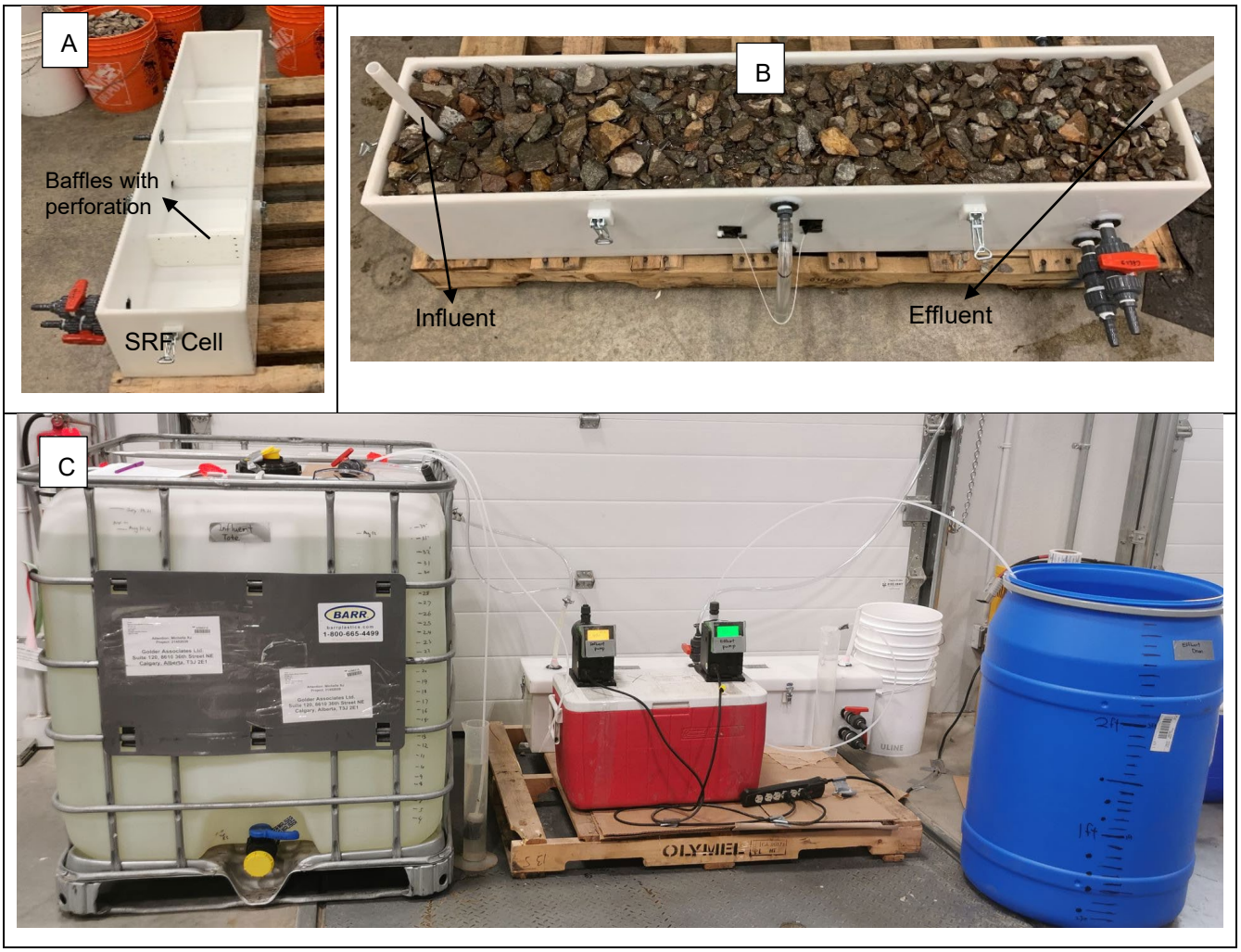
The SRF is a fixed-film anaerobic reactor which is commonly designed and implemented for removal of selenium and nitrate from MIW. The SRF consists of a submerged waste rock bed media which provides a biofilm growth surface for attachment and growth of bacteria. Within the rock media void spaces exist, where oxygen is consumed by microorganisms and anaerobic conditions prevail.

Under anaerobic conditions, the Se removal mechanism includes reduction of soluble oxidized forms of Se to particulate elemental Se by selenium reducing bacteria (SeRB). Nitrate is removed by the process of denitrification where nitrate reducing bacteria (NRB) facilitate the reduction of nitrate to nitrogen gas. The nitrate reduction process is more energetically favourable to the microbial community than the Se reduction pathway, and nitrate is generally reduced prior to Se reduction. Some nitrate reducing bacteria can reduce Se as well. Carbon and phosphorus dosing is required as nutrient sources for energy production and cell synthesis of anaerobic bacteria.

3.1.1 Bench SRF Reactor Design

As discussed in the previous Section, nitrate reduction affects the rate of Se reduction in the SRF. Since concentration of nitrate is orders of magnitude higher than Se in MIW, nitrate reduction hydraulic retention time (HRT) is the limiting factor and is selected as the main design criterion for the SRF.

In addition, the dimensions of the bench-scale SRF units were determined to replicate those of the Wight Pit (Golder 2021). To test the SRF unit process, a custom-built 79-L open top polyethylene basin was used (**Photograph 1A**). The basins were fitted with sampling ports for effluent sample collection, a level sight tube, and an off-gassing valve on the lid to vent gas build-up. The substrate mixture provided by MPMC consisted of waste rock that was washed and screened to ¼" to 3" particle size in the WSP Laboratory. The assembled cells with media are shown in **Photograph 1B**. The assembled SRF reactor system is shown in **Photograph 1C.** Nutrients (carbon and phosphorous) were manually added to the SRF cells through an injection valve on the influent feed line. The key SRF design parameters are provided in Table 1.



Photograph 1: A) Empty Custom-Built SRF Cells with Effluent Sampling Valves B) Assembled SRF Cells with Submerged Waste Rock Media and Level Sight Tube C) Assembled SRF Reactor System

Table 1: Key Saturated Rock Fill Reactor Design

Design Parameter	Unit	Value
Overall SRF reactor dimensions	length (m) × width (m) × height (m)	1.22 m × 0.254 m × 0.254 m
SRF bed volume	L	79
SRF submerged bed volume	L	62
SRF bed porosity	%	38%
Estimated HRT at design flow rate of 2.36 mL/min	days	7

Notes:
m metres.
L litre.
HRT hydraulic retention time.
mL/min millilitre per minute.

3.2 Source of Rock Media

Representative waste rock from the site was used as the attached growth media for the SRF leaching test work. The waste rock sample that was used in this bench-scale test work was supplied by MPMC and is assumed to be representative of the waste rock in Wight Pit. Based on the rock type and information provided by MPMC, WSP determined that the waste rock in the SRF portion of Wight Pit (below 860 m) was predominantly PAG (95 wt%) and that it consists of waste rock originating from South East Pit (59 wt%) and Springer Pit (35 wt%).

Representative waste rock samples for bench-scale testing were supplied by MPMC from two locations for the SEZ/PZ material (UTM 10 592699 5825548 and 592895 5825231) and one location for the Springer Pit material (UTM 10 592886 5825268). These samples were sourced from a depth of approximately 2 m below surface. The rock was screened to 3/8” to 3” particle size and was washed in the WSP Laboratory prior to use in this test.

3.3 Source of Inoculum and Influent Water

Biomass collected from a bench-scale bioreactor previously operated by WSP was used as inoculum for the bench-scale leaching test. The inoculum had a density similar to water with a slight grey color and some suspended solids. Prior to the batch inoculation of bench-scale SRF reactor, the inoculum was stored in the fridge to preserve the bacteria. The inoculum was mixed with influent water at 15% volume/volume ratio which was based on the previous proof-of-concept test work (Golder 2021). Approximately 3.6 L of the inoculum was added into the 20.2 L of influent water to create the inoculation solution.

The influent water for the bench-scale leaching test was collected from Joe’s Creek Pipe (JCP) at the Site, as it was identified as the site that best represents the anticipated closure water quality (DWB 2021). WSP noted that although nitrite and most total metal concentrations at JCP from February 2020 to January 2021 are significantly lower than the corresponding concentrations during post-closure, the concentrations for target analyte (parameter of interest from water treatment presentive), primarily Se and NO_3, at JCP are comparable to the post-closure water quality. WSP is aware that phosphorous in JCP exceed the proposed treatment targets. The purpose of the leaching test work was not to target the removal of these constituents per se, but to establish the extent to which leaching occurs under the reducing conditions in an SRF reactor. The full SRF treatment system is likely to include carbon and nutrient polishing steps downstream of the SRF reactor in order to meet the treatment target.

MPMC collected bulk water samples from JCP in two 1,000 L totes, which was sufficient to facilitate up to 52 weeks of bench-scale work. The average water quality of target analyte in the bulk water samples received is summarized in Table 2 along with the average water quality from JCP from February 2020 to January 2021, modelled post-closure influent water quality and the proposed discharge target.

The water quality of the two totes was comparable with the average water quality at JCP from February 2020 to January 2021 except for phosphorous. The phosphorus concentrations in the totes were lower than the corresponding concentration in JCP. However, as indicated above, the purpose of the test work was to establish the extent to which leaching occurs. This lower phosphorus concentration did not affect the test work; more phosphoric acid was dosed into the SRF reactor as nutrient to account for this.

3.4 Effluent Water Quality

Although the purpose of the leaching test work was not to remove target analyte, the proposed discharge targets are presented in Table 2 as a reference. These targets are based on SRF effluent being discharged to Polley Lake as the receiving body and are based on the latest data available to WSP at the time of writing this report which was the 2017 Reclamation and Closure Plan (RCP) Water Quality Modelling Report (Golder 2017). WSP is aware that the RCP is currently being updated and these values may change in the future based on the new RCP. The Polley Lake closure water quality targets are used as the discharge targets for water treatment design purposes. Should the option to discharge to Polley Lake be retained, it is anticipated that a future permit amendment would use a smaller list of target analyte, and that the concentration values and volumes in the discharge would be evaluated for suitability for discharge, supported by plume modelling if required (i.e., as is commonly done for a Technical Assessment Report).

These proposed discharge targets should not be viewed as proposed permit limits because the necessary work to develop permit limits has not yet been undertaken and requires the identification of treatment effectiveness and a Best Achievable Technology (BAT) assessment when the operational characteristics of the technology are known. The specific scope of work to support permitting would be based on application instructions from BC ENV.

Table 2: Average Water Quality of Target Analyte and Proposed Treatment Targets for Discharge to Polley Lake

Parameter	Unit	Joe's Creek Pipe Average Water Quality [(a)] (±Standard Deviation)	Joe's Creek Pipe Tote 1 Average Water Quality (±Standard Deviation)	Joe's Creek Pipe Tote 2 Average Water Quality (±Standard Deviation)	Post Closure Influent Water Quality [(b)]	Proposed Discharge Target [(c)]	Proposed Discharge Target Notes [(d)]
Physical Parameters							
pH	s.u.	7.8 (±0.3)	7.39 (±0.26)	8.32 (±0.10)	Not modelled	6.5 - 9.0	NA
Alkalinity	mg/L as $CaCO_3$	92 (±14)	85.5 (±2.6)	79.3 (±6.0)	Not modelled	NA	NA
Major Ions							
Sulphate (SO4)	mg/L	851 (±151)	750 (±21)	697 (±131)	840	1361	EDO
Nutrients							
Nitrate (as N)	mg/L	11.1 (±4.5)	6.77 (±0.24)	6.11 (±1.02)	**20**	14	EDO
Nitrite (as N)	mg/L	<0.010	0.010 (±0.015)	0.0058 (±0.0017)	**0.5**	0.096	EDO
Phosphorus (P)-Total	mg/L	**0.043 (±0.007)**	0.014 (±0.010)	0.010 (±0.009)	**0.05**	0.036	EDO, no change in trophic status
Total Metals							
Aluminum (Al)-Total	mg/L	0.01 (±0.01)	0.012 (±0.004)	0.008 (±0.004)	**0.9**	0.39	EDO
Copper (Cu)-Total	mg/L	0.021 (±0.002)	0.017 (±0.002)	0.015 (±0.004)	**0.05**	0.033	Permit 11678
Iron (Fe)-Total	mg/L	0.037 (±0.013)	0.033 (±0.021)	0.018 (±0.018)	**1.13**	1	Max WQG
Selenium (Se)-Total	mg/L	**0.10 (±0.01)**	**0.092 (±0.010)**	**0.098 (±0.008)**	**0.1**	0.0064	EDO

Notes:

(a) Water quality at Joe's Creek Pipe is the average of 5 samples collected between February 2020 to January 2021.

(b) Influent for Centralized Water Treatment based on predicted site water quality in the Perimeter Embankment Till Borrow Pond (PETBP) at closure - reproduced from the Closure Water Treatment Conceptual Design Report (Golder 2016a).

(c) Polley Lake Closure Target- reproduced from the Reclamation and Closure Plan Water Quality Modelling Report (Golder 2017).

(d) Proposed treatment targets for discharge to Polley Lake post-closure were derived from the lowest of Effluent Discharge Objectives (EDOs), Metal Mining Effluent Regulations (MMER) limits, maximum BC water quality guidelines (WQGs) or alternate acute screening values (ASV). EDOs are back calculated to meet WQGs in the receiving waterbody. The max WQG when there is no 30-d WQG was used in the calculation of EDOs, unless noted otherwise. WQGs specified for the protection of aquatic life were considered in the evaluation of the treatment targets unless noted otherwise. WQGs were calculated based on a baseline hardness in the receiving environment. ASVs are maximum WQGs based on source water chemistry or alternative screening value identified in the LTWMP-TAR. Further details on the evaluation of the treatment targets can be found in the Golder 2016 report (2016b). For total copper the maximum water quality in the current water treatment plant effluent is used according to the Environmental Management Act (EMA) Permit 11678, as amended on 1 February 2020 (BC ENV 2020).

s.u. standard units.

X Indicates concentration exceeding the closure treatment targets for post closure.

NA Not applicable.

EDO Effluent Discharge Objectives.

WQG Water Quality Guideline.

3.5 Test Location and Conditions

The bench-scale tests were conducted at WSP's laboratory and warehouse, located in Calgary, AB. The entire test period of 52 weeks was divided into three phases, the inoculation, the start-up, and the testing phase. Table 3 provides a summary of the flow rates for each phase. The conditions for the testing phase were adjusted depending on the performance of the system during the start-up and the data in the previous testing phases, if needed.

During inoculation, the SRF reactor was filled with rock media; then a mixture of inoculum (15% v/v) and site water (85% v/v) was added into the SRF to initiate the growth of SeRB. The experiment was initially started in batch mode to allow time for bacteria to grow in the system. This initial batch phase was also needed for anoxic conditions and nitrate reduction to develop in the SRF.

After nitrate reduction activity was observed in the system, the reactor was switched to continuous mode. The forward flow was started at a slow flow rate of 1.18 mL/min to avoid the risk of washout of the SeRB from the system. The flow rate was then increased in a stepwise manner to reach the targeted flow rate and consequently the targeted hydraulic retention time (HRT) for the testing phase. During testing phase, the flow rate was maintained to have a constant HRT of 7 days in the reactor for which high removal of selenium was observed during the previous SRF bench-scale tests (Golder 2021). Carbon and phosphorus were dosed twice per week as nutrients to support the growth of microorganisms in the system. Since the influent contained appreciable nitrate concentration, additional nitrogen dosing was not required.

Table 3: Summary of Test Conditions

Experimental Phase	Inoculation	Start-up Phase[(a)]	Testing Phase
Flow Rate	0 mL/min	1.18 to 2.36 mL/min	2.36 mL/min

Note:

(a) This phase is initiated once 50% nitrate reduction is achieved during inoculation.

3.5.1 Flow Rate Calculations

Since the size of SRF cell was determined by the size of readily available container used for proof-of-concept test work, the flow rates were adjusted to achieve the desired HRTs. The design HRTs for the SRF for different phases were set as discussed in Section 4.0. The pore volume was determined by measuring the volume required to submerge the substrates, approximately 2 to 3 cm above the rock surface. The pore volume for the SRF was 23.78 L, and the liquid level was maintained constant throughout the entire bench trial unless an unforeseen event happened in the system. Based on pore volume of 23.78 L, the calculated influent flow rate was 2.36 mL/min for the continuous operation to achieve the HRT of 7 days.

3.5.2 Nutrient Dosing Calculation

Acetic acid was provided as carbon source. The required amount (moles) of acetate was calculated using two different approaches.

The first approach calculates the acetic acid required based on the electron demand from the influent water. A stoichiometric molar ratio was applied to the acetic acid required to avoid carbon limiting situation and accommodate the higher bacterial specific growth rate. The ratio was adjusted to maintain a residual total organic carbon (TOC) in the effluent similar to the residual TOC in the previous proof-of-concept SRF test (Golder 2021).

Throughout the leaching test, it was observed that this dosing approach resulted in overdose of carbon source, which resulted in undesired sulphate reduction in the SRF reactor (see Section 6.2.1 for discussion on the relationship between carbon source dosing and selenium and sulphate reduction). A second carbon source dosing approach was adopted.

The second approach assumes that only 60% of acetate is used by the bacteria for energy production and the rest of 40% acetate was used for cell synthesis. The stoichiometric molar ratio of acetate was calculated for the reduction of all nitrate and selenate in the feed. To avoid carbon limiting situation and accommodate the higher bacterial specific growth rate, 2 to 5-times stoichiometric excess carbon source was added to the SRF. The amount of dosed carbon source was adjusted based on the ORP in the effluent of SRF to be within the targeted optimum range of ORP for Se and nitrate removal.

Phosphoric acid was dosed to the SRF as phosphorous source at a 10:1 nitrogen to phosphorus (N:P) molar ratio. To maintain the 10:1 N:P molar ratio with the influent nitrogen concentration, 1.52 mg/L of phosphorous was required, equivalent to 0.011 mL/day of 85% pure solution of phosphoric acid.

A 100 – 1000 µL variable volume micropipette was used to dose both acetic acid and phosphoric acid. Acetic acid was dosed from a fresh bottle of 99.5% glacial acetic acid from VWR International. For accurate dosing of phosphoric acid, the 85% phosphoric acid from Aldon Corporation was diluted to a ratio of 1:10 in DI water and then dosed into the reactor.

In full-scale system, nutrient is typically dosed continuously. However, due to low flow rates in the bench-scale leaching test and the minimum achievable flow of available pumps, it was not feasible to dose nutrients continuously. Nutrients were dosed into the reactor twice a week instead. Refer to Appendix A which summarizes nutrient dosage and dosing frequency.

4.0 OPERATIONS

The bench-scale system was intended to operate for 52 weeks. The testing period was divided into three phases, initial batch inoculation, start-up, and continuous testing.

- Initial Batch Inoculation (Phase 1): During Phase 1, the reactor was running in a closed system without any influent pumping in or effluent out from the reactor. This objective of this phase was to give time for SeRB to grow biofilms on the rock media and adapt to the new environment.
- Start-up (Phase 2): During Phase 2, the influent and effluent pumps were switched on to continuous mode. The pumping rates were adjusted gradually to obtain the desired HRT. The stepwise increase in pumping rate was to prevent washout of bacteria and to give time for the microbial communities to adapt to increasing flowrate.
- Continuous Testing (Phase 3): During Phase 3, the influent and effluent pumping rates were maintained at the desired HRT. Regular analytical samples were collected to monitor the extent of metal leaching during steady state operation.

At the beginning of the experiment, two sets of influent samples were collected from each raw water tote to establish a baseline for influent water quality. The date on which the influent sample was collected, was considered as Day 0. Phase 1 started on Day 14 following setting up of the SRF reactor system. The operations phases are presented in Table 4.

Table 4: Summary of Operation Phases

Phase	Phase Description	Phase Duration
1	Initial Batch Inoculation	Day 14 to Day 34 (Week 2 to Week 5)
2	Start-up	Day 34 to Day 93 (Week 5 to Week 13)
3	Continuous Testing	Day 93 to Day 377 (Week 13 to Week 54)

During the 52 weeks of batch inoculation and continuous testing, WSP was responsible for coordination of analytical sample delivery to a third-party laboratory designated by MPMC (i.e., ALS). ALS conducted quality assurance (QA) and quality control (QC) of the analytical parameters. WSP reviewed the data on a regular basis and compiled all measured bench parameters and analytical test results in an incorporated meta data table.

Additional activities during operation phase included:

- Weekly checks on pumps and quarterly replacement of system tubing to ensure the system is flowing and no obstructions have occurred that block the flow.
- Weekly calibration on multi-meter probe for bench parameter measurements.
- Weekly bench parameter measurements.
- Quarterly blind duplicates and one set of blank sample collection for QA/QC.

4.1 Initial Batch Inoculation (Phase 1)

After the bench-scale SRF reactor system was constructed, on Day 14, the SRF reactor was filled with a 15% V/V of inoculum in influent water from JCP. Nutrients were dosed at half of the required amount to achieve a C:N:P ratio of 100:10:1 to initiate the growth of the bacterial consortium. The SRF lid was sealed tight and any connection tubing from the reactor were sealed to prevent oxygen intrusion. The reactor was then left to incubate.

While waiting for the bacterial consortium to grow, the SRF effluent was sampled for bench and analytical parameters on a regular basis. Refer to Section 5.3 and 5.4 for the monitoring frequencies for bench and analytical parameters, respectively. Once the system showed consistent nitrate reduction of more than 50% and confirmed selenium removal from the analytical laboratory result, Phase 2 was initiated. Influent flow was introduced at a set flowrate of 1.18 mL/min on Day 34.

4.2 Start-up (Phase 2)

The continuous flow of the influent water into the SRF reactor and effluent out of the SRF reactor was provided by two Grundfos DDA Pumps (Product number DDA 17-7). At the beginning of Phase 2, the set flowrate into the reactor was 1.18 mL/min, which was equivalent to HRT of 14 days. Bench parameters were measured twice per week to closely monitor the reactor to ensure anoxic conditions and nitrate reductions in the reactor were maintained. SRF effluent samples were collected on a weekly basis to verify reactor performance in nitrate and selenium reductions (Sections 5.3 and 5.4). Nutrient dosages were increased based on flowrate and adjusted until the residual TOC in the SRF effluent was approximately 10 mg/L.

After confirming selenium removal activity and presence of residual TOC in the SRF, the forward flow was increased to a flow rate of 1.5 mL/min, corresponding to HRT of 11 days. The same monitoring procedures in selenium removal, and residual TOC were repeated until the reactor was ready for the next flowrate increase. The monitoring period after each stepwise increase was approximately two weeks. In the first week the flow was increased and in the second week the nutrient dose was increased. Flowrate and nutrient dosage increases were never done during the same week to allow bacteria consortium to adapt to changing condition. During this two-week period, reactor's response to increase in flow and nutrient dose was monitored. Set flowrate was increased stepwise to reach the target HRTs of 10, 9, 8, and finally 7 days, which was the HRT of Phase 3.

Pump tests were performed after each flowrate increase and before each bench parameter measurement on the days which flowrate was not adjusted. Pump calibration was performed when the relative percent difference (RPD) between the measured pumping rate and set flowrate was greater than 10%.

4.3 Continuous Testing (Phase 3)

Continuous testing started after HRT of 7 days was achieved. The flowrate was then maintained at 7 days for the entire duration of Phase 3. Pump tests were performed once per week after sample collection to ensure the flowrate remained constant. Flowrate during Phase 3 was maintained at 2.33 ±0.08 mL/hr while the set flowrate was 2.36 mL/hr (refer to Appendix B Figure B1 for a graph of flowrates plotted over time).

The second carbon source dosing method was adopted during Phase 3 to determine the stoichiometric ratio of carbon source dosing for obtaining the optimal ORP for selenium removal. Once the stoichiometric ratio was determined, the dosage was maintained constant to establish a steady-state condition inside the SRF reactor to monitor the extent of metals leaching from the rock media in the SRF reactor under reducing conditions.

The influent tote was switched from tote 1 to tote 2 on Day 272. A summary table comparing the water quality of the two influent totes can be found in Appendix C. WSP noted a change in concentration in the total cadmium, total zinc, dissolved aluminum, dissolved boron, dissolved manganese, and dissolved zinc concentrations between the two totes. However, these changes did not impact the reactor performance nor had a noticeable impact on metals leaching. From the bench parameter measurement of influent from the two totes, it was noted that tote 1 had a lower ORP measurement than tote 2. This was addressed by adjusting the stoichiometric ratio of carbon source dosage for the two totes during the continuous testing phase.

From Day 93 to Day 377, the SRF reactor system encountered four upsets. Refer to Appendix D on details resulting in upsets and actions implemented to recover the SRF reactor. The reactor performance typically recovered within one week following the upset.

5.0 SAMPLING AND ANALYSES FOR PERFORMANCE MONITORING

Two types of sampling were conducted: 1) bench parameter monitoring and 2) laboratory analytical monitoring. Bench parameter monitor was conducted in-house, whereas the analytical samples were submitted to a third-party laboratory (ALS).

5.1 Sampling Equipment

The following equipment were required during sampling and SRF performance monitoring:

- calibrated bench multi-meter capable of measuring pH, temperature, oxidation-reduction potential (ORP), dissolved oxygen (DO), and conductivity (YSI 556 or YSI Pro)
- nitrate test strips (WaterWorks 480009)
- sulphate test strips (MQuant™ 110019)
- hydrogen sulphide test strips (WaterWorks 481197-1)
- laboratory sample containers and 0.45 µm filters for dissolved samples
- 500 mL and 250 mL graduated cylinders for flow rate measurement

5.2 Sampling Locations

Table 5 provides sample locations, names, and descriptions.

Table 5: Description of Sample Locations

Sample Location	Name	Description
Influent Water Drum (S1)	INF	Sampled collected from the influent drum using a disposable syringe.
SRF Effluent (S2)	SRF	Sampled from the SRF effluent line.
Blind Duplicates	DUP	Varied locations throughout the test.
Blanks	FB	One full set of sampling bottles filled with laboratory supplied blank/distilled water. Filled on site using the same sampling equipment/containers used for normal samples and same standard cleaning procedures.

5.3 Bench Parameter Monitoring

The list of bench parameters monitored at the WSP laboratory and the monitoring frequency at different sampling location is presented in Table 6.

Table 6: List of Bench Parameters Monitored and Monitoring Frequency

Sampling Location	Bench Parameters	Monitoring Frequency
SRF	Conductivity	▪ Twice per week for Phase 1 and 2 ▪ Once per week for Phase 3
	Dissolved Oxygen (DO)	
	Nitrate	
	Sulphide [(a)]	
	Sulphate [(a)]	
	ORP	
	pH	
	Temperature	

Table 6: List of Bench Parameters Monitored and Monitoring Frequency

Sampling Location	Bench Parameters	Monitoring Frequency
INF	Conductivity	Bench parameter monitoring of SRF influent was initially conducted at the same frequency as the SRF effluent. It was noted these parameters remained fairly consistent between measurements and monitoring of influent was stopped until the switching of influent totes.
	Dissolved Oxygen (DO)	
	Nitrate	
	ORP	
	pH	
	Temperature	

Note:

(a) Sulphide and sulphate were added to the list during Phase 3 to monitor sulphate reduction in the SRF reactor.

5.4 Laboratory Analytical Monitoring

The analytical monitoring suite consisted of the following parameters:

Table 7: List of Bench Parameters Monitored and Monitoring Frequency

Sampling Location	Analytical Parameters	Monitoring Frequency
SRF	Total Organic Carbon (TOC)	Once per week for all phases.
	Total Selenium	
	Dissolved Selenium [(a)]	
	Nitrate (NO_3)	Once per week for all phase if bench NO_3 measurement is greater than 0. Otherwise, it was analyzed once per month.
	Sulphate (SO_4)	Once per week for all phases if bench ORP measurement is below -300 mV. Otherwise, it was analyzed once per month.
	Total Metals	Bi-weekly for Phase 3 only.
	Dissolved Metals, filtered at WSP laboratory	
	Alkalinity (as $CaCO_3$)	Once per monthly for Phase 3 only.
	Anions (Cl, Br, F, NO_2)	
	Sulphide	
	Ammonia, as N	
	Total Phosphorus	
	Turbidity	
	Total Suspended Solids (TSS)	
	5-day Biochemical Oxygen Demand (BOD_5)	

Table 7: List of Bench Parameters Monitored and Monitoring Frequency

Sampling Location	Analytical Parameters	Monitoring Frequency
INF	Alkalinity (as $CaCO_3$)	Once per month.
	Anions (Cl, Br, F, NO_2, NO_3, SO_4)	
	Sulphide	
	Ammonia, as N	
	Total Phosphorus	
	Total Metals	
	Dissolved Metals, filtered at WSP laboratory	
	TDS	
	Turbidity	
	TSS	
	BOD_5	
	TOC	

Note:

(a) Out of the first 24 samples collected for selenium analyses, dissolved selenium concentration of 17 samples exceeded the total selenium concentration by greater than 20% RPD. This exceedance is likely due to the standard laboratory method used for the analysis. It has been reported by ALS that volatile reduced organoselenium species produced by anaerobic bioreactors can cause dissolved selenium test results exceed total selenium results (ALS 2020). Since then, dissolved selenium was analyzed by another analytical method as per ALS's recommendation.

One-off analytical samples for metals analyses were also collected during Phase 1 and 2 to capture any metal leaching during inoculation and start-up.

6.0 TESTING RESULTS AND DISCUSSION

This section presents the results from the long-term bench-scale leaching test of the SRF reactor system. Additional figures showing both bench and analytical data are presented in Appendix B. Summary tables of bench and analytical data over the testing period are provided in Appendix E. Certificates of Analyses from the analytical laboratory are provided in Appendix F.

6.1 Influent and SRF Effluent Water Quality

A comparison of average influent and SRF effluent water quality for the target analyte identified in the previous SRF proof-of-concept (Golder 2021) during each phase of the leaching test is presented in Table 8.

Key observations from the table are as follows:

- Nitrate and total selenium concentration in Phase 2 and 3 were well below the proposed discharge target. The SRF reactor system was successful at nitrate and selenium reduction (see Section 6.3.1 and 6.3.2 for details).
- Total copper and dissolved cadmium were leached and exceeded the proposed discharge target during Phase 1. Leaching of total copper and dissolved cadmium eventually stopped in Phase 3. Total and dissolved iron were leached and exceeded the proposed discharge target during Phase 2. Leaching of total and dissolved iron slowed during Phase 3. The total iron concentration was below the proposed discharge target while the dissolved iron concentration was near the proposed discharge target considering the standard deviation (see Section 6.3.3 for details).
- Total phosphorus concentration exceeded the proposed discharge target in Phase 3 (see Section 6.3.4 for details) suggesting the need for nutrient polishing step downstream of the SRF reactor in order to meet the treatment target.

Biochemical oxygen demand was monitored throughout the leaching test as a measure for constituents that exert an oxygen demand (Figure B7). The influent BOD was below the laboratory detection of 2 mg/L while the BOD in SRF effluent fluctuates between <2 mg/L to 319 mg/L. To prevent anoxia in the receiving environment, aeration would be necessary.

Table 8: Comparison of Average Concentrations of Identified Target Analyte in the Influent and SRF Effluent

Parameter	Units	Influent Average Water Quality Tote 1 (±Standard Deviation)	Influent Average Water Quality Tote 2 (±Standard Deviation)	SRF Effluent Average Water Quality (±Standard Deviation)[a]			Proposed Discharge Target[b]	Notes[c]
				Phase 1	Phase 2	Phase 3		
Physical Parameters								
pH	s.u.	7.39 (±0.26)	8.32 (±0.10)	7.16 (±0.25)	7.24 (±0.38)	7.03 (±0.16)	6.5-9.0	NA
Alkalinity	mg/L as $CaCO_3$	85.5 (±2.6)	79.3 (±6.0)	162	n/a	200 (±110)	NA	NA
Total Dissolved Solids	mg/L	1169 (±74)	1103 (±132)	1220	n/a	1234 (±204)	NA	NA
Total Suspended Solids	mg/L	38.5 (±107)	3.14 (±0.31)	3	n/a	56 (±114)	NA	NA
Major Ions								
Sulphate (SO_4)	mg/L	750 (±21)	697 (±131)	745	n/a	679 (±83)	1361	EDO
Nutrients								
Nitrate (as N)	mg/L	6.77 (±0.24)	6.11 (±1.02)	1.43 (±1.93)	0.13 (±0.19)	0.25 (±0.76)	14	EDO
Nitrite (as N)	mg/L	0.010 (±0.015)	0.0058 (±0.0017)	<0.005	n/a	0.0071 (±0.0046)	0.096	EDO
Phosphorus (P)-Total	mg/L	0.014 (±0.010)	0.010 (±0.009)	**0.036**	**0.25**	**1.71 (±0.62)**	0.036	EDO, no change in trophic status
Total Metals								
Aluminum (Al)-Total	mg/L	0.012 (±0.004)	0.008 (±0.004)	0.013	0.015	0.010 (±0.003)	0.39	EDO
Antimony (Sb)-Total	mg/L	0.00052 (±0.0001)	0.00049 (±0.00002)	0.0013	0.0005	0.00023 (±0.00019)	0.0038	EDO
Arsenic (As)-Total	mg/L	0.0012 (±0.0002)	0.0012 (±0.0001)	0.0021	0.0090	0.0031 (±0.002)	0.021	EDO
Barium (Ba)-Total	mg/L	0.036 (±0.002)	0.036 (±0.003)	0.043	0.045	0.030 (±0.003)	5	EDO
Boron (B)-Total	mg/L	0.060 (±0.006)	0.070 (±0.006)	0.06	0.072	0.065 (±0.006)	1.2	Max WQG
Cadmium (Cd)-Total	mg/L	0.000060 (±0.000017)	0.000060 (±0.000013)	0.00061	0.00011	0.000042 (±0.000031)	NA	NA
Cobalt (Co)-Total	mg/L	0.00032 (±0.00021)	0.00018 (±0.00018)	0.017	0.010	0.00061 (±0.00049)	0.02	EDO
Copper (Cu)-Total	mg/L	0.017 (±0.002)	0.015 (±0.004)	**0.045**	0.026	0.012 (±0.020)	0.033	Permit 11678
Iron (Fe)-Total	mg/L	0.033 (±0.021)	0.018 (±0.018)	0.01	**6.71**	0.32 (±0.19)	1	Max WQG
Lead (Pb)-Total	mg/L	0.00016 (±0.00011)	0.00009 (±0.00009)	0.00006	0.00058	0.00020 (±0.00011)	0.038	EDO
Manganese (Mn)-Total	mg/L	0.0013 (±0.0016)	0.0016 (±0.0018)	0.72	2.9	0.29 (±0.16)	3.4	Max WQG based on source water hardness
Molybdenum (Mo)-Total	mg/L	0.078 (±0.006)	0.088 (±0.020)	0.2	0.26	0.014 (±0.015)	2	Max WQG
Nickel (Ni)-Total	mg/L	0.0017 (±0.001)	0.0009 (±0.0009)	0.0014	0.0025	0.0012 (±0.0009)	0.5	MMER
Selenium (Se)-Total	mg/L	**0.092 (±0.010)**	**0.098 (±0.008)**	**0.016 (±0.010)**	0.0014 (±0.0012)	0.0016 (±0.0013)	0.0064	EDO
Zinc (Zn)-Total	mg/L	0.012 (±0.004)	0.0072 (±0.0046)	0.017	0.015	0.0070 (±0.0056)	0.18	EDO
Dissolved Metals								
Aluminum (Al)-Dissolved	mg/L	0.0065 (±0.0017)	0.0037 (±0.0013)	0.0099	0.0046	0.0056 (±0.0016)	0.23	EDO
Cadmium (Cd)-Dissolved	mg/L	0.000056 (±0.000016)	0.000052 (±0.000006)	**0.00059**	0.000058	0.000018 (±0.000011)	0.00013	EDO
Copper (Cu)-Dissolved	mg/L	0.016 (±0.002)	0.014 (±0.003)	0.035	0.0015	0.0018 (±0.0022)	NA	NA
Iron (Fe)-Dissolved	mg/L	0.037 (±0.020)	0.026 (±0.022)	0.01	**6.82**	0.26 (±0.16)	0.35	Max WQG

Notes:

(a) Standard deviation is presented only if two or more sample results were available.

(b) Polley Lake Closure Target- reproduced from the Reclamation and Closure Plan Water Quality Modelling Report (Golder 2017).

(c) Proposed treatment targets for discharge to Polley Lake post-closure were derived from the lowest of Effluent Discharge Objectives (EDOs), Metal Mining Effluent Regulations (MMER) limits, maximum BC water quality guidelines (WQGs) or alternate acute screening values (ASV). EDOs are back calculated to meet WQGs in the receiving waterbody. The max WQG when there is no 30-d WQG was used in the calculation of EDOs, unless noted otherwise. WQGs specified for the protection of aquatic life were considered in the evaluation of the treatment targets unless noted otherwise. WQGs were calculated based on a baseline hardness in the receiving environment. ASVs are maximum WQGs based on source water chemistry or alternative screening value identified in the LTWMP-TAR. Further details on the evaluation of the treatment targets can be found in the Golder 2016 report (2016b). For total copper the maximum water quality in the current water treatment plant effluent is used according to the Environmental Management Act (EMA) Permit 11678, as amended on 1 February 2020 (BC ENV 2020).

s.u. standard units.

X Indicates concentration exceeding the closure treatment targets for post closure.

n/a Not analyzed.

NA Not applicable.

EDO Effluent Discharge Objectives.

WQG Water Quality Guideline.

6.2 Bench Parameters

Bench parameters such as ORP, dissolved oxygen, pH, and conductivity were monitored on a regular basis to provide information on the performance of SRF reactor. Among these, ORP was used as the key indicator of the performance and to adjust the carbon source dosing.

Please refer to Appendix B and E for figures and summary tables of the bench parameter readings during the leaching test, respectively.

Key observations on the bench parameters are summarized as follows:

- Dissolved oxygen was maintained below 1 mg/L for most of leaching test duration to maintain an anoxic condition inside the SRF reactor (Figure B2). This is critical for biological selenium removal because only in the absence of DO, do the anaerobic microorganisms use nitrate or Se as electron acceptor.
- The average pH of influent from the first tote is 7.39 ± 0.26 and from the second tote is 8.32 ± 0.10. The average pH of effluent from all phases is 7.10 ± 0.26. Effluent pH is slightly below the influent pH. This decrease in pH could be attributed to addition of acetic acid and phosphoric acid as nutrients. Since the amount of nutrients dosed was relatively small compared to the overall reactor volume, the pH of the SRF reactor was maintained in the neutral range (Figure B3).
- The average influent conductivity from the first tote is 1449 ± 50 µS/cm and from the second tote is 1442 ± 30 µS/cm. The average conductivity of effluent from all phases is 1440 ± 209 µS/cm. The conductivity was mostly maintained constant throughout the leaching test (Figure B4). The high standard deviation calculated was due to a couple lower conductivity measured, which is believed to be due to measurement error.

6.2.1 Oxidation Reduction Potential (ORP)

ORP was identified as the key indicator for the performance of the SRF reactor because it was used to determine the carbon source dosing ratio during Phase 3. Figure 2 shows the changes in ORP measured through the leaching test and the corresponding stoichiometric ratio of carbon source dosed on the day of measurement.

Based on literature, the optimal range of ORP for selenium reduction is in the range of -50 mV to -200 mV (Simm R.,2021). The optimal range of ORP for sulphate reduction is in the range of -50 mV to -250 mV, which overlaps with that of selenium reduction. For MPMC, the goal for the full-scale SRF treatment system is to remove selenium and not sulphate. Therefore, it was critical to determine the leaching of metals under optimal ORP range for selenium reduction. The stoichiometric ratio of carbon source dosing to be within the optimal ORP range was also determined.

During Phase 1 and 2 of the leaching test, the carbon source was dosed in excess to avoid carbon limitation by maintaining a residual TOC of approximately 10 mg/L in SRF effluent. As a result of excess carbon source dosing, during the transition period from Phase 2 to Phase 3, ORP dropped to below -250 mV. Significant sulphate reduction was observed in the SRF reactor (Figure B5), which indicated an undesirable shift of SeRB to sulphate reducing bacteria in the long-term SRF reactor. Since this observation, the stoichiometric ratio used for carbon source dosing was decreased and the second carbon source dosing approach based on ORP measurement was implemented.

For the remaining period of the leaching test, high selenium removal was maintained at an ORP range of -100 mV to -200 mV, which was determined to be the optimal ORP range for the microbial community present in the long-term leaching test SRF reactor (as indicated by the two red lines in Figure 2). The corresponding carbon source dosing was 1 to 2-times stoichiometric to maintain the optimal ORP. Although the optimal ORP range in literature provides a basis for running the SRF reactor for selenium reduction, it is still critical to run bench-scale test work to determine the ORP range for specific microbial community populating the SRF reactor system.

During Phase 3, there were three instances where the ORP increased to 0 mV. These sudden increases were a result of three reactor upsets. Refer to Appendix D on details on reactor troubleshooting.

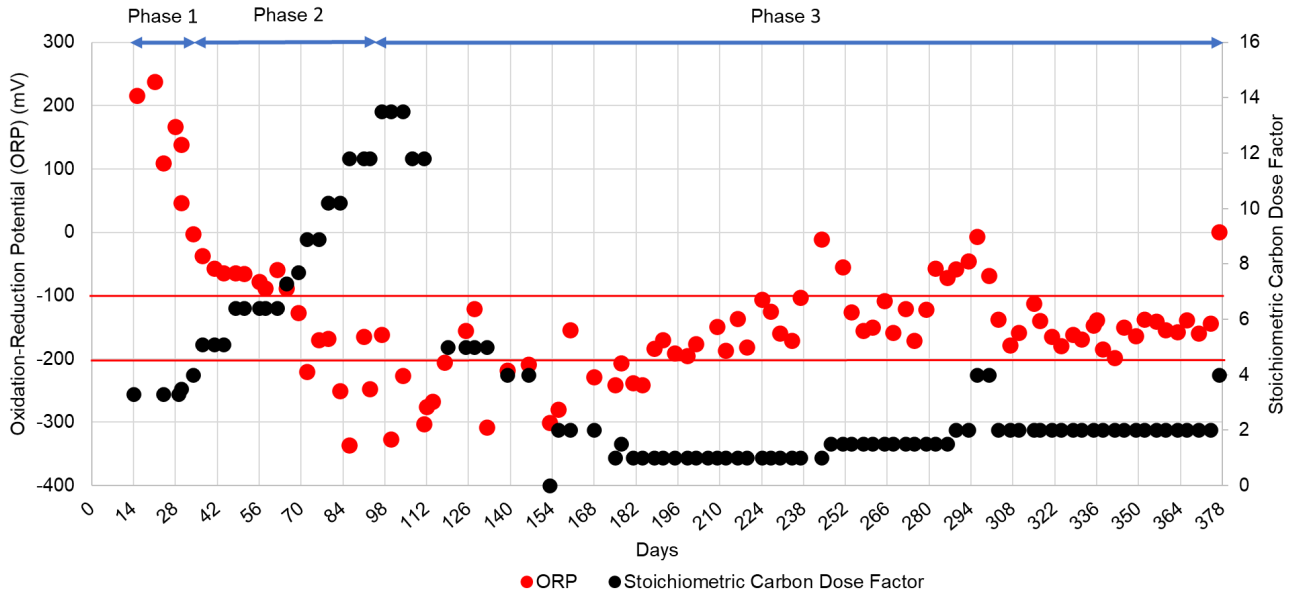


Figure 2 Effect of Carbon Source Dosing on ORP Measurements in SRF:

6.3 Analytical Parameters

Samples were collected from the SRF reactor on a weekly basis and submitted to a third party analytical laboratory. Analytical parameters such as selenium and TOC were analyzed on a weekly basis to monitor the SRF reactor performance and allow WSP to make any adjustment to SRF operation. Total and dissolved metals were analyzed on a biweekly basis to monitor the extent of leaching for leachable metals. All other analytical parameters were analyzed monthly to provide supplementary information on how the system was behaving overall.

6.3.1 Total Selenium Removal

The concentration of influent total selenium (T-Se), effluent T-Se and the percentage removal of T-Se over the duration of the leaching test are presented in Figure 3. Total selenium was effectively removed for the entire duration of Phase 3 with an average percentage removal of 98.33 ± 1.36% regardless of fluctuation in ORP measured, which suggested the microbial community in the SRF was versatile and diverse. The effluent T-Se had been consistently below the proposed T-Se treatment target of 0.0064 mg/L.

Changes in dissolved selenium (D-Se) concentration and the percentage removal of D-Se is presented in Figure B6 in Appendix B. Dissolved selenium was also effectively removed for the entire duration of Phase 3 with an average percentage removal of 97.23± 3.03%. The removal rate for dissolved selenium is lower than total selenium because of the dissolved concentration exceeding the total concentration. Out of the first 24 samples collected for selenium analyses, the dissolved selenium concentration of 17 samples exceeded the total selenium concentration by greater than 20% RPD. This exceedance is likely due to the standard laboratory method used for the analysis. It has been reported by ALS that volatile reduced organoselenium species produced by anaerobic bioreactors can cause dissolved selenium test results to exceed total selenium results (ALS 2020). Since identifying this, dissolved selenium was analyzed by another analytical method as per ALS's recommendation.

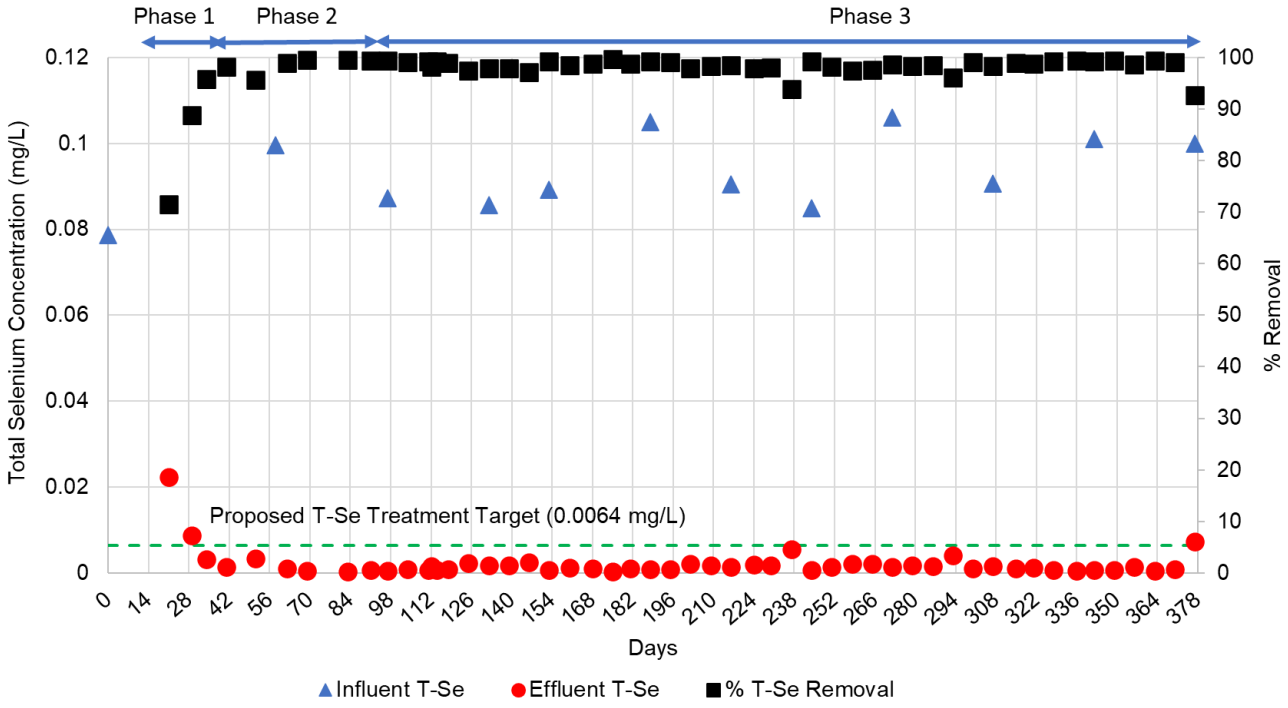


Figure 3: Total Selenium Concentration in Influent and SRF Effluent, and the Percentage Removal Over 52 weeks of Testing

6.3.2 Nitrate Removal

Concentration of influent nitrate, effluent nitrate and the percentage removal of nitrate over the duration of the leaching test is presented in Figure 4. Except for the spike in nitrate during Phase 1, nitrate removal was maintained at an average of 96.57% indicating nitrate was effectively removed for the entire duration of continuous flow.

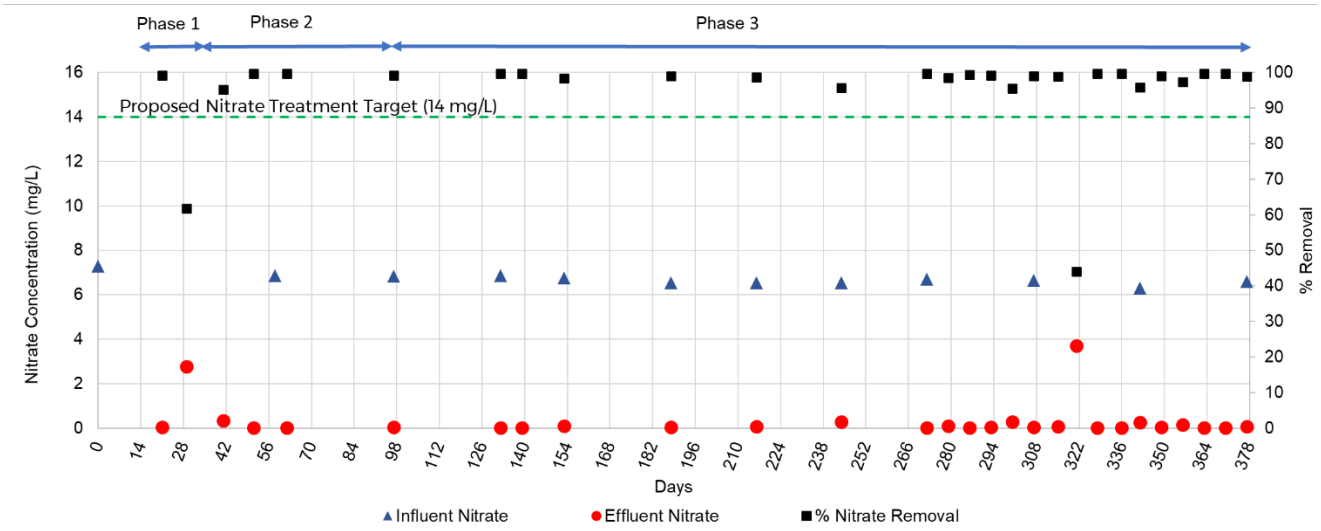


Figure 4: Nitrate Concentration in Influent and SRF Effluent, and the Percentage Removal Over 52 weeks of Testing

6.3.3 Total and Dissolved Metals

As noted in the SRF proof-of-concept bench-scale test (Golder 2021), under reducing conditions which are required for removal of Se and NO_3 in bioreactors, leachable metals were released or dissolved from waste rock media into the effluent resulting in elevated metals concentrations observed in the effluent of bioreactor treatment systems. To study the extent of metal leaching from the waste rocks, metals concentrations were monitored throughout the course of the leaching test.

The concentrations of leachable metals including arsenic, copper, iron, and manganese are plotted in Figure 5 to Figure 8, respectively. Figures for other metals monitoring during the leaching test can be found in Appendix B (Figure B8 to Figure B31).

Key observations on the trends in metal leaching are summarized as follows:

- Arsenic leaching was observed during all phases of the leaching test. The effluent arsenic concentration peaked on Day 97 during the transition from Phase 2 into Phase 3 at 0.0094 mg/L for total arsenic when the influent total arsenic concentration was 0.00096 mg/L around the same period. On Day 190, arsenic leaching seemed to have stopped, i.e. the effluent arsenic concentration is similar to the influent arsenic concentration. After Day 244, the effluent arsenic concentration increased slightly again.
- Copper leaching was observed during Phases 1 and 2 of the leaching test. The effluent copper concentration peaked on Day 21 during Phase 1 at 0.045 mg/L for total copper when the influent total copper concentration at the beginning of the test was 0.020 mg/L. On Day 51, copper removal was observed and continued until the end of the test. Copper removal in the SRF was important since Cu is a key parameter of interest for MPMC. It was also noted that influent copper concentration decreased overtime during the leaching test.
- Iron leaching was observed during all phases of the leaching test. The effluent iron concentration peaked on Day 51 during Phase 2 at 6.71 mg/L for total iron when the influent total iron concentration was less than laboratory detection limit of 0.01 mg/L around the same period. Leaching continued until the end of the test with effluent total and dissolved iron concentrations fluctuating around the dissolved iron treatment target of 0.35 mg/L. Note that the influent total iron was typically below detection limit of 0.01 mg/L and that is why the influent data does not appear in Figure 7.

- Manganese leaching was observed during all phases of the leaching test. The effluent manganese concentration peaked on Day 51 during Phase 2 at 2.9 mg/L for total manganese when the influent total manganese was 0.0015 mg/L around the same period. Leaching of manganese continued until the end of the test.
- There were other metals that leached from the waste rock media during the test but either stopped leaching or slowly transitioned into reduction in Phase 3. Refer to Table 9 for the list of metals that were leached, were removed, or were constant during the leaching test. Total metal concentration of leached metals in the SRF effluent during the leaching test are plotted in two separate figures (Figure 9 and Figure 11) to prevent overlapping of data for clarity. Refer to Appendix E for total metal concentration of leached metals in the influent.
- After Phase 1 (Inoculation), none of the leachable metals being leached into the SRF effluent were above the proposed site-specific treatment targets except for iron. Proper monitoring of leaching and adequate polishing steps after SRF are critical in running SRF treatment systems.

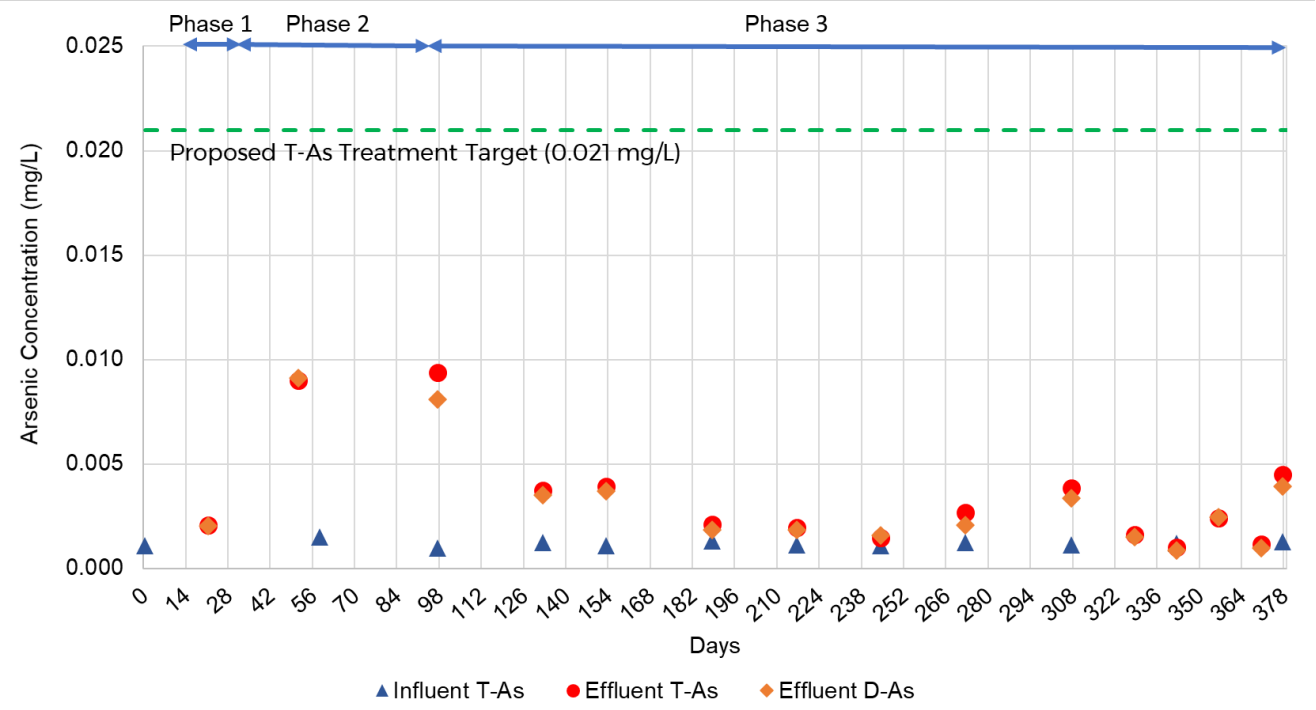


Figure 5: Total and Dissolved Arsenic Concentrations in the SRF over 52 weeks of Testing in Comparison with Influent Total Arsenic Concentration and Treatment Target

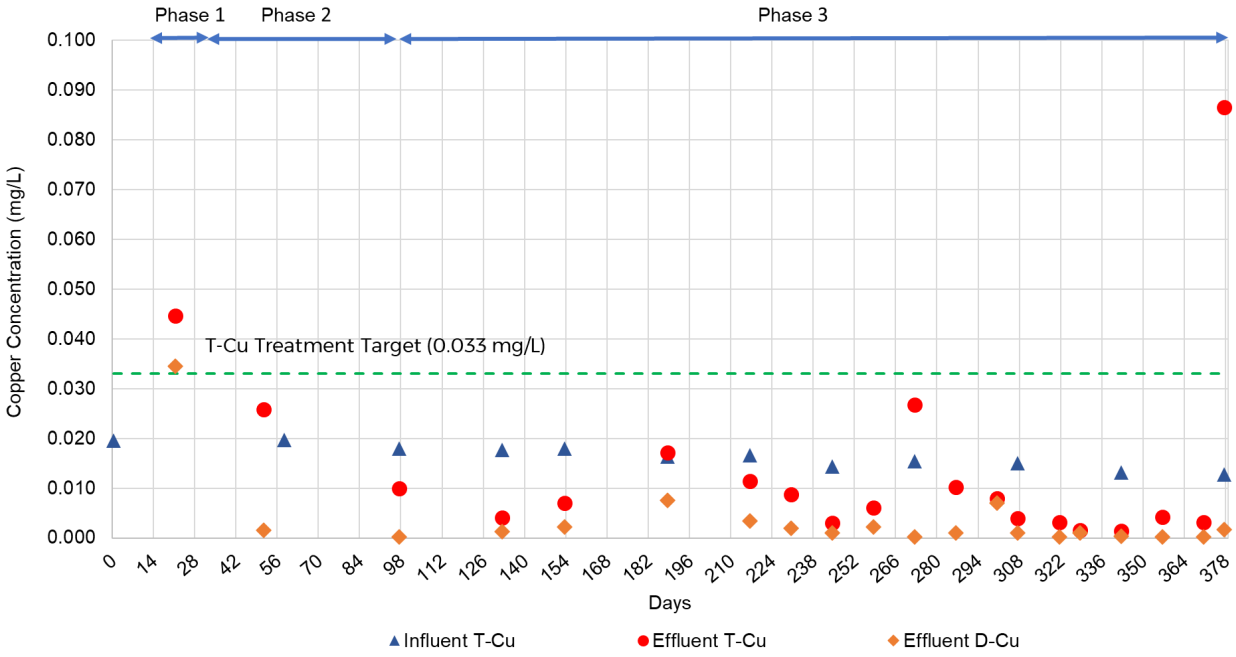


Figure 6: Total and Dissolved Copper Concentrations in the SRF Over 52 weeks of Testing in Comparison with Influent Total Copper Concentration and Treatment Target

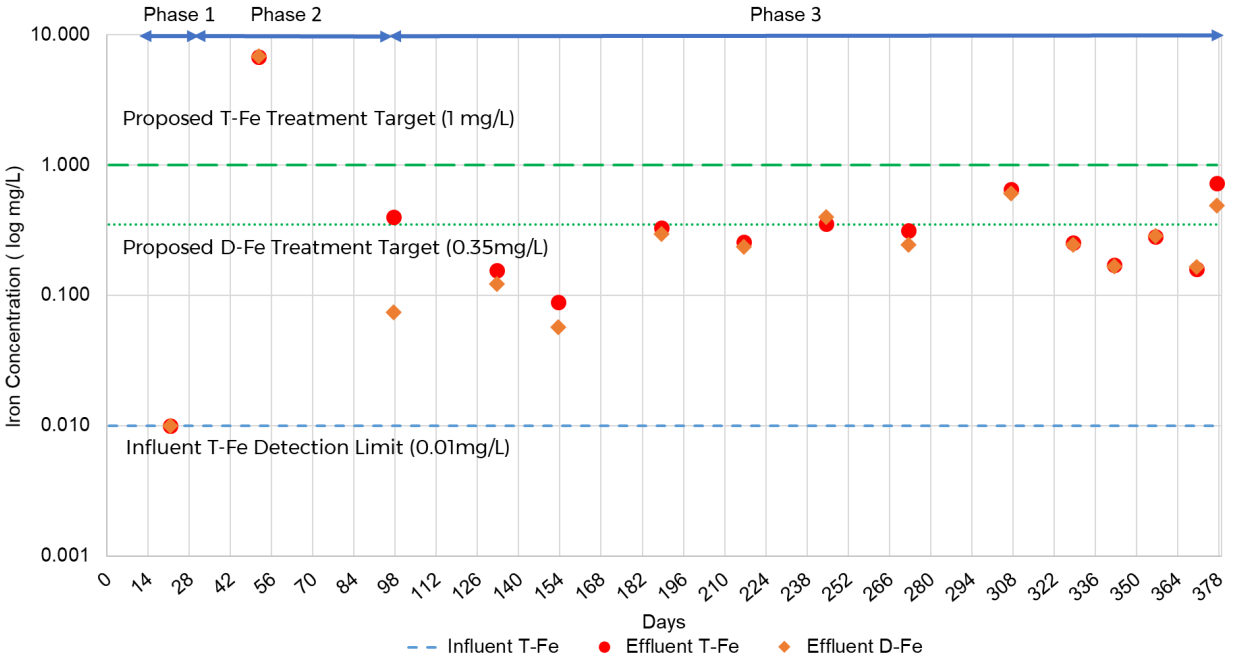


Figure 7: Total and Dissolved Iron Concentrations in the SRF Over 52 weeks of Testing in Comparison with Treatment Targets (Note: Influent T-Fe concentration is shown as detection limit concentration because it was typically below detection limit of 0.01 mg/L.)

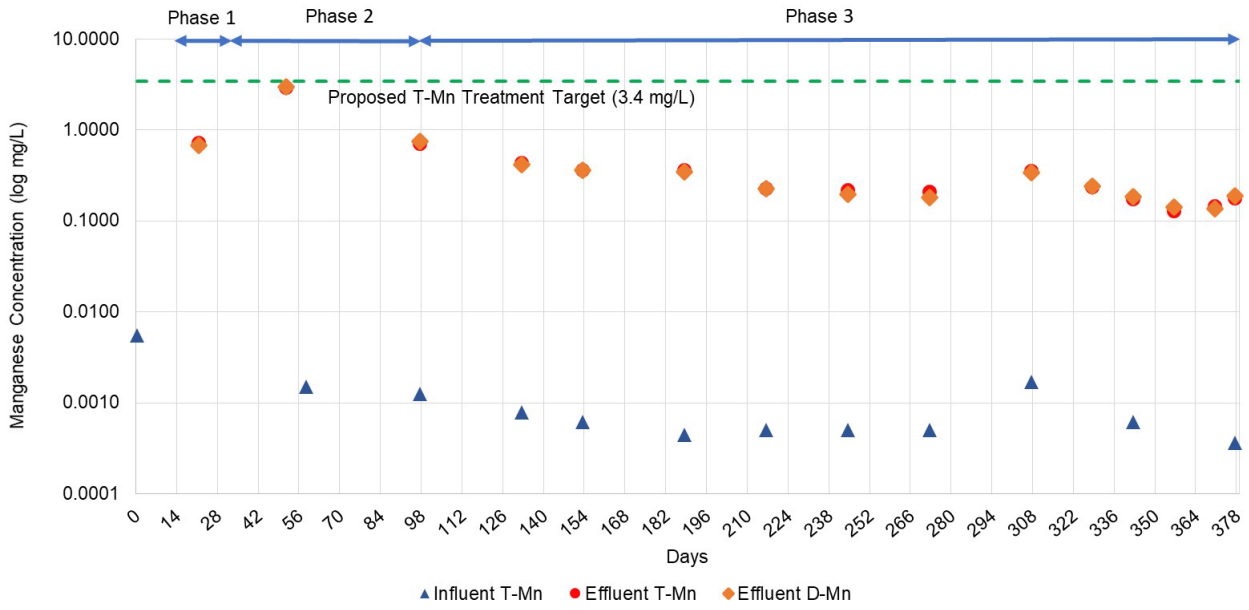


Figure 8: Total and Dissolved Manganese Concentrations in the SRF Over 52 weeks of Testing in Comparison with Influent Total Manganese Concentration and Treatment Target

Table 9: Summary of Total Metals Leached, Removed, and was Constant During Leaching Test

Total Metals Concentration Trend	Total Metals	
Metals leached	▪ Arsenic ▪ Antimony ▪ Barium ▪ Cadmium ▪ Cobalt ▪ Copper (a) ▪ Iron	▪ Lead ▪ Lithium ▪ Manganese ▪ Molybdenum (a) ▪ Mercury ▪ Silicon ▪ Strontium
Metals Removed	▪ Copper (a)	▪ Molybdenum (a)
Constant	▪ Beryllium ▪ Bismuth ▪ Boron ▪ Chromium ▪ Nickel ▪ Silver	▪ Thallium ▪ Tin ▪ Titanium ▪ Uranium ▪ Vanadium ▪ Zinc ▪ Zirconium

Notes:

(a) Copper and molybdenum were initially leached during Phase 1 and Phase 2 of the leaching test but slowly transitioned into reduction during Phase 3.

(b) Aluminum is not included in this table due to an inconclusive trend.

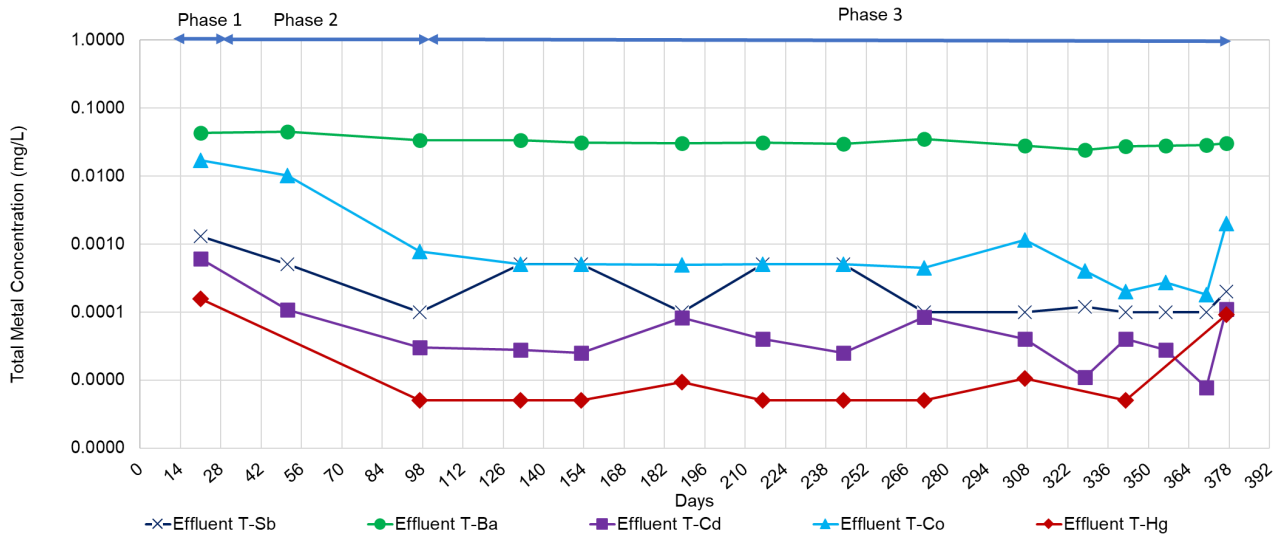


Figure 9: Total Concentration of Leached Metals in SRF Effluent Over 52 weeks of Testing

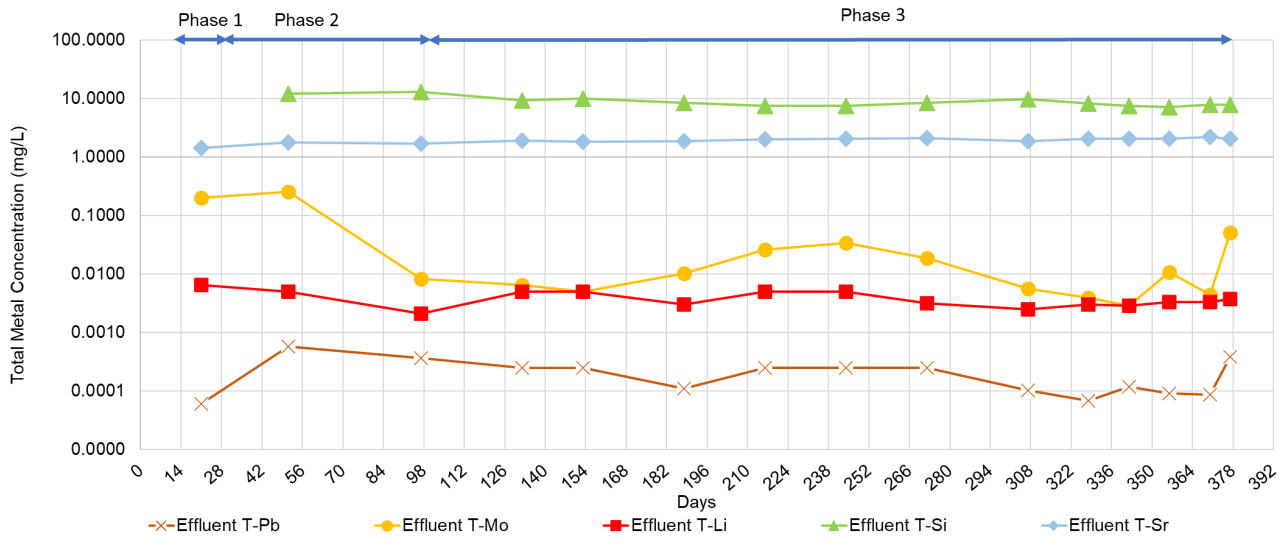


Figure 10: Total Concentration of Leached Metals in SRF Effluent Over 52 weeks of Testing

6.3.4 Residual Nutrients and the Effect on Bioreactor Performance

Acetic acid and phosphoric acid were dosed as carbon and phosphorus sources, respectively, to support the bacterial growth in the SRF reactor. To avoid overdosing or nutrient limiting conditions, TOC and total phosphorus (TP) were monitored in the SRF effluent throughout the test. TOC and TP concentrations in the SRF effluent during the leaching test are plotted in Figure 11 and Figure 12, respectively.

During Phase 3 when optimal ORP was maintained at a stoichiometric ratio of 1 to 2, it was observed that the TOC in the SRF effluent was almost the same amount as TOC that was coming in with the influent. A potential explanation for this was that the TOC in the influent was not utilized by the bacteria and potentially the externally added carbon source was used. It was unclear if the SRF reactor was in a nutrient limiting condition while observing high selenium removal.

TP was observed to increase in SRF effluent throughout the leaching test, which was possibly due to overdosing of the phosphorus source. For the future detailed bench-scale test, it is recommended to adjust the dose of phosphoric acid accordingly to avoid overdosing of phosphorus.

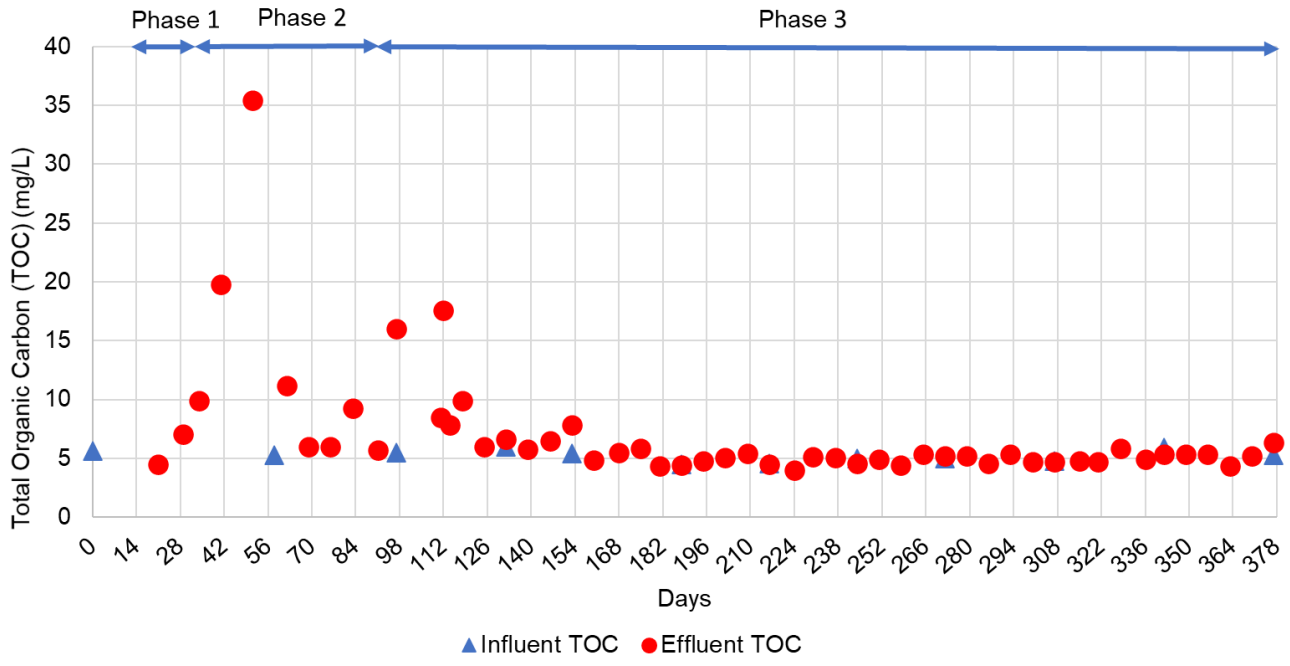


Figure 11: TOC Concentration over 52 weeks of Testing

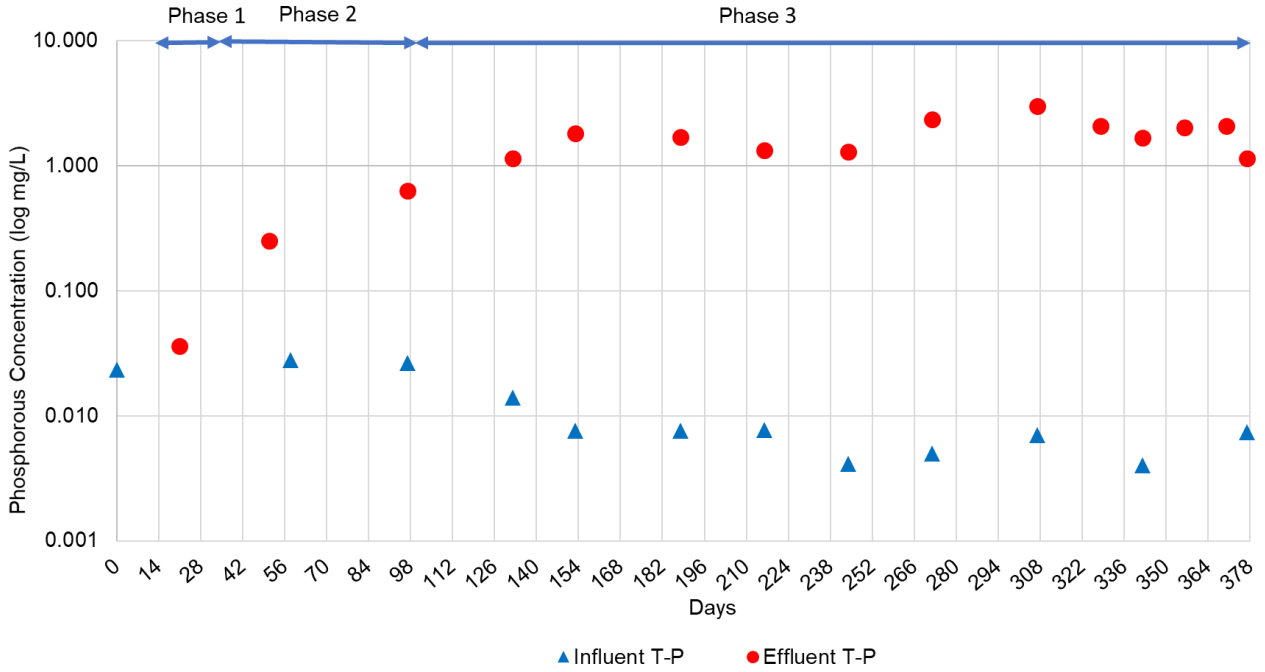


Figure 12: Total Phosphorus Concentration over 52 weeks of Testing

6.4 Quality Assurance and Quality Control (QAQC) in Sampling and Data Analysis

To avoid contamination of samples, extra care was taken during collection, handling, and preservation of samples. A summary of key considerations during the bench parameter monitoring were as follows:

- The bench parameters were analyzed immediately after sample collection to prevent inaccurate results due to samples being in contact with oxygen in the air.
- The samples for analytical monitoring were properly preserved immediately after sampling based on the intended analytical method using ALS laboratory-supplied bottles and preservatives.
- Nitrate analysis was submitted for analytical measurement when the bench nitrate strip testing exceeded zero to obtain more accurate results.
- Sulphate analysis was submitted for analytical measurement when the bench ORP testing went below -300 mV to monitor whether the SRF was in the sulphate reducing condition.
- A field blank was submitted during the beginning of the leaching test to confirm contamination was not occurring during sampling. The field blank result is presented in Appendix G with all parameters below detection limit.
- Quarterly blind duplicates were submitted for analytical measurement to ensure the laboratory's QA/QC method was reliable. The RPD, as a measure to determine the acceptability of laboratory duplicates according to BC Field Sampling Manual (BCFSM, 2013), between the sample and duplicate was calculated and presented in Appendix G. There was only one parameter (T-Mn) of a duplicate collected on 20 June 2022, that exceeded the RPD of 20%.
- Re-analysis was requested from the analytical laboratory when an unexpected result was received.
- Values from the ALS excel report were used to avoid any issues with ALS PDF documents reporting raised detection limits incorrectly.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Key conclusions from the long-term leaching test are as follows:

- The saturated rock fill (SRF) is a reliable technology for selenium and nitrate removal from the treatability perspective. The bench-scale SRF reactor used in this study was very effective in removing total and dissolved selenium, and nitrate with an average percentage removal of 98.33 ± 1.36%, 97.23 ± 3.03%, and 96.57 ± 10.57%, respectively.
- Utilizing mine waste rock as reactor media for SRF introduces the risk of leaching or release of metals into the SRF effluent. Consequently, for this treatment techonology to be implemented at full-scale as a viable option, the effect of metals leaching should be understood at the specific reducing conditions (-100 to -200 mV) that are required for SRF to achieve effective removal of selenium and nitrate.
- The data from this leaching test confirmed that the leaching behaviour of metals can change over time and is different for each type of metal. Leaching of metals in the bench-scale SRF reactor system effluent was observed during inoculation (Phase 1) and start-up (Phase 2) of the long-term leaching test. For most metals, leaching stopped or slowly transitioned into removal in the continuous testing phase (Phase 3).
- By the end of 52 weeks of testing, none of the metals being leached into the SRF effluent were above the proposed site-specific treatment targets except for iron.
- Total copper, which is one of the key constituents for this site, was leached and exceeded the proposed site-specific discharge target for a period during Phase 1 and 2. Copper then decreased to be below the influent and the target; indicating the SRF technology could provide copper removal during closure.
- Some other leachable metals such as arsenic, manganese, and iron continued leaching during Phase 3; however, the concentrations did not exceed the proposed site-specific discharge target except for dissolved iron.
- Based on the trends observed for most of the metals, the concentration of leachable metals can be managed through a start-up or commissioning period prior to discharge from the system. Another possible solution to manage metals that leached for the entire test period could be the use of additional polishing treatment steps downstream of the SRF reactor.

WSP recommends the followings to be considered during the detailed bench-scale test work to be completed in 2023 and during further evaluation and development of SRF treatment technology:

- Optimize the design parameters and operational conditions, including HRT and nutrient dosing, to establish the process design criteria for the pilot-scale SRF treatment system to be implemented on-site.
- Evaluate the effectiveness and stability of the SRF treatment system in achieving the treatment goals over a range of design parameter setpoints.
- Improve the performance of the SRF treatment system in removal of contaminants from the site water by including aeration and settling cells as downstream polishing cells.

- Evaluate the effect of elevated copper concentration (highest concentration of copper that has been observed onsite) on the performance of the SRF treatment system as copper is a current and predicted key constituent for the site. Copper inhibits nitrification at concentration of 0.1 mg/L, while denitrification is less sensitive to copper concentration. High copper concentration could be toxic to bacteria and result in adverse effects on microbial community in SRF. It is recommended to establish the benchmark for when copper inhibits denitrification to understand how copper can interfere with the performance of SRF.

8.0 CLOSURE

The reader is referred to the Study Limitations section, which precedes the text and forms an integral part of this report.

We trust the above meets your present requirements. If you have any questions or comments, please contact the undersigned.

Signature Page

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https://golderassociates.sharepoint.com/sites/10023g/22514095 deliverables/002_issued/079-r-31445-mpmc bench-scale leaching test report/rev0_final/22514095-079-r-rev0-31445-bench-scale leaching test report 21jun_23.docx

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APPENDIX A

Nutrient Dosing Table

Week	Days into Trial	Date	Mode	Nutrient Addition								
				Acetic Acid Added (mL)	Acetic Acid Added Per Day (mL/day)	Phosphoric Acid Added (mL)	Phosphoric Acid Added Per Day (mL/day)	C Ratio	N Ratio	TOC Added (mg/L)	TOC Consumed (mg/L)	Acetate Stoichiometric Ratio
0	0	7/13/2021	Batch									
2	14	7/27/2021	Batch	1.875		0.086		85	10	67		3.3
2	15	7/28/2021	Batch									
3	21	8/3/2021	Batch								62	
3	24	8/6/2021	Batch	1.875		0.086		85	10	67	67	3.3
4	28	8/10/2021	Batch									
4	29	8/11/2021	Batch	1.875		0.086		85	10	67	60	3.30
4	30	8/12/2021	Batch	1.280	0.32	0.040	0.01	89	10	71	71	3.5
4	30	8/12/2021	Batch									
5	34	8/16/2021	Continuous	1.510	0.50	0.040	0.01	103	10	82	72	4.00
5	37	8/19/2021	Continuous	1.880	0.47	0.040	0.01	127	10	102	102	5.1
6	41	8/23/2021	Continuous	1.890	0.63	0.040	0.01	127	10	102	82	5.10
6	44	8/26/2021	Continuous	2.150	0.54	0.040	0.01	127	10	102	102	5.10
7	48	8/30/2021	Continuous	2.700	0.90	0.055	0.02	157	10	128	128	6.40
7	51	9/2/2021	Continuous	3.390	0.68	0.069	0.01	157	10	128	93	6.40
8	56	9/7/2021	Continuous	1.732	0.87	0.036	0.02	157	10	128	128	6.40
8	58	9/9/2021	Continuous	2.660	0.67	0.055	0.01	167	10	128	128	6.40
9	62	9/13/2021	Continuous	2.660	0.89	0.055	0.02	167	10	128	117	6.40
9	65	9/16/2021	Continuous	3.130	0.78	0.055	0.01	191	10	147	147	7.30
10	69	9/20/2021	Continuous	3.650	1.22	0.060	0.02	201	10	155	149	7.70
10	72	9/23/2021	Continuous	4.250	1.06	0.060	0.02	229	10	178	178	8.90
11	76	9/27/2021	Continuous	4.200	1.40	0.060	0.02	229	10	178	178	8.90
11	79	9/30/2021	Continuous	5.070	1.27	0.065	0.02	263	10	205	205	10.20
12	83	10/4/2021	Continuous	5.070	1.69	0.065	0.02	263	10	205	196	10.20
12	86	10/7/2021	Continuous	8.480	1.70	0.094	0.02	302	10	236	236	11.8
13	91	10/12/2021	Continuous	5.080	2.54	0.057	0.03	302	10	236	230	11.8
13	93	10/14/2021	Continuous	7.710	1.93	0.086	0.02	302	10	236	236	11.8
14	97	10/18/2021	Continuous	8.870	2.96	0.086	0.03	346	10	271	255	13.5
14	100	10/21/2021	Continuous	8.870	2.22	0.086	0.02	347	10	271	271	13.5
15	104	10/25/2021	Continuous	8.870	2.96	0.086	0.03	347	10	271	271	13.5
15	107	10/28/2021	Continuous	7.620	1.91	0.086	0.02	303	10	236	236	11.8
16	111	11/1/2021	Batch	7.380	0.92	0.086	0.09	303	10	236	228	11.8
16	112	11/2/2021	Batch									
16	114	11/4/2021	Batch									
17	118	11/8/2021	Batch									
17	119	11/9/2021	Continuous	3.020	0.76	0.560	0.14			62	62	5
18	125	11/15/2021	Continuous	2.090	0.52	0.450	0.11			62	56	5
18	128	11/18/2021	Continuous	2.090	0.52	0.450	0.11			62	62	5
19	132	11/22/2021	Continuous	2.090	0.52	0.450	0.11			62	55	5
20	139	11/29/2021	Continuous	1.671	0.42	0.450	0.11			49	43	4
21	146	12/6/2021	Continuous	1.671	0.42	0.450	0.11			49	43	4
22	153	12/13/2021	Continuous									0
22	156	12/16/2021	Continuous	0.835	0.21	0.453	0.11			25	17	2
23	160	12/20/2021	Continuous	0.835	0.21	0.453	0.11			25	20	2
24	168	12/28/2021	Continuous	0.835	0.21	0.453	0.11			25	19	2
25	175	1/4/2022	Continuous	0.209	0.10	0.226	0.11			12	6	1
25	177	1/6/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
26	181	1/10/2022	Continuous	0.418	0.10	0.453	0.11			12	8	1
26	184	1/13/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
27	188	1/17/2022	Continuous	0.418	0.10	0.453	0.11			12	8	1
27	191	1/20/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
28	195	1/24/2022	Continuous	0.418	0.10	0.453	0.11			12	8	1
28	199	1/28/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
29	202	1/31/2022	Continuous	0.418	0.10	0.453	0.11			12	7	1
29	206	2/4/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
30	209	2/7/2022	Continuous	0.418	0.10	0.453	0.11			12	7	1
30	212	2/10/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
31	216	2/14/2022	Continuous	0.418	0.10	0.453	0.11			12	8	1
31	219	2/17/2022	Continuous	0.522	0.10	0.566	0.11			12	12	1
32	224	2/22/2022	Continuous	0.418	0.10	0.453	0.11			12	8	1
32	227	2/25/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
33	230	2/28/2022	Continuous	0.418	0.10	0.453	0.11			12	7	1
33	234	3/4/2022	Continuous	0.418	0.10	0.453	0.11			12	12	1
34	237	3/7/2022	Continuous	0.418	0.10	0.453	0.11			12	7	1
35	244	3/14/2022	Continuous	0.418	0.10	0.453	0.11			12	8	1
35	247	3/17/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
36	251	3/21/2022	Continuous	0.627	0.16	0.453	0.11			18	14	1.5
36	254	3/24/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
37	258	3/28/2022	Continuous	0.627	0.16	0.453	0.11			18	14	1.5
37	261	3/31/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
38	265	4/4/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
38	268	4/7/2022	Continuous	0.627	0.16	0.453	0.11			18	13	1.5
39	272	4/11/2022	Continuous	0.627	0.16	0.453	0.11			18	13	1.5
39	275	4/14/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
40	279	4/18/2022	Continuous	0.627	0.16	0.453	0.11			18	13	1.5
40	282	4/21/2022	Continuous	0.627	0.16	0.453	0.11			18	18	1.5
41	286	4/25/2022	Continuous	0.627	0.16	0.453	0.11			18	14	1.5
41	289	4/28/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
42	293	5/2/2022	Continuous	0.835	0.21	0.453	0.11			25	19	2
42	296	5/5/2022	Continuous	1.671	0.42	0.453	0.11			49	49	4
43	300	5/9/2022	Continuous	1.671	0.42	0.453	0.11			49	45	4
43	303	5/12/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
44	307	5/16/2022	Continuous	0.835	0.21	0.453	0.11			25	20	2
44	310	5/19/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
45	315	5/24/2022	Continuous	0.835	0.21	0.453	0.11			25	20	2
45	317	5/26/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2

Week	Days into Trial	Date	Mode	Nutrient Addition								
				Acetic Acid Added (mL)	Acetic Acid Added Per Day (mL/day)	Phosphoric Acid Added (mL)	Phosphoric Acid Added Per Day (mL/day)	C Ratio	N Ratio	TOC Added (mg/L)	TOC Consumed (mg/L)	Acetate Stoichiometric Ratio
46	321	5/30/2022	Continuous	0.835	0.21	0.453	0.11			25	20	2
46	324	6/2/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
47	328	6/6/2022	Continuous	0.835	0.21	0.453	0.11			25	19	2
47	331	6/9/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
48	335	6/13/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
48	336	6/14/2022	Continuous									
48	338	6/16/2022	Continuous	0.835	0.21	0.453	0.11			25	20	2
49	342	6/20/2022	Continuous	0.835	0.21	0.453	0.11			25	19	2
49	345	6/23/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
50	349	6/27/2022	Continuous	0.835	0.21	0.453	0.11			25	19	2
50	352	6/30/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
51	356	7/4/2022	Continuous	0.835	0.21	0.453	0.11			25	19	2
51	359	7/7/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
52	363	7/11/2022	Continuous	0.835	0.21	0.453	0.11			25	20	2
52	366	7/14/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
53	370	7/18/2022	Continuous	0.835	0.21	0.453	0.11			25	19	2
53	374	7/22/2022	Continuous	0.835	0.21	0.453	0.11			25	25	2
54	377	7/25/2022	Continuous	1.671	0.42	0.453	0.11			49	43	4

APPENDIX B

Additional Figures

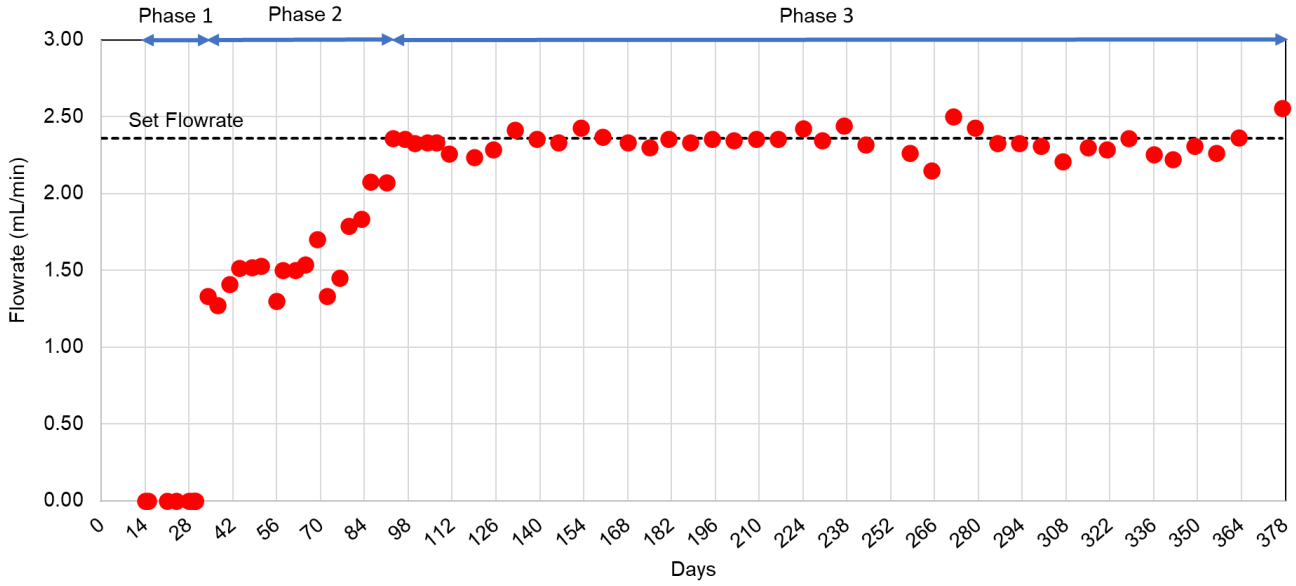

Figure B1: Influent Flowrate into SRF During Leaching Test

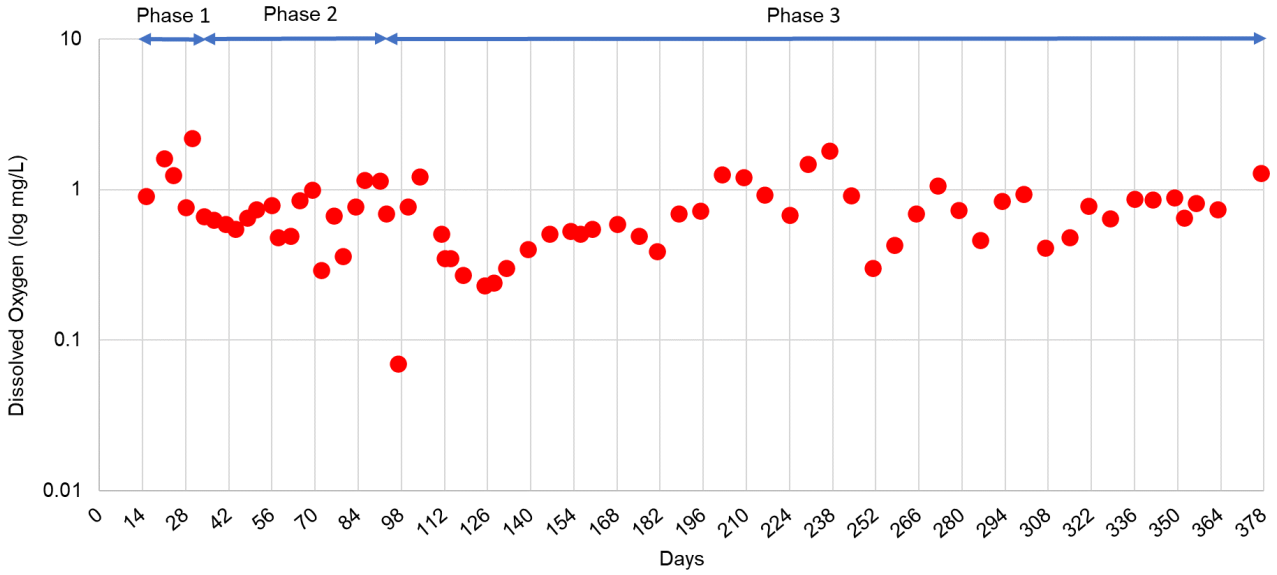

Figure B2: Dissolved Oxygen Measuring in SRF Effluent During Leaching Test

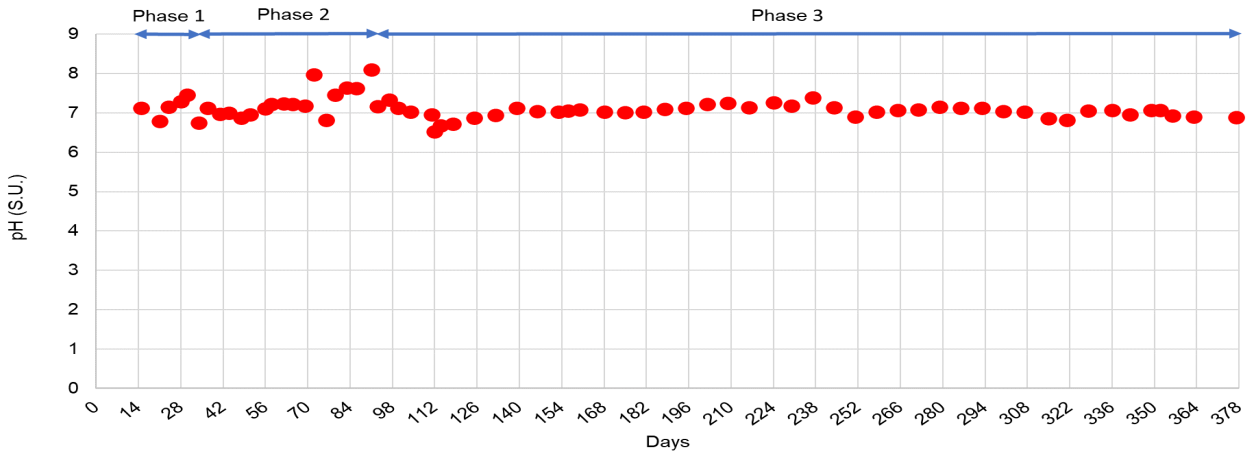

Figure B3: pH in SRF Effluent During Leaching Test

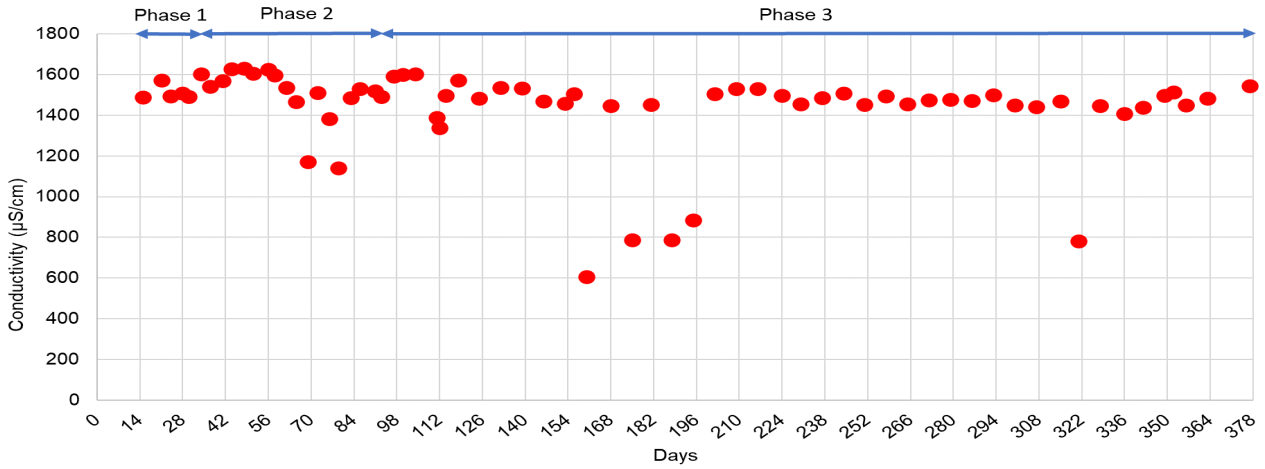

Figure B4: Conductivity in SRF Effluent During Leaching Test

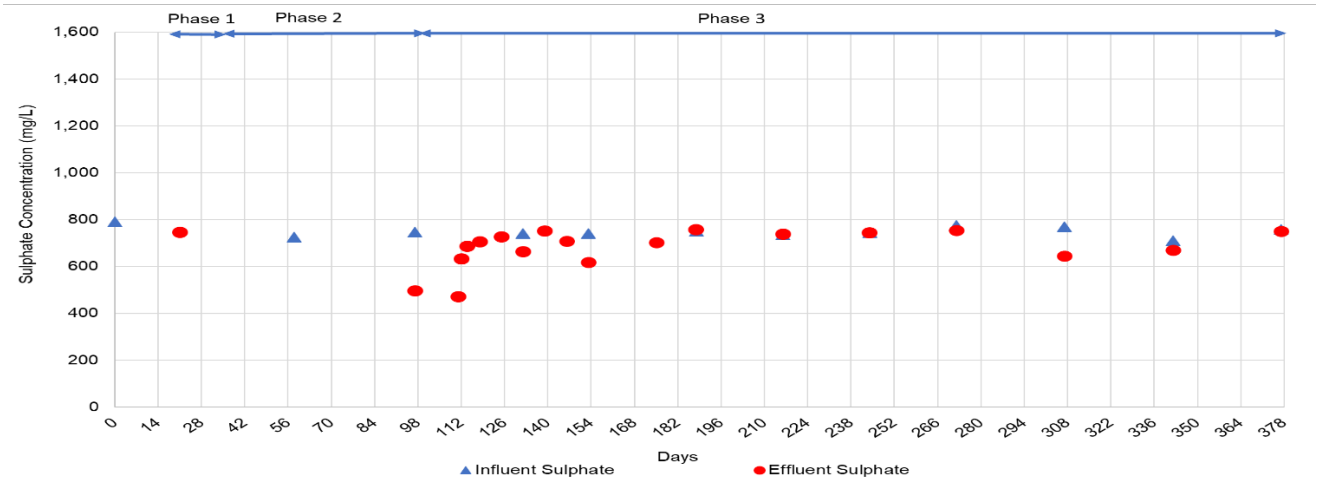

Figure B5: Sulphate Concentration in SRF Effluent During Leaching Test

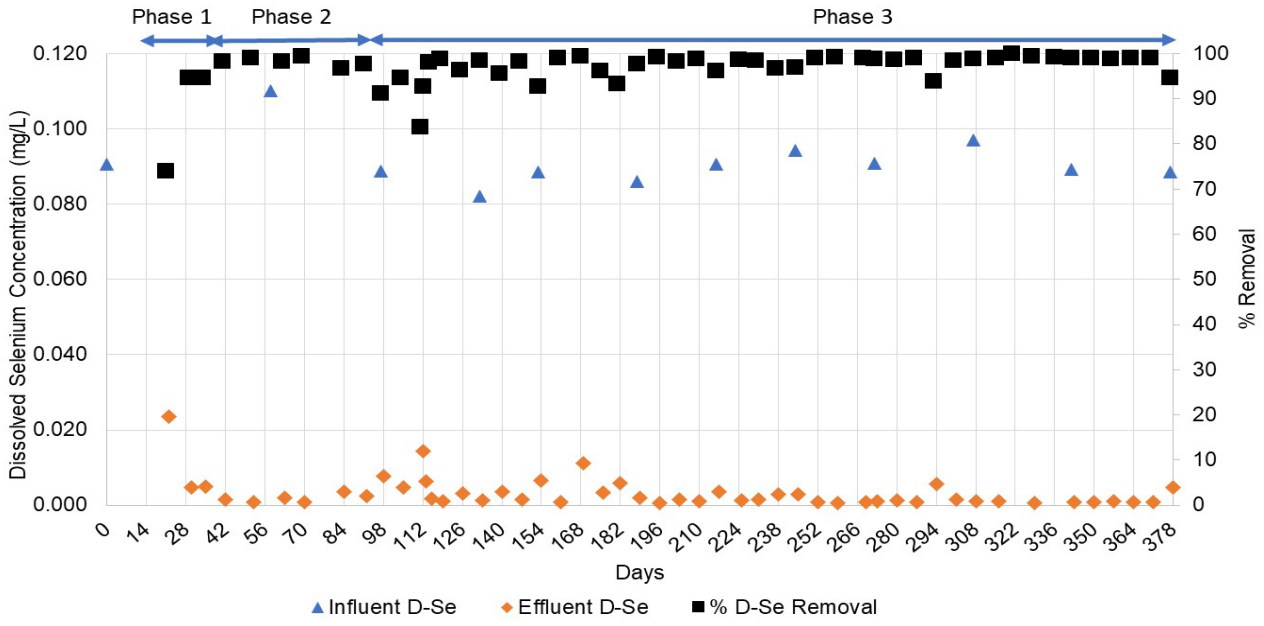

Figure B6: Dissolved Selenium Concentration in SRF Effluent During Leaching Test

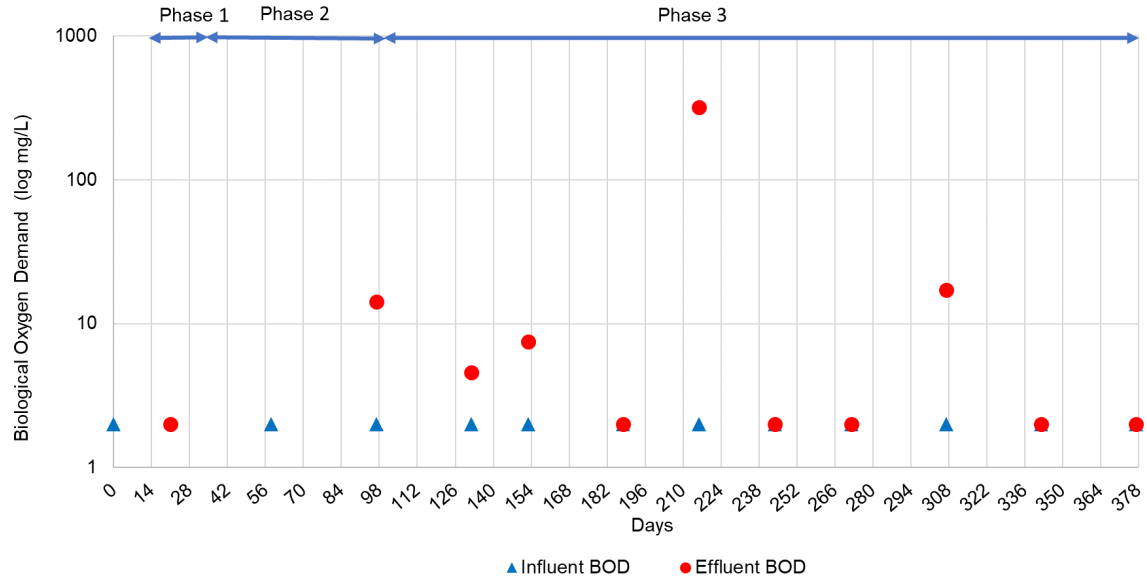

Figure B7: Biological Oxygen Demand During Leaching Test

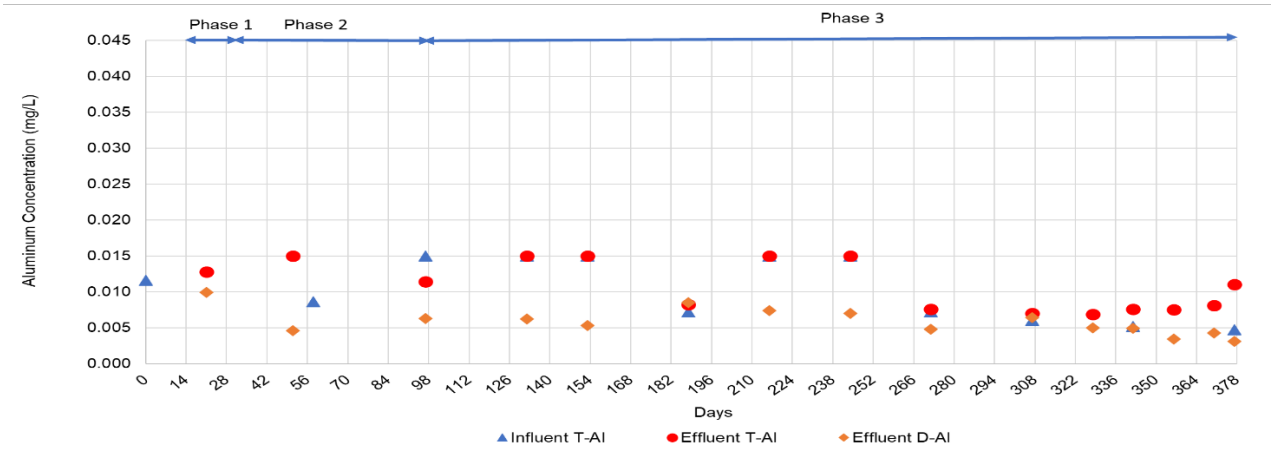

Figure B8: Aluminium Concentration in SRF Effluent During Leaching Test

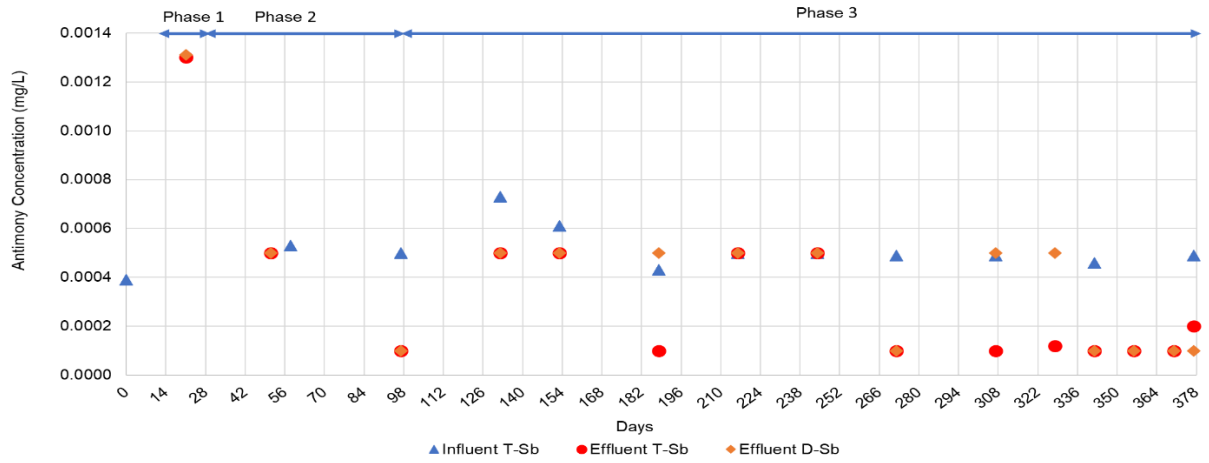

Figure B9: Antimony Concentration in SRF Effluent During Leaching Test

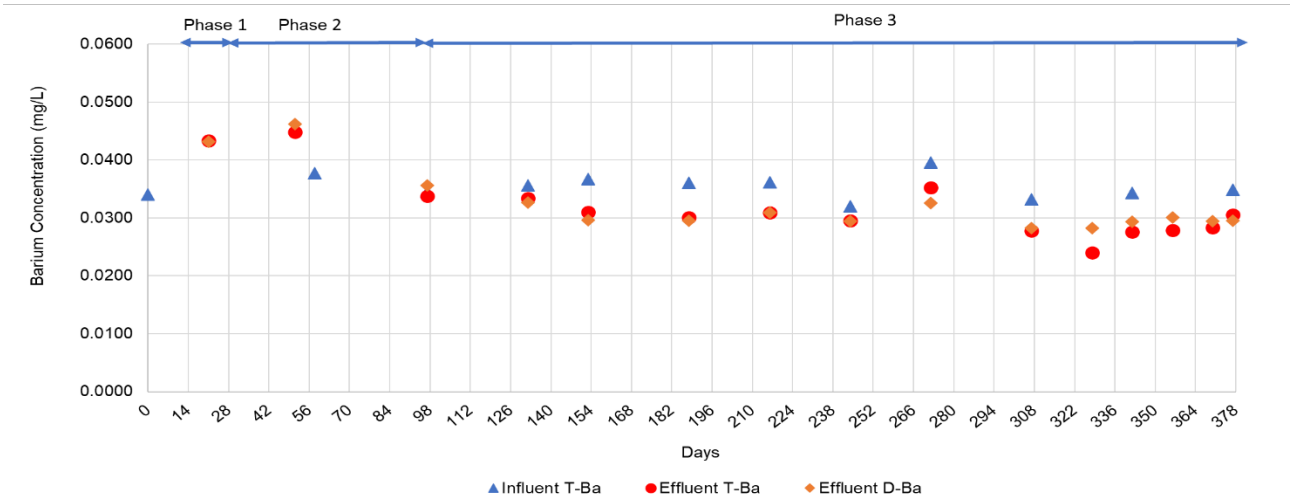

Figure B10: Barium Concentration in SRF Effluent During Leaching Test

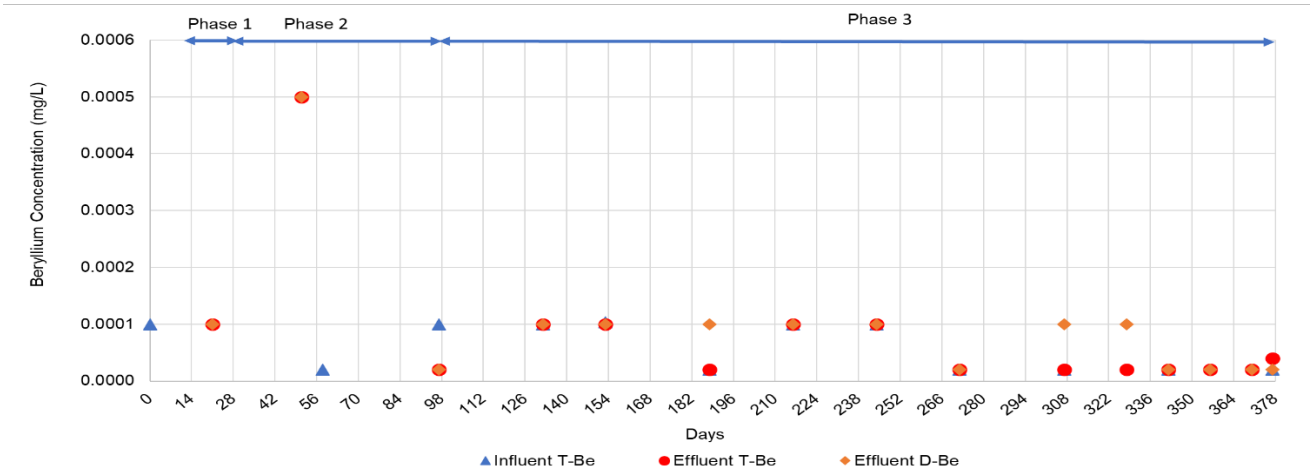

Figure B11: Beryllium Concentration in SRF Effluent During Leaching Test

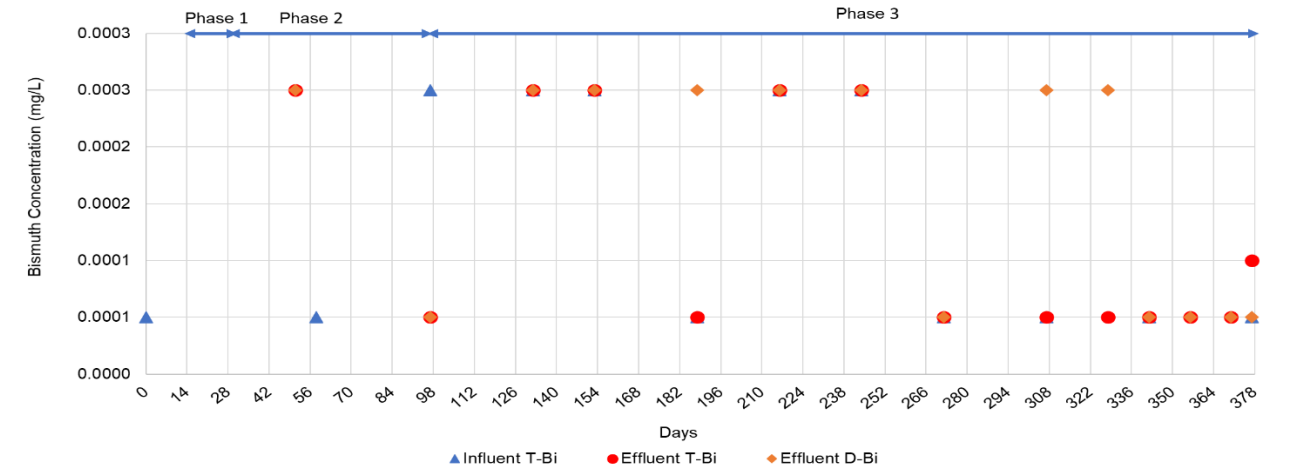

Figure B12: Bismuth Concentration in SRF Effluent During Leaching Test

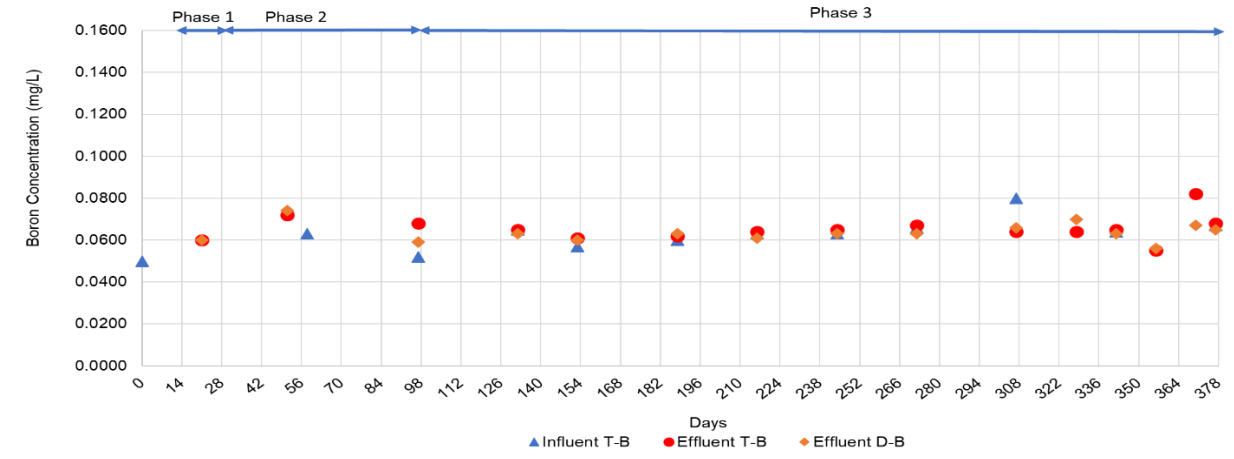

Figure B13: Boron Concentration in SRF Effluent During Leaching Test

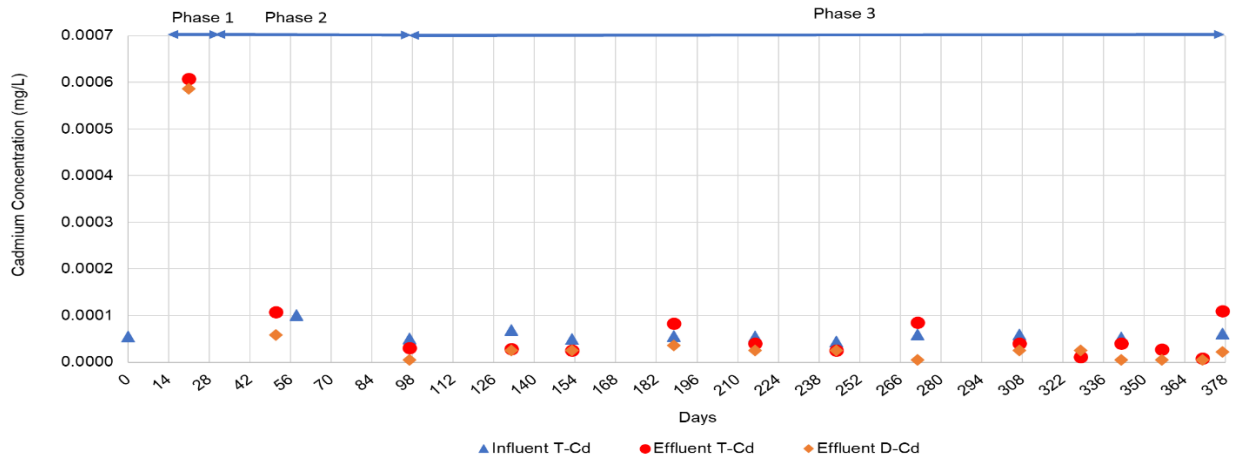

Figure B14: Cadmium Concentration in SRF Effluent During Leaching Test

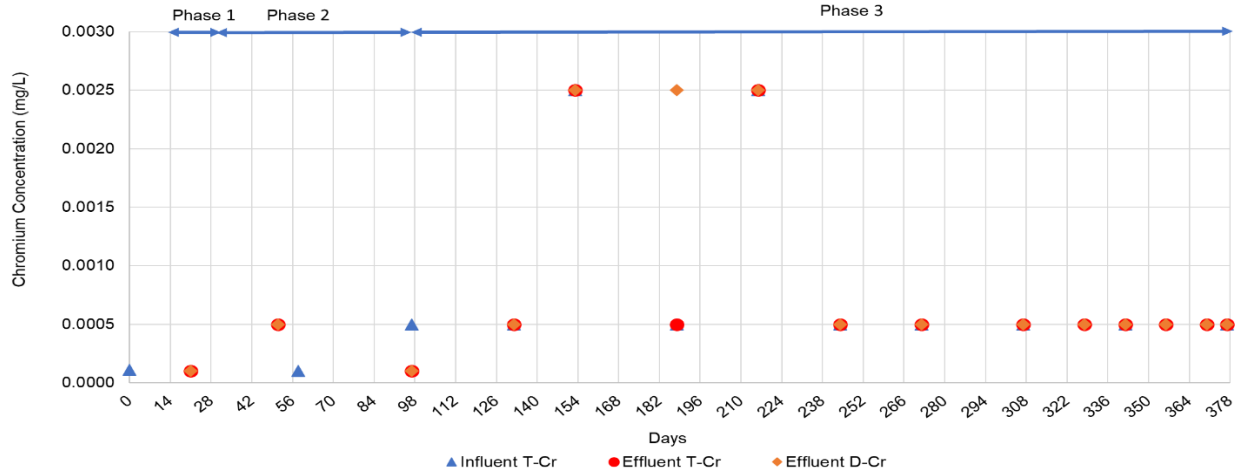

Figure B15: Chromium Concentration in SRF Effluent During Leaching Test

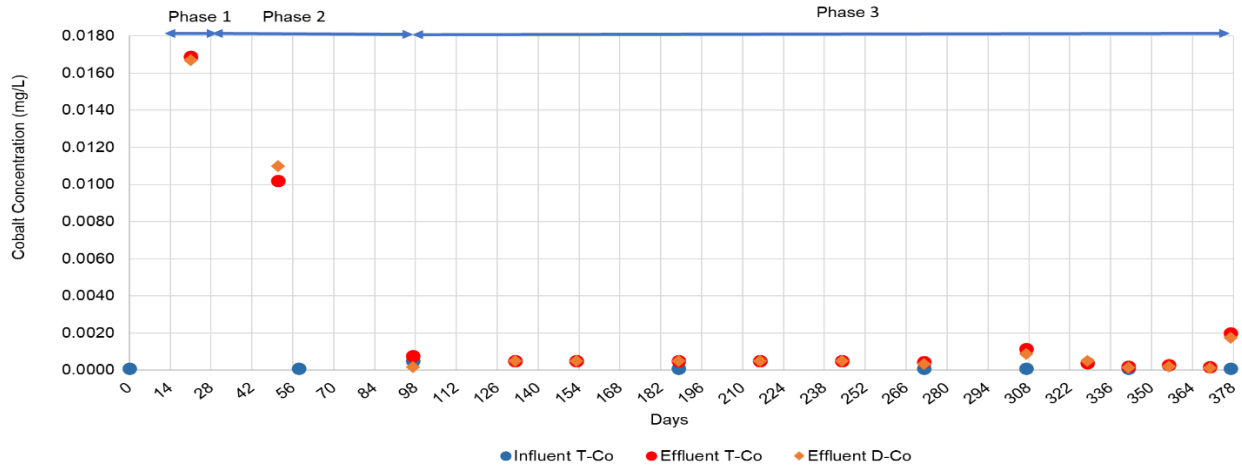

Figure B16: Cobalt Concentration in SRF Effluent During Leaching Test

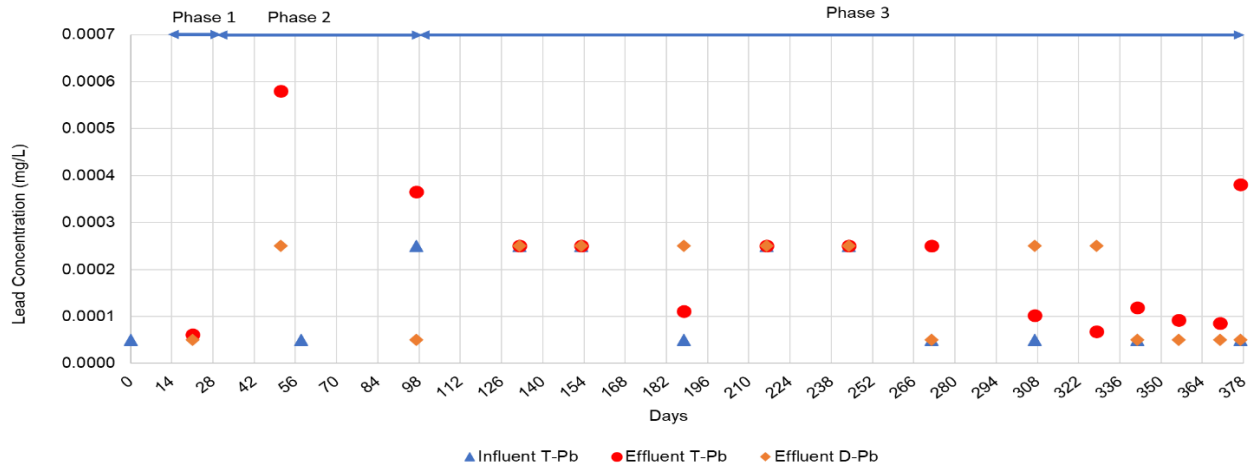

Figure B17: Lead Concentration in SRF Effluent During Leaching Test

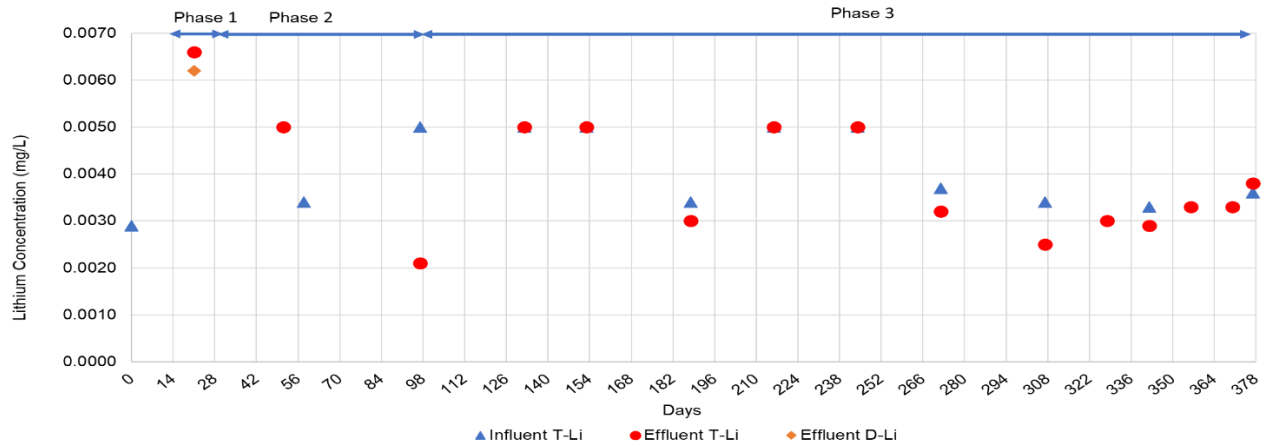

Figure B18: Lithium Concentration in SRF Effluent During Leaching Test

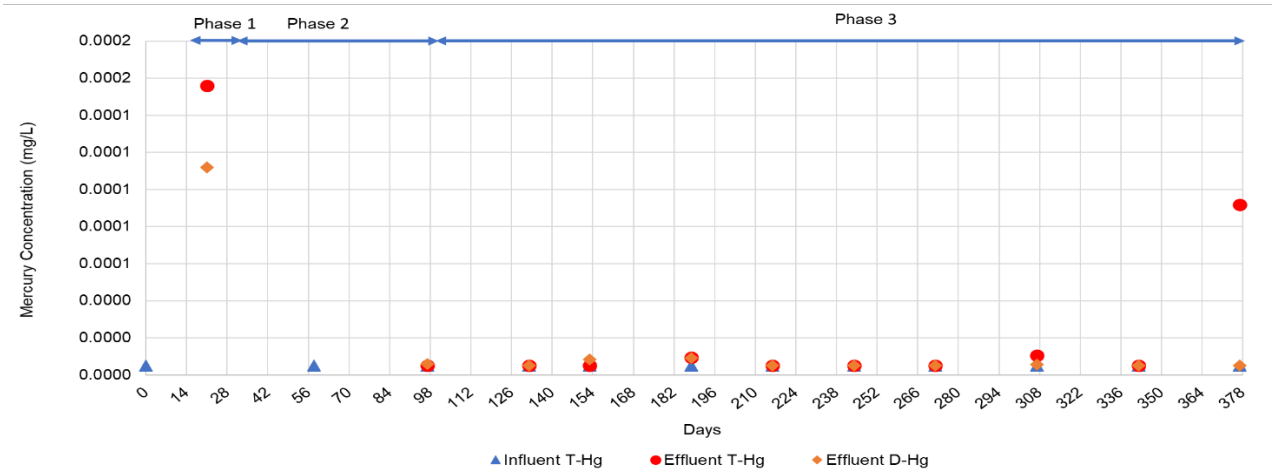

Figure B19: Mercury Concentration in SRF Effluent During Leaching Test

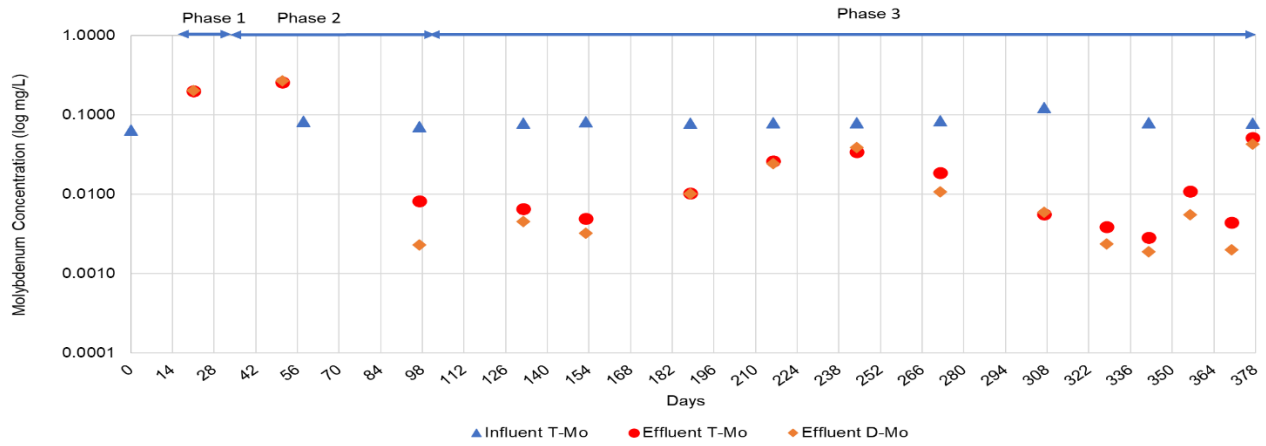

Figure B20: Molybdenum Concentration in SRF Effluent During Leaching Test

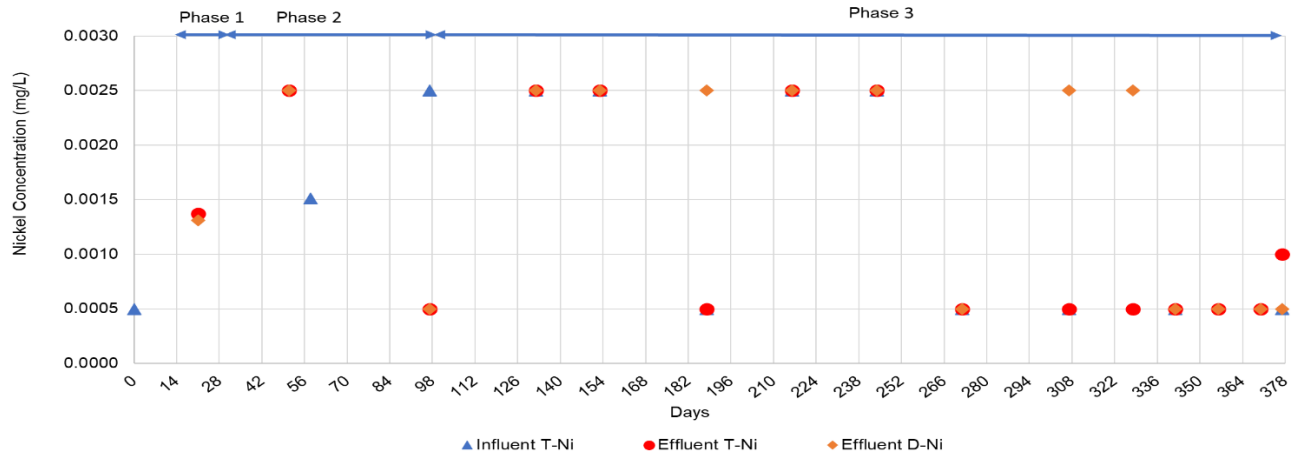

Figure B21: Nickel Concentration in SRF Effluent During Leaching Test

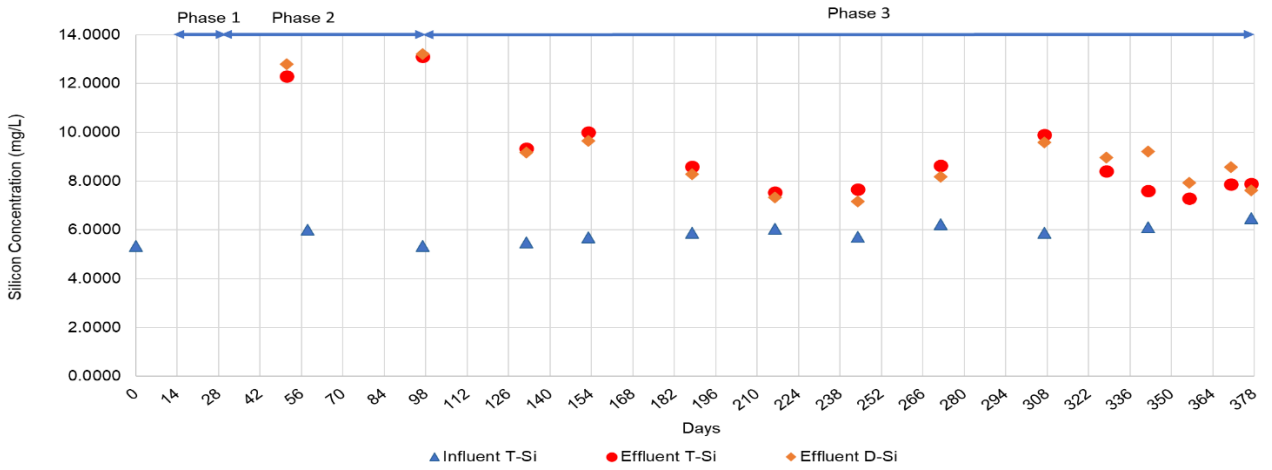

Figure B22: Silicon Concentration in SRF Effluent During Leaching Test

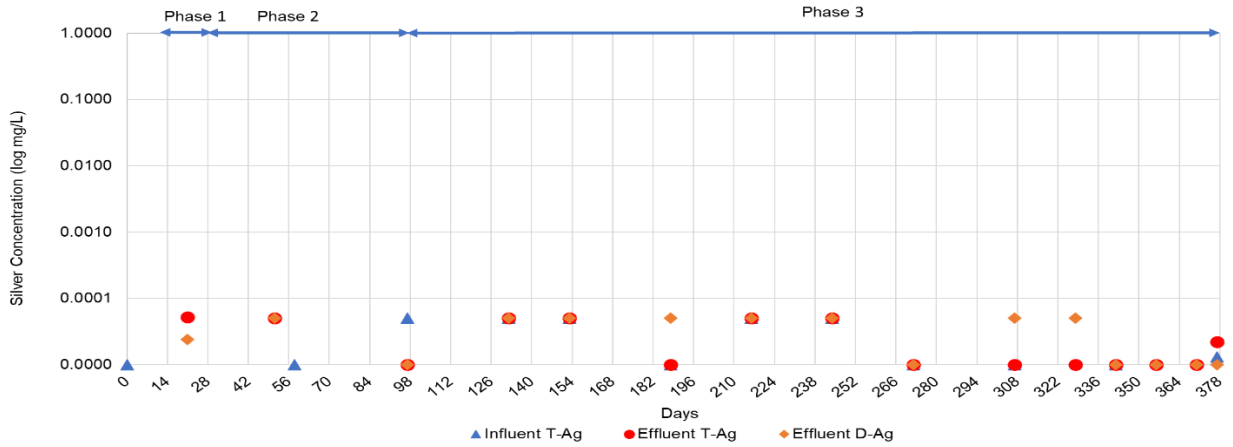

Figure B23: Silver Concentration in SRF Effluent During Leaching Test

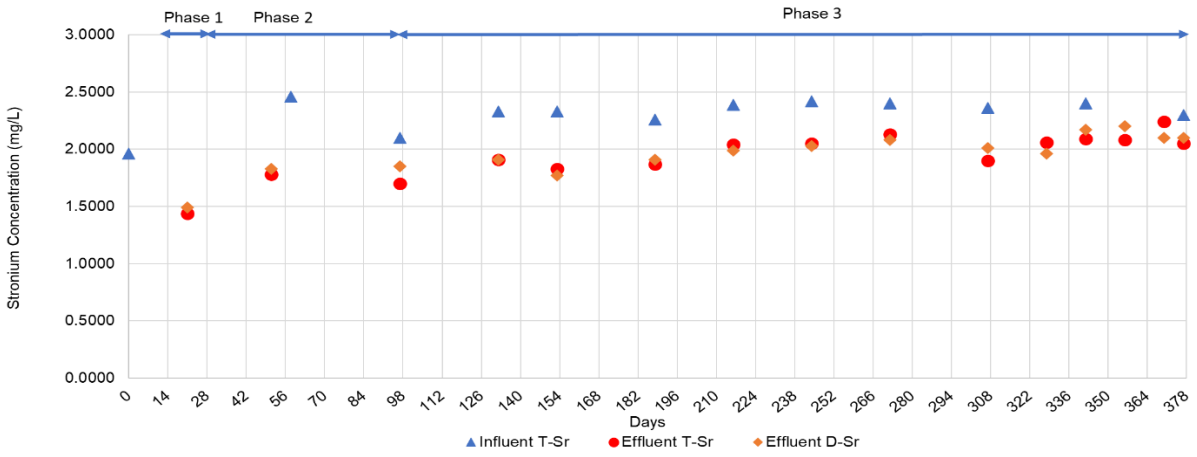

Figure B24: Strontium Concentration in SRF Effluent During Leaching Test

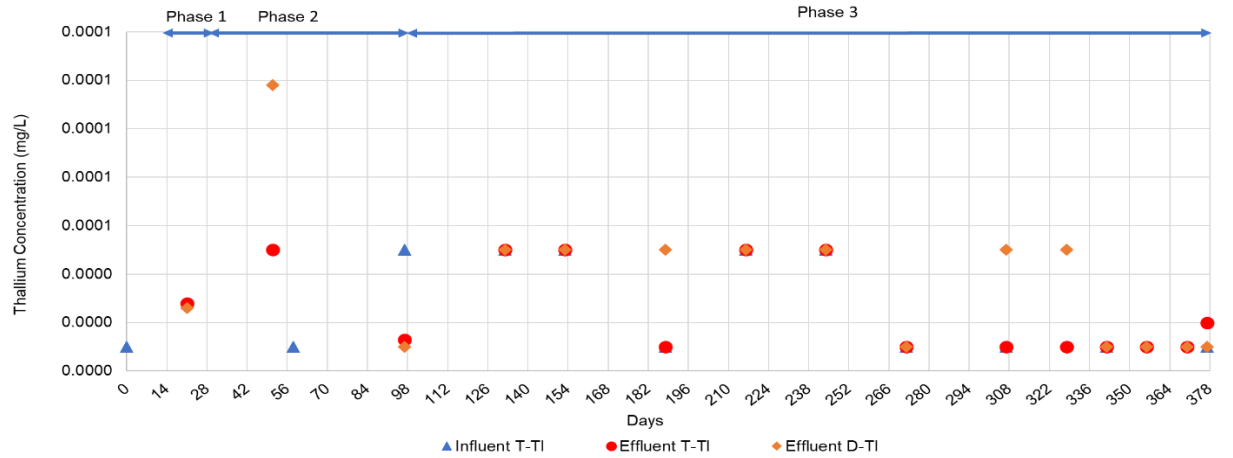

Figure B25: Thallium Concentration in SRF Effluent During Leaching Test

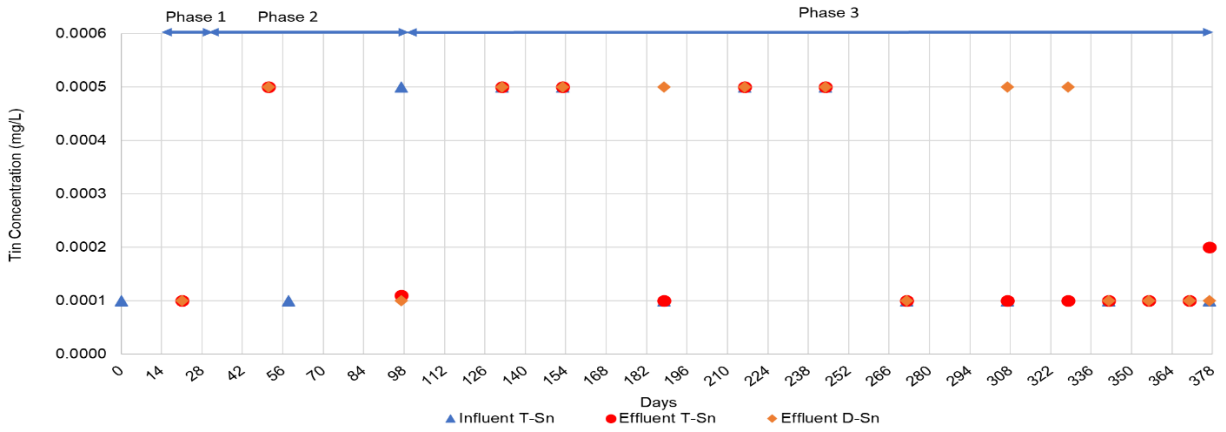

Figure B26: Tin Concentration in SRF Effluent During Leaching Test

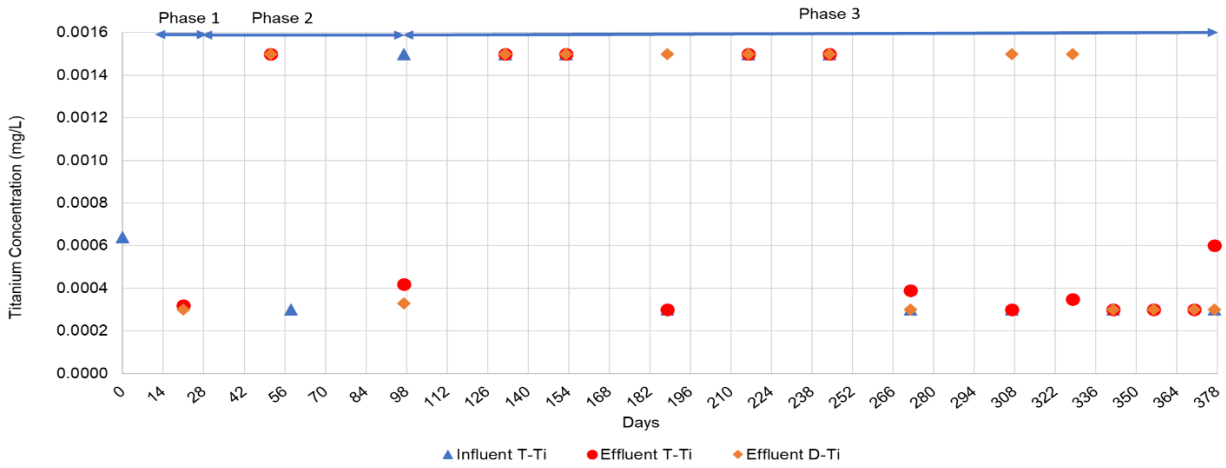

Figure B27: Titanium Concentration in SRF Effluent During Leaching Test

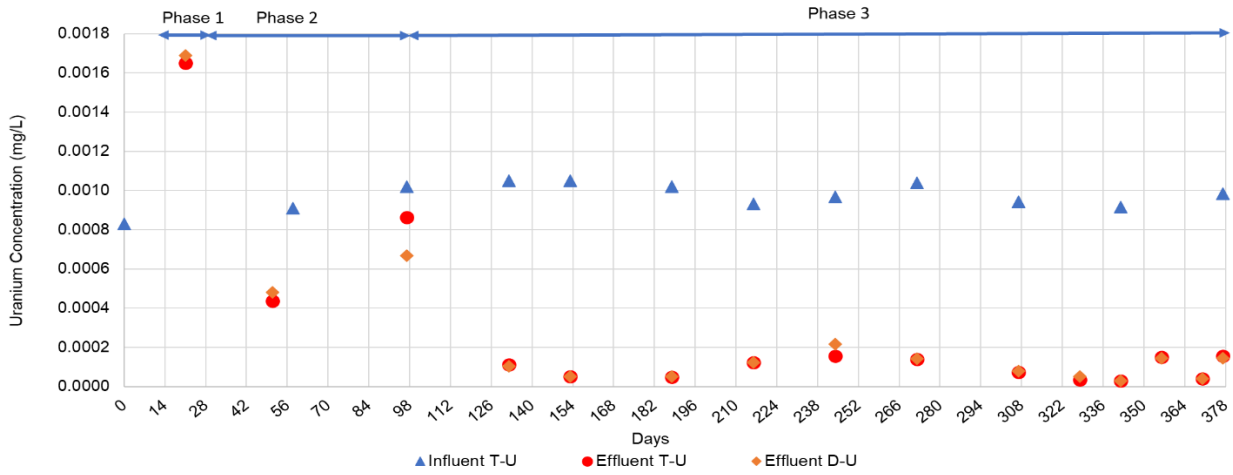

Figure B28: Uranium Concentration in SRF Effluent During Leaching Test

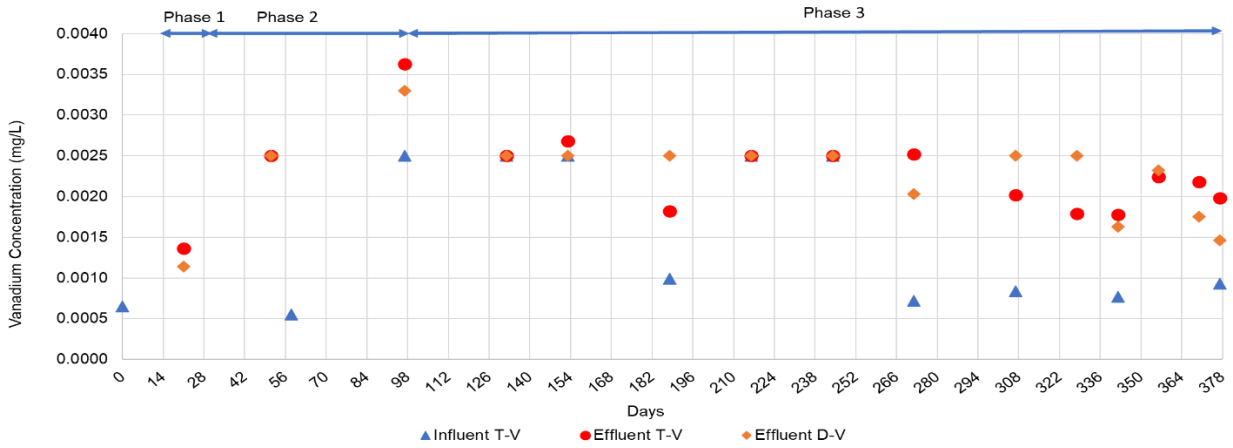

Figure B29: Vanadium Concentration in SRF Effluent During Leaching Test

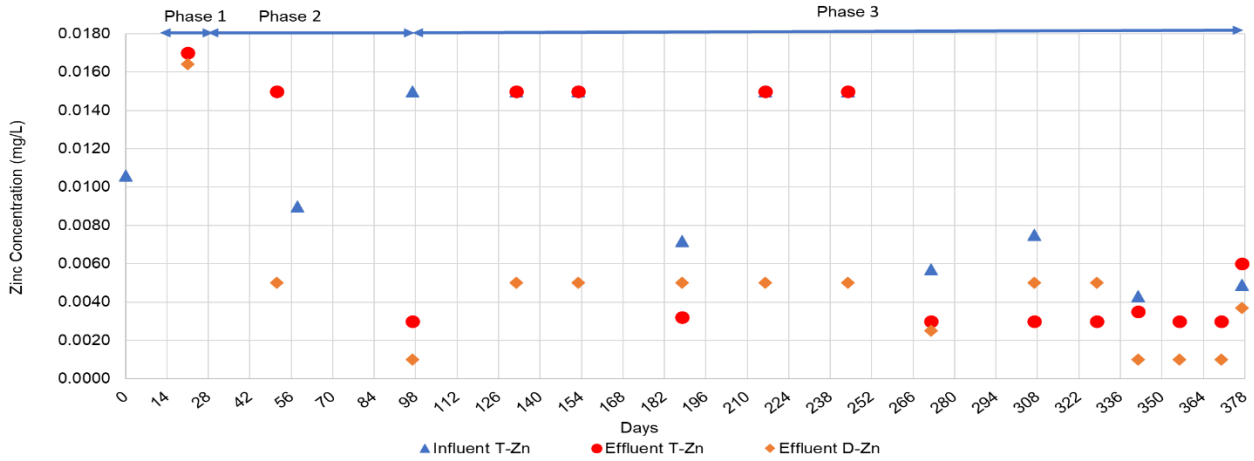

Figure B30: Zinc Concentration in SRF Effluent During Leaching Test

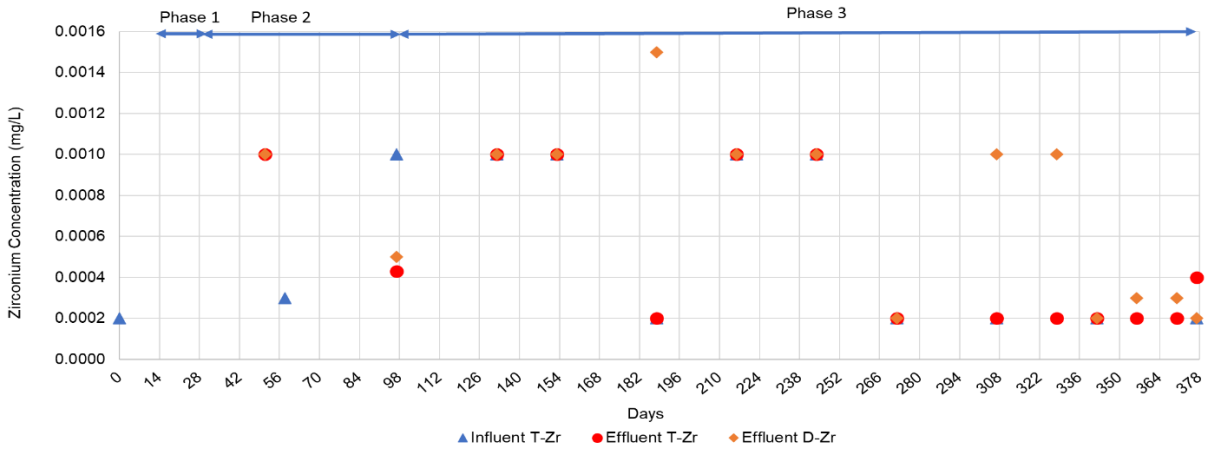

Figure B31: Zirconium Concentration in SRF Effluent During Leaching Test

APPENDIX C

Influent Water Quality Comparison Table

Influent Water Quality Comparsion Table

Parameter	Influent Tote 1	Influent Tote 2	RPD (%)
	4/11/2022	4/11/2022	
Physical Parameters			
Hardness (as CaCO3)	897	868	3.29
Total Dissolved Solids	1170	1080	8.00
Total Suspended Solids	3.4	<3.0	-
Turbidity	0.16	0.16	0.00
Major Ions and Nutrients			
Bromide (Br)	<0.250	<0.250	-
Chloride (Cl)	2.84	2.87	1.05
Fluoride (F)	0.209	0.204	2.42
Sulfate (SO4)	776	779	0.39
Sulphide as S (Dissolved)	<0.0015	<0.0015	-
Sulphide as H2S (Dissolved)	<0.0016	<0.0016	-
Alkalinity, Total (as CaCO3)	89.7	84.1	6.44
Alkalinity, Bicarbonate (as CaCO3)	89.7	78.1	13.83
Alkalinity, Carbonate (as CaCO3)	<1.0	6.0	-
Alkalinity, Hydroxide (as CaCO3)	<1.0	<1.0	-
Ammonia as N	0.0569	<0.0050	-
Nitrate (as N)	6.71	6.67	0.60
Nitrite (as N)	<0.0050	<0.0050	-
Phosphorus (P)-Total	0.0050	0.0054	7.69
Organics			
Total Organic Carbon	4.99	4.89	2.02
Biochemical Oxygen Demand	<2.0	<2.0	-
Total Metals			
Aluminum (Al)-Total	0.0072	0.0066	8.70
Antimony (Sb)-Total	0.00049	0.00050	2.02
Arsenic (As)-Total	0.00123	0.00109	12.07
Barium (Ba)-Total	0.0396	0.0420	5.88
Beryllium (Be)-Total	<0.000020	<0.000020	-
Bismuth (Bi)-Total	<0.000050	<0.000050	-
Boron (B)-Total	0.066	0.067	1.50
Cadmium (Cd)-Total [(a)]	0.0000589	0.0000459	24.81
Calcium (Ca)-Total	278	264	5.17
Chromium (Cr)-Total	<0.00050	<0.00050	-
Cobalt (Co)-Total	<0.00010	<0.00010	-
Copper (Cu)-Total	0.0154	0.0138	10.96
Iron (Fe)-Total	<0.010	<0.010	-
Lead (Pb)-Total	<0.000050	<0.000050	-
Lithium (Li)-Total	0.0037	0.0035	5.56
Magnesium (Mg)-Total	49.2	50.7	3.00
Manganese (Mn)-Total	0.00050	0.00051	1.98
Mercury (Hg)-Total	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Total	0.0841	0.0851	1.18
Nickel (Ni)-Total	<0.00050	<0.00050	-

Parameter	Influent Tote 1	Influent Tote 2	RPD (%)
	4/11/2022	4/11/2022	
Potassium (K)-Total	1.64	1.67	1.81
Selenium (Se)-Total	0.106	0.108	1.87
Silicon (Si)-Total	6.23	6.40	2.69
Silver (Ag)-Total	<0.000010	<0.000010	-
Sodium (Na)-Total	14.4	14.7	2.06
Strontium (Sr)-Total	2.40	2.42	0.83
Sulfur (S)-Total	223	228	2.22
Thallium (Tl)-Total	<0.000010	<0.000010	-
Tin (Sn)-Total	<0.00010	<0.00010	-
Titanium (Ti)-Total	<0.00030	<0.00030	-
Uranium (U)-Total	0.00104	0.00105	0.96
Vanadium (V)-Total	0.00072	0.00074	2.74
Zinc (Zn)-Total [(b)]	0.0057	0.0042	30.30
Zirconium (Zr)-Total	<0.00020	<0.00020	-
Dissolved Metals			
Aluminum (Al)-Dissolved [(c)]	0.0061	0.0036	51.55
Antimony (Sb)-Dissolved	0.00044	0.00049	10.75
Arsenic (As)-Dissolved	0.00108	0.00113	4.52
Barium (Ba)-Dissolved	0.0383	0.0382	0.26
Beryllium (Be)-Dissolved	<0.000020	<0.000020	-
Bismuth (Bi)-Dissolved	<0.000050	<0.000050	-
Boron (B)-Dissolved [(d)]	0.047	0.065	32.14
Cadmium (Cd)-Dissolved	0.0000493	0.0000514	4.17
Calcium (Ca)-Dissolved	238	254	6.50
Chromium (Cr)-Dissolved	<0.00050	<0.00050	-
Cobalt (Co)-Dissolved	<0.00010	<0.00010	-
Copper (Cu)-Dissolved	0.0135	0.0129	4.55
Iron (Fe)-Dissolved	<0.010	<0.010	-
Lead (Pb)-Dissolved	<0.000050	<0.000050	-
Lithium (Li)-Dissolved	0.0032	0.0035	8.96
Magnesium (Mg)-Dissolved	45.2	47.2	4.33
Manganese (Mn)-Dissolved [(e)]	0.00012	0.00024	66.67
Mercury (Hg)-Dissolved	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Dissolved	0.0741	0.0824	10.61
Nickel (Ni)-Dissolved	<0.00050	<0.00050	-
Potassium (K)-Dissolved	1.51	1.59	5.16
Selenium (Se)-Dissolved	0.0909	0.0919	1.09
Silicon (Si)-Dissolved	5.63	5.93	5.19
Silver (Ag)-Dissolved	<0.000010	<0.000010	-
Sodium (Na)-Dissolved	13.2	14.0	5.88
Strontium (Sr)-Dissolved	2.18	2.38	8.77
Sulfur (S)-Dissolved	203	215	5.74
Thallium (Tl)-Dissolved	<0.000010	<0.000010	-
Tin (Sn)-Dissolved	<0.00010	<0.00010	-

Influent Water Quality Comparsion Table

Parameter	Influent Tote 1	Influent Tote 2	RPD (%)
	4/11/2022	4/11/2022	
Titanium (Ti)-Dissolved	<0.00030	<0.00030	-
Uranium (U)-Dissolved	0.000926	0.00103	10.63
Vanadium (V)-Dissolved	<0.00050	0.00050	-
Zinc (Zn)-Dissolved [f]	0.0050	0.0038	27.27
Zirconium (Zr)-Dissolved	<0.00020	<0.00020	-

APPENDIX D

SRF Reactor Troubleshooting

1.0 INTRODUCTION

During the 52 weeks of running the SRF reactor, the SRF reactor experienced three upsets which resulted in sudden changes in ORP and deviation from steady-state operation. The following sections describe the situations that resulted in the upsets and the corresponding recovery measures.

2.0 FIRST UPSET

On Day 111, the SRF reactor was partially drained (roughly 50% of reactor liquid volume and some suspended biomass) during the switch out of effluent drum that caused a siphoning situation. This error was caught before the reactor was completely drained.

The day prior to the siphoning issues, high sulphate reduction was observed in the SRF reactor. This high sulphate reduction could suggest that the bacterial community had been slowly shifting to sulphate reduction and away from selenium reduction. The shift in bacterial community was undesired as the goal for the MPMC on-site SRF is selenium reduction.

The immediate actions taken to recover the SRF reactor were as follows:

1) Refilled the SRF reactor with influent water.
2) Stopped both influent and effluent pumps and returned the SRF to batch operation (similar to the incubation phase) to promote regrowth of bacterial cells that were lost.
3) During this time, acetic acid and phosphoric acid were dosed into the SRF as usual to provide nutrient for faster recovery of the microbial community.

Follow-up actions were as follows:

1) Bench parameters measurements were conducted every other day to monitor the recovery process of the reactor.
2) SRF effluent samples were also collected after the bench parameter measurements and were submitted to ALS for total organic carbon (TOC), total selenium, dissolved selenium, and sulphate measurement.
3) A new carbon dosing approach was adopted, where dosage was adjusted based on the oxidation reduction potential (ORP) measured. The stoichiometric ratio of dosed carbon was increased when ORP was above -100 mV and was decreased when ORP was below -200 mV.

The ORP value reached -205.3 mV within 8 days after the upset. The SRF reactor was then put back to continuous mode with target HRT of 7 days. With the new approach for carbon source dosing, sulphate reduction slowed, then stopped.

3.0 SECOND UPSET

On Day 244, the ORP measured in the SRF effluent was significantly higher than the ORP measured 7 days prior. The exact reason for this upset is unknown but it may have been caused by oxygen intrusion identified during a reactor inspection when a loose connection was found.

The immediate actions taken to recover the SRF reactor were as follows:

1) Carbon source was dosed at the normal stoichiometric ratio for 4 days to see if ORP recovered in the system.
2) ORP was measured again before the next dosing event to observe any changes in ORP. Based on the ORP reading, the stoichiometric ratio for carbon dosing was increased to target an ORP of -200 mV.
3) All connections of the SRF reactor system were checked and sealed with parafilm to prevent future oxygen intrusion.

After approximately one week, the SRF effluent ORP reading was back to the optimal -100 to -200 mV ORP range.

4.0 THIRD UPSET

On Day 296, the ORP measured in the SRF effluent was significantly higher than the optimal ORP range. After reviewing the ORP measurements for the previous weeks, it was noted that the ORP was increasing overtime. The cause for the increase in ORP may have been due to switching of the influent tote on Day 272. After reviewing the influent water quality and conducting bench parameters measurement of the two influent totes, it was found that tote 2 had higher ORP reading than tote 1.

The immediate actions taken to recover the SRF reactor were as follows:

1) The stoichiometric ratio for carbon dosing was increased to target an ORP of -200 mV.
2) ORP was measured again before the next dosing event to observe any changes in ORP.

After approximately one week, the SRF effluent ORP reading was back to the optimal -100 to -200 mV ORP range.

5.0 FOURTH UPSET

On Day 370, after the pump check, it was observed the effluent pump was pumping at a faster rate than the influent pump which resulted in approximately 4 L of SRF reactor volume loss. To recover the lost volume in the SRF, the effluent pump was stopped on Day 375 for 1 day while the influent pump was running at the set flow rate. This action resulted in the sudden increase in ORP.

The immediate action taken to recover the SRF reactor was as follows:

1) The stoichiometric ratio for carbon dosing was increased to 4 to target an ORP of -200 mV.

The leaching test had already completed the 52-week testing period before the outcomes of this action could be evaluated.

APPENDIX E

Raw Data Table

Week	Days	Date	Mode	Lab Analysis Submitted? (Y/N)	Probes Calibrated? (Y/N)	Influent															
						Bench Measurement									Analytical Laboratory Results						
						Set Flow (mL/min)	Actual Flow (mL/min)	HRT (d)	pH (s.u.)	Temp (°C)	Cond. (µS/cm)	ORP (mv)	DO (mg/l)	NO_3 (mg/L)	NO_3 (mg/L)	TP (mg/L)	TOC (mg/L)	D-Se (mg/L)	D-Se (mg/L) Digested with HNO_3	T-Se (mg/L)	SO_4 (mg/L)
0	0	7/13/2021	Batch	Y	N/A										7.29	0.0234	5.6	0.0906		0.0786	791
2	14	7/27/2021	Batch				0.00														
2	15	7/28/2021	Batch				0.00														
3	21	8/3/2021	Batch	Y			0.00														
3	24	8/6/2021	Batch				0.00														
4	28	8/10/2021	Batch				0.00														
4	29	8/11/2021	Batch	Y			0.00														
4	30	8/12/2021	Batch				0.00														
4	30	8/12/2021	Batch				0.00														
5	34	8/16/2021	Continuous	Y	Y	1.18	1.33	12.42	7.43	22.8	1586	79.4	4.46	5							
5	37	8/19/2021	Continuous			1.18	1.27	13.00	7.5	20.1	1419	138.9	5.56	5							
6	41	8/23/2021	Continuous	Y	Y	1.18	1.41	11.71	7.16	18.9	1424	177.6	3.96	5							
6	44	8/26/2021	Continuous			1.18	1.52	10.89	7.42	19.7	1446	134.5	4.75	5-10							
7	48	8/30/2021	Continuous		Y	1.18	1.52	10.86	6.82	20.2	1450	186.2	4.3	5-10							
7	51	9/2/2021	Continuous	Y		1.18	1.53	10.80	7.53	19.5	1426	125.7	4.88	5-10							
8	56	9/7/2021	Continuous		Y	1.18	1.30	12.70	7.6	21	1456	152.8	4.71	5-10							
8	58	9/9/2021	Continuous			1.50	1.50	11.01	7.72	20.3	1439	108.5	4.42	5-10	6.86	0.0279	5.29	0.11		0.0995	725
9	62	9/13/2021	Continuous	Y	Y	1.50	1.50	11.01	7.24	19.7	1440	171.2	4.82	5-10							
9	65	9/16/2021	Continuous			1.50	1.54	10.73	7.45	18.7	1407	133.7	5.67	5-10							
10	69	9/20/2021	Continuous	Y		1.65	1.70	9.71													
10	72	9/23/2021	Continuous		Y	1.65	1.33	12.39													
11	76	9/27/2021	Continuous		Y	1.65	1.45	11.38													
11	79	9/30/2021	Continuous		Y	1.80	1.79	9.25													
12	83	10/4/2021	Continuous	Y	Y	1.80	1.83	9.01													
12	86	10/7/2021	Continuous			2.00	2.08	7.96													
13	91	10/12/2021	Continuous	Y	Y	2.00	2.07	7.97													
13	93	10/14/2021	Continuous		Y	2.36	2.36	7.00													
14	97	10/18/2021	Continuous	Y	Y	2.36	2.35	7.02							6.84	0.0263	5.5	0.0887		0.0873	746
14	100	10/21/2021	Continuous			2.36	2.33	7.10													
15	104	10/25/2021	Continuous	Y	Y	2.36	2.33	7.08													
15	107	10/28/2021	Continuous			2.36	2.33	7.08													
16	111	11/1/2021	Batch	Y	Y	2.36	2.26	7.31													
16	112	11/2/2021	Batch	Y																	
16	114	11/4/2021	Batch	Y	Y																
17	118	11/8/2021	Batch	Y																	
17	119	11/9/2021	Continuous			2.36	2.23	7.39													
18	125	11/15/2021	Continuous	Y	Y	2.36	2.29	7.22													
18	128	11/18/2021	Continuous																		
19	132	11/22/2021	Continuous	Y		2.36	2.41	6.84							6.87	0.0139	5.98	0.0821		0.0857	740
20	139	11/29/2021	Continuous	Y		2.36	2.35	7.01													
21	146	12/6/2021	Continuous	Y	Y	2.36	2.33	7.08													
22	153	12/13/2021	Continuous	Y	Y	2.36	2.43	6.80							6.75	0.0076	5.45	0.0886		0.0892	740
22	156	12/16/2021	Continuous																		
23	160	12/20/2021	Continuous	Y		2.36	2.37	6.97													
24	168	12/28/2021	Continuous	Y	Y	2.36	2.33	7.08													
25	175	1/4/2022	Continuous	Y	Y	2.36	2.30	7.18													
25	177	1/6/2022	Continuous																		
26	181	1/10/2022	Continuous	Y	Y	2.36	2.35	7.02													
26	184	1/13/2022	Continuous																		
27	188	1/17/2022	Continuous	Y	Y	2.36	2.33	7.08							6.54	0.0076	4.48	0.0861		0.105	751
27	191	1/20/2022	Continuous																		
28	195	1/24/2022	Continuous	Y	Y	2.36	2.35	7.02													
28	199	1/28/2022	Continuous			2.36															
29	202	1/31/2022	Continuous	Y	Y	2.36	2.34	7.05													
29	206	2/4/2022	Continuous			2.36															

Week	Days	Date	Mode	Lab Analysis Submitted? (Y/N)	Probes Calibrated? (Y/N)	Influent																
						Bench Measurement									Analytical Laboratory Results							
						Set Flow (mL/min)	Actual Flow (mL/min)	HRT (d)	pH (s.u.)	Temp (°C)	Cond. (µS/cm)	ORP (mv)	DO (mg/l)	NO_3 (mg/L)	NO_3 (mg/L)	TP (mg/L)	TOC (mg/L)	D-Se (mg/L)	D-Se (mg/L) Digested with HNO_3	T-Se (mg/L)	SO_4 (mg/L)
30	209	2/7/2022	Continuous	Y	Y	2.36	2.35	7.02														
30	212	2/10/2022	Continuous			2.36																
31	216	2/14/2022	Continuous	Y	Y	2.36	2.35	7.02							6.55	0.0077	4.56	0.0907		0.0905	736	
31	219	2/17/2022	Continuous			2.36																
32	224	2/22/2022	Continuous	Y	Y	2.36	2.42	6.81														
32	227	2/25/2022	Continuous			2.36																
33	230	2/28/2022	Continuous	Y	Y	2.36	2.34	7.05														
33	234	3/4/2022	Continuous			2.36																
34	237	3/7/2022	Continuous	Y	Y	2.36	2.44	6.76														
35	244	3/14/2022	Continuous	Y	Y	2.36	2.32	7.12							6.54	0.0041	4.98		0.0942	0.0849	745	
35	247	3/17/2022	Continuous			2.36																
36	251	3/21/2022	Continuous	Y	Y	2.36																
36	254	3/24/2022	Continuous			2.36																
37	258	3/28/2022	Continuous	Y	Y	2.36	2.26	7.29														
37	261	3/31/2022	Continuous			2.36																
38	265	4/4/2022	Continuous		Y	2.36	2.15	7.69														
38	268	4/7/2022	Continuous	Y		2.36																
39	272	4/11/2022	Continuous	Y	Y	2.36	2.50	6.61							6.71	0.005	4.99		0.0909	0.106	776	
39	275	4/14/2022	Continuous			2.36																
40	279	4/18/2022	Continuous	Y	Y	2.36	2.43	6.80														
40	282	4/21/2022	Continuous			2.36																
41	286	4/25/2022	Continuous	Y	Y	2.36	2.33	7.10														
41	289	4/28/2022	Continuous			2.36																
42	293	5/2/2022	Continuous	Y	Y	2.36	2.33	7.10														
42	296	5/5/2022	Continuous			2.36																
43	300	5/9/2022	Continuous	Y	Y	2.36	2.31	7.16	8.39		1421	168.7	3.63									
43	303	5/12/2022	Continuous			2.36																
44	307	5/16/2022	Continuous	Y	Y	2.36	2.21	7.49							6.66	0.007	4.75		0.097	0.0906	770	
44	310	5/19/2022	Continuous			2.36																
45	315	5/24/2022	Continuous	Y	Y	2.36	2.30	7.19	8.25		1463	175	3.5									
45	317	5/26/2022	Continuous			2.36																
46	321	5/30/2022	Continuous	Y	Y	2.36	2.29	7.22														
46	324	6/2/2022	Continuous			2.36																
47	328	6/6/2022	Continuous	Y	Y	2.36	2.36	7.00														
47	331	6/9/2022	Continuous			2.36																
48	335	6/13/2022	Continuous			2.36																
48	336	6/14/2022	Continuous	Y	Y	2.36	2.25	7.32														
48	338	6/16/2022	Continuous			2.36																
49	342	6/20/2022	Continuous	Y	Y	2.36	2.22	7.43							6.31	0.004	5.9		0.0893	0.101	711	
49	345	6/23/2022	Continuous			2.36																
50	349	6/27/2022	Continuous	Y	Y	2.36	2.31	7.16														
50	352	6/30/2022	Continuous			2.36																
51	356	7/4/2022	Continuous	Y	Y	2.36	2.26	7.29														
51	359	7/7/2022	Continuous			2.36																
52	363	7/11/2022	Continuous	Y	Y	2.36	2.36	6.99														
52	366	7/14/2022	Continuous			2.36																
53	370	7/18/2022	Continuous	Y		2.36																
53	374	7/22/2022	Continuous			2.36																
54	377	7/25/2022	Continuous	Y	Y	2.36	2.56	6.46							6.6	0.0074	5.25		0.0886	0.1	759	

Week	Days	Date	Mode	SRF Effluent																	
				Bench Measurement								Analytical Laboratory Results									
				pH (s.u.)	Temp (°C)	Cond. (µS/cm)	ORP (mv)	DO (mg/l)	NO_3 (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	NO_3 (mg/L)	TP (mg/L)	TOC (mg/L)	D-Se (mg/L)	D-Se (mg/L) Digested with HNO_3	% D-Se Removal	T-Se (mg/L)	% T-Se Removal	SO_4 (mg/L)	% SO_4 Removal
0	0	7/13/2021	Batch																		
2	14	7/27/2021	Batch						3-5												
2	15	7/28/2021	Batch	7.12	22.1	1488	216.4	0.9													
3	21	8/3/2021	Batch	6.79	22.8	1571	238.1	1.61	0.5			0.063	0.0363	4.48	0.0236		73.95	0.0224	71.50	745	5.82
3	24	8/6/2021	Batch	7.15	22.8	1494	109.7	1.24	0-0.5												
4	28	8/10/2021	Batch	7.29	22.1	1509	166.4	0.76	0												
4	29	8/11/2021	Batch									2.79		7.03	0.00484		94.66	0.00883	88.77		
4	30	8/12/2021	Batch	7.46	22.3	1490	46.2	2.2	0												
4	30	8/12/2021	Batch				138.5														
5	34	8/16/2021	Continuous	6.75	22.5	1603	-2.9	0.66	0					9.9	0.00491		94.58	0.00324	95.88		
5	37	8/19/2021	Continuous	7.12	19.8	1542	-36.8	0.63	0.5 -2												
6	41	8/23/2021	Continuous	6.97	19.1	1570	-57.2	0.59	0			0.35		19.8	0.00152		98.32	0.00142	98.19		
6	44	8/26/2021	Continuous	6.99	20.3	1627	-63.9	0.55	0												
7	48	8/30/2021	Continuous	6.87	20.6	1630	-64.4	0.65	0												
7	51	9/2/2021	Continuous	6.95	19.6	1606	-64.9	0.74	0-0.5			0.025	0.25	35.4	0.00094		98.96	0.0034	95.67		
8	56	9/7/2021	Continuous	7.11	21	1625	-77.4	0.79	0-0.5												
8	58	9/9/2021	Continuous	7.22	20.8	1598	-88.7	0.48	0-0.5												
9	62	9/13/2021	Continuous	7.23	19.9	1537	-58.7	0.49	0-0.5			0.02		11.2	0.0019		98.27	0.00106	98.93		
9	65	9/16/2021	Continuous	7.22	18.3	1466	-88.4	0.85	0-0.5												
10	69	9/20/2021	Continuous	7.18	19.2	1172	-127.3	0.99	0-0.5					6	0.000733		99.33	0.000441	99.56		
10	72	9/23/2021	Continuous	7.97	20	1511	-220.3	0.29	0-0.5												
11	76	9/27/2021	Continuous	6.82	19.9	1384	-169.4	0.67	0					5.96							
11	79	9/30/2021	Continuous	7.45	19.1	1142	-167.6	0.36	0												
12	83	10/4/2021	Continuous	7.64	19.1	1486	-250.2	0.77	0					9.25	0.00358		96.75	0.00041	99.59		
12	86	10/7/2021	Continuous	7.62	19.9	1530	-336	1.15	0												
13	91	10/12/2021	Continuous	8.09	19.5	1518	-165	1.14	0					5.73	0.00253	0.000441	97.70	0.000637	99.36		
13	93	10/14/2021	Continuous	7.16	21	1490	-247	0.69	0												
14	97	10/18/2021	Continuous	7.33	22.7	1591	-161.3	0.07	0			0.053	0.631	16	0.00778		91.23	0.000586	99.33	497	33.38
14	100	10/21/2021	Continuous	7.12	21.4	1600	-326.2	0.77													
15	104	10/25/2021	Continuous	7.02	21.1	1603	-226.2	1.22							0.00481		94.58	0.000807	99.08		
15	107	10/28/2021	Continuous																		
16	111	11/1/2021	Batch	6.96	23.3	1388	-303	0.51						8.5	0.0144		83.77	0.00066	99.24	471	36.86
16	112	11/2/2021	Batch	6.53	23.1	1339	-275.4	0.35	0					17.6	0.00643		92.75	0.00154	98.24	633	15.15
16	114	11/4/2021	Batch	6.67	23.6	1497	-267	0.35	0					7.8	0.00177		98.00	0.0007	99.20	687	7.91
17	118	11/8/2021	Batch	6.72	23.9	1573	-205.3	0.27	0	5	200-400			9.9	0.00104		98.83	0.000933	98.93	705	5.50
17	119	11/9/2021	Continuous																		
18	125	11/15/2021	Continuous	6.87	21.3	1483	-155	0.23	0	0-5	400-800			6	0.0032		96.39	0.00227	97.40	727	2.55
18	128	11/18/2021	Continuous				-121.1	0.24	0												
19	132	11/22/2021	Continuous	6.94	20.9	1537	-307.5	0.3	0	0-5	400-800	0.029	1.15	6.66	0.00125		98.48	0.00181	97.89	663	10.41
20	139	11/29/2021	Continuous	7.12	21.1	1533	-217.5	0.4	0.5	0-5	400-800	0.029		5.8	0.00355		95.68	0.00179	97.91	751	-1.49
21	146	12/6/2021	Continuous	7.04	20.8	1468	-209	0.51	0.5	0-5	400-800			6.46	0.00146		98.22	0.0025	97.08	708	4.32
22	153	12/13/2021	Continuous	7.03	21.2	1458	-301	0.53	0.5	20	>400	0.108	1.82	7.83	0.00647		92.70	0.000714	99.20	618	16.49
22	156	12/16/2021	Continuous	7.05	21.6	1506	-279.8	0.51	0.5	20	400-800										
23	160	12/20/2021	Continuous	7.08	21.2	607	-154.5	0.55	0.5	0-5	400-800			4.86	0.000897		98.99	0.00129	98.55		
24	168	12/28/2021	Continuous	7.02	21.4	1448	-228.1	0.59	0.5	5-10	400-800			5.48	0.0112	0.000514	99.42	0.00102	98.86		
25	175	1/4/2022	Continuous	7.01	21.7	788	-240.9	0.49	0.5	20.00	400-800			5.87	0.00344		96.12	0.00025	99.72	702	5.14
25	177	1/6/2022	Continuous				-206.4														
26	181	1/10/2022	Continuous	7.03	21.8	1451	-237.7	0.39	0.5	5-10	400-800			4.35	0.00592		93.32	0.00112	98.74		
26	184	1/13/2022	Continuous				-241.3														
27	188	1/17/2022	Continuous	7.09	21.8	788	-183.9	0.69	0.5	0-5	400-800	0.064	1.69	4.45	0.00197		97.71	0.000858	99.18	757	-0.80
27	191	1/20/2022	Continuous				-170.3														
28	195	1/24/2022	Continuous	7.12	26.1	886	-190.4	0.72	0.5	0-5	>800			4.81		0.000713	99.17	0.000961	99.08		
28	199	1/28/2022	Continuous				-194.6														
29	202	1/31/2022	Continuous	7.22	23.7	1505	-175.6	1.26	0.5	0-5	>800			5.04		0.00155	98.20	0.0022	97.90		
29	206	2/4/2022	Continuous																		

Week	Days	Date	Mode	SRF Effluent																	
				Bench Measurement								Analytical Laboratory Results									
				pH (s.u.)	Temp (°C)	Cond. (µS/cm)	ORP (mv)	DO (mg/l)	NO_3 (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	NO_3 (mg/L)	TP (mg/L)	TOC (mg/L)	D-Se (mg/L)	D-Se (mg/L) Digested with HNO_3	% D-Se Removal	T-Se (mg/L)	% T-Se Removal	SO_4 (mg/L)	% SO_4 Removal
30	209	2/7/2022	Continuous	7.25	22.9	1530	-149.4	1.2	0.5	5	>800			5.43		0.00106	98.77	0.00177	98.31		
30	212	2/10/2022	Continuous				-186.8														
31	216	2/14/2022	Continuous	7.13	23.1	1529	-136.5	0.92	0.5	0-5	>800	0.0868	1.33	4.46	0.00351		96.13	0.00141	98.44	738	-0.27
31	219	2/17/2022	Continuous				-181.3														
32	224	2/22/2022	Continuous	7.26	21.8	1498	-106.3	0.68	0.5	0-5	>800			4.02		0.0012	98.68	0.00197	97.82		
32	227	2/25/2022	Continuous				-125.1														
33	230	2/28/2022	Continuous	7.18	21.3	1456	-159.4	1.48	0.5	0-5	>800			5.15		0.00142	98.43	0.00172	98.10		
33	234	3/4/2022	Continuous				-171														
34	237	3/7/2022	Continuous	7.39	22.3	1486	-103.2	1.8	0.5	0-5	>800			5.03		0.00299	96.70	0.00552	93.90		
35	244	3/14/2022	Continuous	7.13	24.6	1509	-11	0.91	0.5	0-5	>800	0.284	1.3	4.55		0.00298	96.84	0.000693	99.18	744	0.13
35	247	3/17/2022	Continuous																		
36	251	3/21/2022	Continuous	6.9	24.3	1452	-54.5	0.3	0.5	0-5	>800			4.94		0.000851	99.10	0.00149	98.24		
36	254	3/24/2022	Continuous				-126.4														
37	258	3/28/2022	Continuous	7.03	24.9	1495	-155	0.43	0.5	0-5	>800			4.41		0.000688	99.27	0.00214	97.48		
37	261	3/31/2022	Continuous				-150.5														
38	265	4/4/2022	Continuous	7.07	24.8	1454	-107.9	0.69	0.5	0-5	>800			5.33		0.000938	99.00	0.00207	97.56		
38	268	4/7/2022	Continuous				-158.5														
39	272	4/11/2022	Continuous	7.08	24.6	1474	-121.2	1.06	0.5	0-5	>800	0.025	2.36	5.19		0.00113	98.76	0.00148	98.60	754	2.84
39	275	4/14/2022	Continuous				-171.3														
40	279	4/18/2022	Continuous	7.15	23	1478	-122.2	0.73	0.5	0-5	>800	0.102		5.17		0.0013	98.57	0.00168	98.42		
40	282	4/21/2022	Continuous				-57.2														
41	286	4/25/2022	Continuous	7.12	22.5	1471	-71.7	0.46	0.5	0-5	>800	0.0422		4.53		0.000892	99.02	0.00166	98.43		
41	289	4/28/2022	Continuous				-57.8														
42	293	5/2/2022	Continuous	7.12	22.5	1500	-45.7	0.84	0.5	0-5	>800	0.0521		5.38		0.00563	93.81	0.00414	96.09		
42	296	5/5/2022	Continuous				-7														
43	300	5/9/2022	Continuous	7.04	22.5	1449	-68.2	0.93	0.5	0-5	>800	0.307		4.73		0.00145	98.40	0.00104	99.02		
43	303	5/12/2022	Continuous				-137														
44	307	5/16/2022	Continuous	7.03	22.7	1441	-178.1	0.41	0.5	0-5	>400	0.0633	3.01	4.72		0.0011	98.87	0.00154	98.30	645	16.23
44	310	5/19/2022	Continuous				-158.4														
45	315	5/24/2022	Continuous	6.86	22.5	1470	-112.3	0.48	0.5	0-5	>800	0.0792		4.79		0.000982	98.99	0.000989	98.91		
45	317	5/26/2022	Continuous				-139.3														
46	321	5/30/2022	Continuous	6.82	22.6	783	-165	0.78	0.5	0-5	>800	3.72		4.73		(a)	99.95	0.00116	98.72		
46	324	6/2/2022	Continuous				-178.8														
47	328	6/6/2022	Continuous	7.05	22.7	1446	-162	0.64	0.5	0-5	>800	0.025	2.07	5.82		0.000658	99.32	0.000635	99.30		
47	331	6/9/2022	Continuous				-168.3														
48	335	6/13/2022	Continuous				-146.8														
48	336	6/14/2022	Continuous	7.07	22.9	1407	-138.8	0.87	0.5	0-5	>800	0.005		4.91		0.000682	99.30	0.000584	99.36		
48	338	6/16/2022	Continuous				-184.3														
49	342	6/20/2022	Continuous	6.96	22.7	1438	-198.2	0.86	0-0.5	5	>800	0.268	1.68	5.38		0.000941	98.95	0.000706	99.30	669	5.91
49	345	6/23/2022	Continuous				-149.6														
50	349	6/27/2022	Continuous	7.06	23	1498	-163.6	0.88	0-0.5	5	>800	0.0591		5.37		0.00079	99.12	0.000645	99.36		
50	352	6/30/2022	Continuous	7.07		1513	-137.8	0.65													
51	356	7/4/2022	Continuous	6.92	22.8	1450	-140.2	0.81	0-0.5	5	>800	0.17	2.03	5.38		0.00102	98.86	0.00138	98.63		
51	359	7/7/2022	Continuous				-154.4														
52	363	7/11/2022	Continuous	6.9	23.2	1482	-157.2	0.74	0-0.5	0-5	>800	0.025		4.34		0.000861	99.04	0.000562	99.44		
52	366	7/14/2022	Continuous				-138.1														
53	370	7/18/2022	Continuous				-159.3					0.0262	2.07	5.2		0.000863	99.03	0.000924	99.09		
53	374	7/22/2022	Continuous				-143.6														
54	377	7/25/2022	Continuous	6.88	23.6	1544	0.2	1.29	0-0.5	0-5	>800	0.0767	1.14	6.35		0.00477	94.62	0.00738	92.62	750	1.19

Note:
a) D-Se result did not meet ALS Quality Objectives

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	Influent																			
				T-Al (mg/l)	T-Sb (mg/L)	T-As (mg/l)	T-Ba (mg/l)	T-Be (mg/L)	T-Bi (mg/L)	T-B (mg/l)	T-Cd (mg/L)	T-Ca (mg/L)	T-Cr (mg/L)	T-Co (mg/L)	T-Cu (mg/L)	T-Fe (mg/L)	T-Pb (mg/L)	T-Li (mg/L)	T-Mg (mg/L)	T-Mn (mg/L)	T-Mo (mg/L)	T-Hg (mg/L)	T-Ni (mg/L)	T-K (mg/L)
0	0	7/13/2021	Batch	0.0116	0.00039	0.00108	0.0340	<0.00010	<0.000050	0.050	0.0000554	214	0.00011	<0.00010	0.0195	0.013	<0.000050	0.0029	44.7	0.00554	0.0650	<0.0000050	<0.00050	1.43
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	0.0086	0.00053	0.00150	0.0377	<0.000020	<0.000050	0.063	0.000101	255	0.00010	<0.00010	0.0197	<0.010	<0.000050	0.0034	53.4	0.00151	0.0836	<0.0000050	0.00151	1.52
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	<0.015	<0.00050	0.00096	0.0345	<0.00010	<0.00025	0.052	0.000051	210	<0.00050	<0.00050	0.0179	<0.050	<0.00025	<0.0050	41.3	0.00125	0.0711	<0.0000050	<0.0025	1.33
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	<0.015	0.00073	0.00125	0.0356	<0.00010	<0.00025	0.065	0.000069	253	<0.00050	<0.00050	0.0177	<0.050	<0.00025	<0.0050	45.1	0.00078	0.0786	<0.0000050	<0.0025	1.53
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	<0.0150	0.00061	0.00110	0.0367	0.000103	<0.000250	0.057	0.0000499	237	<0.00250	<0.00050	0.0179	<0.050	<0.000250	<0.0050	43.6	0.00062	0.0821	<0.0000050	<0.00250	1.50
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	0.0072	0.00043	0.00131	0.0361	<0.000020	<0.000050	0.060	0.0000564	255	<0.00050	<0.00010	0.0164	<0.010	<0.000050	0.0034	50.0	0.00044	0.0787	<0.0000050	<0.00050	1.43
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	Influent																			
				T-Al (mg/l)	T-Sb (mg/L)	T-As (mg/l)	T-Ba (mg/l)	T-Be (mg/L)	T-Bi (mg/L)	T-B (mg/l)	T-Cd (mg/L)	T-Ca (mg/L)	T-Cr (mg/L)	T-Co (mg/L)	T-Cu (mg/L)	T-Fe (mg/L)	T-Pb (mg/L)	T-Li (mg/L)	T-Mg (mg/L)	T-Mn (mg/L)	T-Mo (mg/L)	T-Hg (mg/L)	T-Ni (mg/L)	T-K (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	<0.0150	<0.00050	0.00111	0.0362	<0.000100	<0.000250	0.063	0.0000552	240	<0.00250	<0.00050	0.0166	<0.050	<0.000250	<0.0050	49.5	<0.00050	0.0801	<0.0000050	<0.00250	1.46
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	<0.0150	<0.00050	0.00108	0.0320	<0.000100	<0.000250	0.063	0.0000445	240	<0.00050	<0.00050	0.0144	<0.050	<0.000250	<0.0050	42.2	<0.00050	0.0804	<0.0000050	<0.00250	1.37
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	0.0072	0.00049	0.00123	0.0396	<0.000020	<0.000050	0.066	0.0000589	278	<0.00050	<0.00010	0.0154	<0.010	<0.000050	0.0037	49.2	0.00050	0.0841	<0.0000050	<0.00050	1.64
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	0.0060	0.00049	0.00111	0.0332	<0.000020	<0.000050	0.080	0.0000597	236	<0.00050	<0.00010	0.0150	<0.010	<0.000050	0.0034	45.2	0.00170	0.123	<0.0000050	<0.00050	1.52
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	0.0052	0.00046	0.00119	0.0343	<0.000020	<0.000050	0.064	0.0000534	237	<0.00050	<0.00010	0.0132	<0.010	<0.000050	0.0033	47.4	0.00062	0.0800	<0.0000050	<0.00050	1.53
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	0.0047	0.00049	0.00126	0.0349	<0.000020	<0.000050	0.067	0.0000616	232	<0.00050	<0.00010	0.0128	<0.010	<0.000050	0.0036	46.2	0.00036	0.0787	<0.0000050	<0.00050	1.63

Note:
- = not analyzed

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	Influent																			
				T-Si (mg/L)	T-Ag (mg/L)	T-Na (mg/L)	T-Sr (mg/L)	T-Tl (mg/L)	T-Sn (mg/L)	T-Ti (mg/L)	T-U (mg/L)	T-V (mg/L)	T-Zn(mg/L)	T-Zr (mg/L)	D-Al (mg/l)	D-Sb (mg/L)	D-As (mg/l)	D-Ba (mg/l)	D-Be (mg/L)	D-Bi (mg/L)	D-B (mg/l)	D-Cd (mg/L)	D-Ca (mg/L)	D-Cr (mg/L)
0	0	7/13/2021	Batch	5.35	<0.000010	12.0	1.96	<0.000010	<0.00010	0.00064	0.000830	0.00065	0.0106	<0.00020	0.0047	0.00043	0.00118	0.0351	<0.000050	<0.000050	0.050	0.0000558	228	<0.00010
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	6.01	<0.000010	13.9	2.46	<0.000010	<0.00010	<0.00030	0.000910	0.00055	0.0090	<0.00030	0.0059	0.00050	0.00131	0.0364	<0.000020	<0.000050	0.062	0.0000814	247	<0.00010
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	5.35	<0.000050	12.9	2.10	<0.000050	<0.00050	<0.0015	0.00102	<0.0025	<0.015	<0.0010	0.0051	<0.00050	0.00123	0.0351	<0.00010	<0.00025	0.057	0.000078	236	<0.00050
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	5.50	<0.000050	12.7	2.33	<0.000050	<0.00050	<0.0015	0.00105	<0.0025	<0.015	<0.0010	0.0072	<0.00050	0.00107	0.0350	<0.00010	<0.00025	0.062	0.000056	235	<0.00050
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	5.69	<0.000050	12.1	2.33	<0.000050	<0.00050	<0.00150	0.00105	<0.00250	<0.0150	<0.00100	0.0076	<0.00050	0.00124	0.0368	<0.000100	<0.000250	0.060	0.0000525	250	<0.00250
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	5.88	<0.000010	14.6	2.26	<0.000010	<0.00010	<0.00030	0.00102	0.00099	0.0072	<0.00020	0.0102	<0.00050	0.00110	0.0338	<0.000100	<0.000250	0.062	0.0000408	248	<0.00250
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
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Analytical Laboratory Results - Metals

Week	Days	Date	Mode	Influent																			
				T-Si (mg/L)	T-Ag (mg/L)	T-Na (mg/L)	T-Sr (mg/L)	T-Tl (mg/L)	T-Sn (mg/L)	T-Ti (mg/L)	T-U (mg/L)	T-V (mg/L)	T-Zn(mg/L)	T-Zr (mg/L)	D-Al (mg/l)	D-Sb (mg/L)	D-As (mg/l)	D-Ba (mg/l)	D-Be (mg/L)	D-Bi (mg/L)	D-B (mg/l)	D-Cd (mg/L)	D-Ca (mg/L)	D-Cr (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	6.04	<0.000050	13.3	2.39	<0.000050	<0.00050	<0.00150	0.000932	<0.00250	<0.0150	<0.00100	0.0062	<0.00050	0.00115	0.0355	<0.000100	<0.000250	0.059	0.0000559	236	<0.00250
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	5.71	<0.000050	11.6	2.42	<0.000050	<0.00050	<0.00150	0.000968	<0.00250	<0.0150	<0.00100	0.0053	<0.00050	0.00103	0.0344	<0.000100	<0.000250	0.058	0.0000324	228	<0.00050
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	6.23	<0.000010	14.4	2.40	<0.000010	<0.00010	<0.00030	0.00104	0.00072	0.0057	<0.00020	0.0061	0.00044	0.00108	0.0383	<0.000020	<0.000050	0.047	0.0000493	238	<0.00050
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	5.89	<0.000010	12.9	2.36	<0.000010	<0.00010	<0.00030	0.000943	0.00084	0.0075	<0.00020	<0.0050	<0.00050	0.00111	0.0352	<0.000100	<0.000250	0.061	0.0000506	235	<0.00050
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	6.12	<0.000010	13.4	2.40	<0.000010	<0.00010	<0.00030	0.000916	0.00077	0.0043	<0.00020	0.0027	0.00046	0.00115	0.0360	<0.000020	<0.000050	0.062	0.0000462	253	<0.00050
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	6.49	0.000013	13.4	2.30	<0.000010	<0.00010	<0.00030	0.000983	0.00093	0.0049	<0.00020	0.0020	0.00048	0.00119	0.0341	<0.000020	<0.000050	0.064	0.0000503	247	<0.00050

Note:
- = not analyzed

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	Influent																				
				D-Co (mg/L)	D-Cu (mg/L)	D-Fe (mg/L)	D-Pb (mg/L)	D-Li (mg/L)	D-Mg (mg/L)	D-Mn (mg/L)	D-Mo (mg/L)	D-Hg (mg/L)	D-Ni (mg/L)	D-K (mg/L)	D-Si (mg/L)	D-Ag (mg/L)	D-Na (mg/L)	D-Sr (mg/L)	D-Tl (mg/L)	D-Sn (mg/L)	D-Ti (mg/L)	D-U (mg/L)	D-V (mg/L)	D-Zn (mg/L)	D-Zr (mg/L)
0	0	7/13/2021	Batch	<0.00010	0.0188	<0.010	<0.000050	0.0032	44.8	0.00540	0.0704	<0.0000050	<0.00050	1.47	5.39	<0.000010	12.0	2.12	<0.000010	<0.00010	<0.00030	0.000833	0.00052	0.0098	<0.00020
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	<0.00010	0.0180	<0.010	<0.000050	0.0032	50.3	0.00120	0.0798	<0.0000050	0.00062	1.44	6.08	<0.000010	13.3	2.26	<0.000010	<0.00010	<0.00030	0.000860	0.00053	0.0082	<0.00030
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	<0.00050	0.0181	<0.050	<0.00025	<0.0050	46.8	0.00065	0.0770	<0.0000050	<0.0025	1.43	5.43	<0.000050	12.9	2.36	<0.000050	<0.00050	<0.0015	0.000852	<0.0025	0.0088	<0.0010
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	<0.00050	0.0168	<0.050	<0.00025	<0.0050	43.7	<0.00050	0.0754	<0.0000050	<0.0025	1.45	5.40	<0.000050	12.1	2.25	<0.000050	<0.00050	<0.0015	0.00103	<0.0025	0.0071	<0.0010
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	<0.00050	0.0172	<0.050	<0.000250	<0.0050	44.9	<0.00050	0.0819	<0.0000050	<0.00250	1.55	5.86	<0.000050	12.5	2.33	<0.000050	<0.00050	<0.00150	0.00104	<0.00250	0.0066	<0.00100
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	<0.00050	0.0164	<0.050	<0.000250	<0.0050	49.0	<0.00050	0.0773	<0.0000050	<0.00250	1.40	5.59	<0.000050	13.1	2.28	<0.000050	<0.00050	<0.00150	0.000882	<0.00250	0.0062	<0.00150
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	Influent																				
				D-Co (mg/L)	D-Cu (mg/L)	D-Fe (mg/L)	D-Pb (mg/L)	D-Li (mg/L)	D-Mg (mg/L)	D-Mn (mg/L)	D-Mo (mg/L)	D-Hg (mg/L)	D-Ni (mg/L)	D-K (mg/L)	D-Si (mg/L)	D-Ag (mg/L)	D-Na (mg/L)	D-Sr (mg/L)	D-Tl (mg/L)	D-Sn (mg/L)	D-Ti (mg/L)	D-U (mg/L)	D-V (mg/L)	D-Zn (mg/L)	D-Zr (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	<0.00050	0.0156	<0.050	<0.000250	<0.0050	46.8	<0.00050	0.0774	<0.0000050	<0.00250	1.38	5.56	<0.000050	12.5	2.25	<0.000050	<0.00050	<0.00150	0.000914	<0.00250	0.0093	<0.00100
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	<0.00050	0.0140	<0.050	<0.000250	<0.0050	44.0	<0.00050	0.0766	<0.0000050	<0.00250	1.40	5.52	<0.000050	12.3	2.28	<0.000050	<0.00050	<0.00150	0.000917	<0.00250	<0.0050	<0.00100
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	<0.00010	0.0135	<0.010	<0.000050	0.0032	45.2	0.00012	0.0741	<0.0000050	<0.00050	1.51	5.63	<0.000010	13.2	2.18	<0.000010	<0.00010	<0.00030	0.000926	<0.00050	0.0050	<0.00020
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	<0.00050	0.0137	<0.050	<0.000250	<0.0050	47.4	0.00083	0.0784	<0.0000050	<0.00250	1.56	5.86	<0.000050	13.1	2.34	<0.000050	<0.00050	<0.00150	0.000941	<0.00250	<0.0050	<0.00100
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	<0.00010	0.0128	<0.010	<0.000050	0.0034	51.5	0.00021	0.0876	<0.0000050	<0.00050	1.61	6.54	<0.000010	13.8	2.46	<0.000010	<0.00010	<0.00030	0.000965	0.00058	0.0037	<0.00020
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	<0.00010	0.0123	<0.010	<0.000050	0.0039	46.5	0.00011	0.0790	<0.0000050	<0.00050	1.53	5.93	<0.000010	13.2	2.29	<0.000010	<0.00010	<0.00030	0.000984	0.00054	0.0051	<0.00020

Note:
- = not analyzed

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent																
				T-Al (mg/l)	T-Sb (mg/L)	T-As (mg/l)	T-Ba (mg/l)	T-Be (mg/L)	T-Bi (mg/L)	T-B (mg/l)	T-Cd (mg/L)	T-Ca (mg/L)	T-Cr (mg/L)	T-Co (mg/L)	T-Cu (mg/L)	T-Fe (mg/L)	T-Pb (mg/L)	T-Li (mg/L)	T-Mg (mg/L)	T-Mn (mg/L)
0	0	7/13/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	0.0128	0.00130	0.00208	0.0433	<0.00010	-	0.060	0.000608	281	<0.00010	0.0169	0.0447	<0.010	0.000061	0.0066	-	0.724
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	<0.015	<0.00050	0.00898	0.0448	<0.00050	<0.00025	0.072	0.000108	355	<0.00050	0.0102	0.0259	6.71	0.00058	<0.0050	44.5	2.90
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	0.0114	<0.00010	0.00936	0.0338	<0.000020	<0.000050	0.068	0.0000302	278	<0.00010	0.00077	0.00989	0.397	0.000365	0.0021	40.6	0.705
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	<0.015	<0.00050	0.00374	0.0334	<0.00010	<0.00025	0.065	0.000028	264	<0.00050	<0.00050	0.0041	0.154	<0.00025	<0.0050	42.1	0.436
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	<0.0150	<0.00050	0.00391	0.0310	<0.000100	<0.000250	0.061	<0.0000250	250	<0.00250	<0.00050	0.00707	0.088	<0.000250	<0.0050	40.4	0.363
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	0.0082	<0.00010	0.00210	0.0301	<0.000020	<0.000050	0.062	0.0000828	259	<0.00050	0.00049	0.0172	0.330	0.000111	0.0030	47.5	0.364
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent															
				T-Al (mg/l)	T-Sb (mg/L)	T-As (mg/l)	T-Ba (mg/l)	T-Be (mg/L)	T-Bi (mg/L)	T-B (mg/l)	T-Cd (mg/L)	T-Ca (mg/L)	T-Cr (mg/L)	T-Co (mg/L)	T-Cu (mg/L)	T-Fe (mg/L)	T-Pb (mg/L)	T-Li (mg/L)	T-Mg (mg/L)	T-Mn (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	<0.0150	<0.00050	0.00197	0.0309	<0.000100	<0.000250	0.064	0.0000402	246	<0.00250	<0.00050	0.0114	0.256	<0.000250	<0.0050	47.5	0.224
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	0.00875	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	<0.0150	<0.00050	0.00145	0.0295	<0.000100	<0.000250	0.065	<0.0000250	242	<0.00050	<0.00050	0.00304	0.351	<0.000250	<0.0050	44.4	0.216
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	0.00608	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	0.0076	<0.00010	0.00266	0.0352	<0.000020	<0.000050	0.067	0.0000848	272	<0.00050	0.00045	0.0268	0.314	0.000251	0.0032	49.9	0.210
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	0.0102	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	0.00793	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	0.0070	<0.00010	0.00386	0.0278	<0.000020	<0.000050	0.064	0.0000398	225	<0.00050	0.00116	0.00391	0.650	0.000102	0.0025	45.6	0.350
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	0.00319	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	0.0069	0.00012	0.00163	0.0240	<0.000020	<0.000050	0.064	0.0000110	253	<0.00050	0.00040	0.00158	0.252	0.000068	0.0030	47.0	0.234
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	0.0076	<0.00010	0.00102	0.0276	<0.000020	<0.000050	0.065	0.0000401	242	<0.00050	0.00020	0.00140	0.171	0.000119	0.0029	46.7	0.175
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	0.0075	<0.00010	0.00239	0.0279	<0.000020	<0.000050	0.055	0.0000277	237	<0.00050	0.00027	0.00423	0.282	0.000092	0.0033	44.1	0.127
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	0.0081	<0.00010	0.00116	0.0283	<0.000020	<0.000050	0.082	0.0000077	259	<0.00050	0.00018	0.00317	0.158	0.000086	0.0033	47.7	0.144
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	0.0110	<0.00020	0.00448	0.0305	<0.000040	<0.000100	0.068	0.000110	236	<0.00050	0.00200	0.0865	0.718	0.000381	0.0038	45.0	0.177

Note:
- = not analyzed

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent																
				T-Mo (mg/l)	T-Hg (mg/L)	T-Ni (mg/L)	T-K (mg/L)	T-Si (mg/L)	T-Ag (mg/L)	T-Na (mg/L)	T-Sr (mg/L)	T-Tl (mg/L)	T-Sn (mg/L)	T-Ti (mg/L)	T-U (mg/L)	T-V (mg/L)	T-Zn (mg/L)	T-Zr (mg/L)	D-Al (mg/l)	D-Sb (mg/L)
0	0	7/13/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	0.200	0.000156	0.00137	-	-	0.000052	15.6	1.44	0.000028	<0.00010	0.00032	0.00165	0.00136	0.0170	-	0.0099	0.00131
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	0.259	-	<0.0025	1.22	12.3	<0.000050	16.5	1.78	<0.000050	<0.00050	<0.0015	0.000437	<0.0025	<0.015	<0.0010	0.0046	<0.00050
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	0.00821	<0.0000050	<0.00050	1.29	13.1	<0.000010	14.3	1.70	0.000013	0.00011	0.00042	0.000863	0.00363	<0.0030	0.00043	0.0063	<0.00010
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	0.00655	<0.0000050	<0.0025	1.45	9.33	<0.000050	13.7	1.91	<0.000050	<0.00050	<0.0015	0.000112	<0.0025	<0.015	<0.0010	0.0062	<0.00050
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	0.00496	<0.0000050	<0.00250	1.29	10.0	<0.000050	12.6	1.83	<0.000050	<0.00050	<0.00150	<0.000050	0.00268	<0.0150	<0.00100	0.0053	<0.00050
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	0.0103	0.0000094	<0.00050	1.25	8.60	<0.000010	15.0	1.87	<0.000010	<0.00010	<0.00030	0.000048	0.00182	0.0032	<0.00020	0.0085	<0.00050
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent																
				T-Mo (mg/l)	T-Hg (mg/L)	T-Ni (mg/L)	T-K (mg/L)	T-Si (mg/L)	T-Ag (mg/L)	T-Na (mg/L)	T-Sr (mg/L)	T-Tl (mg/L)	T-Sn (mg/L)	T-Ti (mg/L)	T-U (mg/L)	T-V (mg/L)	T-Zn (mg/L)	T-Zr (mg/L)	D-Al (mg/l)	D-Sb (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	0.0263	<0.0000050	<0.00250	1.23	7.54	<0.000050	13.3	2.04	<0.000050	<0.00050	<0.00150	0.000124	<0.00250	<0.0150	<0.00100	0.0074	<0.00050
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	0.0344	<0.0000050	<0.00250	1.24	7.66	<0.000050	12.6	2.05	<0.000050	<0.00050	<0.00150	0.000156	<0.00250	<0.0150	<0.00100	0.0070	<0.00050
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	0.0187	<0.0000050	<0.00050	1.47	8.63	<0.000010	15.5	2.13	<0.000010	<0.00010	0.00039	0.000140	0.00252	<0.0030	<0.00020	0.0048	<0.00010
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	0.00558	0.0000106	<0.00050	1.18	9.90	<0.000010	13.7	1.90	<0.000010	<0.00010	<0.00030	0.000074	0.00202	<0.0030	<0.00020	0.0064	<0.00050
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	0.00390	-	<0.00050	1.18	8.41	<0.000010	14.0	2.06	<0.000010	<0.00010	0.00035	0.000035	0.00179	<0.0030	<0.00020	<0.0050	<0.00050
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	0.00286	<0.0000050	<0.00050	1.24	7.60	<0.000010	13.9	2.09	<0.000010	<0.00010	<0.00030	0.000029	0.00178	0.0035	<0.00020	0.0049	<0.00010
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	0.0109	-	<0.00050	1.26	7.29	<0.000010	13.0	2.08	<0.000010	<0.00010	<0.00030	0.000149	0.00224	<0.0030	<0.00020	0.0034	<0.00010
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	0.00441	-	<0.00050	1.30	7.88	<0.000010	14.2	2.24	<0.000010	<0.00010	<0.00030	0.000040	0.00218	<0.0030	<0.00020	0.0043	<0.00010
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	0.0512	0.0000917	<0.00100	1.34	7.90	0.000022	13.6	2.05	<0.000020	<0.00020	<0.00060	0.000157	0.00198	<0.0060	<0.00040	0.0031	<0.00010

Note:
- = not analyzed

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent														
				D-As (mg/l)	D-Ba (mg/l)	D-Be (mg/L)	D-Bi (mg/L)	D-B (mg/l)	D-Cd (mg/L)	D-Ca (mg/L)	D-Cr (mg/L)	D-Co (mg/l)	D-Cu (mg/L)	D-Fe (mg/L)	D-Pb (mg/L)	D-Li (mg/L)	D-Mg (mg/L)	D-Mn (mg/L)
0	0	7/13/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	0.00204	0.0432	<0.00010	-	0.060	0.000586	278	<0.00010	0.0167	0.0345	<0.010	<0.000050	0.0062	31.5	0.682
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	0.00912	0.0462	<0.00050	<0.00025	0.074	0.000058	366	<0.00050	0.0110	0.0015	6.82	<0.00025	<0.0050	46.3	3.00
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	0.00808	0.0356	<0.000020	<0.000050	0.059	<0.0000050	278	<0.00010	0.00018	<0.00020	0.074	<0.000050	0.0021	43.9	0.749
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	0.00349	0.0327	<0.00010	<0.00025	0.063	<0.000025	247	<0.00050	<0.00050	0.0013	0.122	<0.00025	<0.0050	41.3	0.416
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	0.00371	0.0296	<0.000100	<0.000250	0.060	<0.0000250	243	<0.00250	<0.00050	0.00218	0.057	<0.000250	<0.0050	38.9	0.363
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	0.00185	0.0295	<0.000100	<0.000250	0.063	0.0000356	253	<0.00250	<0.00050	0.00760	0.296	<0.000250	<0.0050	46.7	0.346
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent														
				D-As (mg/l)	D-Ba (mg/l)	D-Be (mg/L)	D-Bi (mg/L)	D-B (mg/l)	D-Cd (mg/L)	D-Ca (mg/L)	D-Cr (mg/L)	D-Co (mg/l)	D-Cu (mg/L)	D-Fe (mg/L)	D-Pb (mg/L)	D-Li (mg/L)	D-Mg (mg/L)	D-Mn (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	0.00184	0.0309	<0.000100	<0.000250	0.061	0.0000254	242	<0.00250	<0.00050	0.00347	0.234	<0.000250	<0.0050	46.1	0.225
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	0.00196	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	0.00159	0.0294	<0.000100	<0.000250	0.063	<0.0000250	231	<0.00050	<0.00050	<0.00100	0.399	<0.000250	<0.0050	43.1	0.196
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	0.00223	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	0.00208	0.0326	<0.000020	<0.000050	0.063	<0.0000050	270	<0.00050	0.00034	<0.00020	0.245	<0.000050	0.0032	45.0	0.181
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	<0.00100	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	0.00708	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	0.00334	0.0282	<0.000100	<0.000250	0.066	<0.0000250	239	<0.00050	0.00089	<0.00100	0.603	<0.000250	<0.0050	45.9	0.340
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	<0.00020	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	0.00149	0.0282	<0.000100	<0.000250	0.070	<0.0000250	237	<0.00050	<0.00050	<0.00100	0.245	<0.000250	<0.0050	47.4	0.239
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	0.00087	0.0293	<0.000020	<0.000050	0.063	0.0000050	254	<0.00050	0.00014	0.00038	0.167	<0.000050	0.0030	50.4	0.186
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	0.00245	0.0301	<0.000020	<0.000050	0.056	<0.0000050	266	<0.00050	0.00020	<0.00020	0.284	<0.000050	0.0032	48.1	0.141
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	0.00098	0.0294	<0.000020	<0.000050	0.067	<0.0000050	236	<0.00050	0.00011	<0.00020	0.165	<0.000050	0.0034	45.3	0.137
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	0.00392	0.0295	<0.000020	<0.000050	0.065	0.0000216	255	<0.00050	0.00176	0.00168	0.484	<0.000050	0.0038	47.0	0.188

Note:
- = not analyzed

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent														
				D-Mo (mg/L)	D-Hg (mg/L)	D-Ni (mg/L)	D-K (mg/L)	D-Si (mg/L)	D-Ag(mg/L)	D-Na(mg/L)	D-Sr (mg/L)	D-Tl (mg/L)	D-Sn (mg/L)	D-Ti (mg/L)	D-U(mg/L)	D-V (mg/L)	D-Zn(mg/L)	D-Zr (mg/L)
0	0	7/13/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	14	7/27/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	15	7/28/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	21	8/3/2021	Batch	0.203	0.000112	0.00131	-	-	0.000024	15.7	1.49	0.000026	<0.00010	<0.00030	0.00169	0.00114	0.0164	-
3	24	8/6/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	28	8/10/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	29	8/11/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	30	8/12/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	34	8/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	37	8/19/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	41	8/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	44	8/26/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	48	8/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	51	9/2/2021	Continuous	0.269	-	<0.0025	1.32	12.8	<0.000050	17.3	1.83	0.000118	<0.00050	<0.0015	0.000481	<0.0025	<0.0050	<0.0010
8	56	9/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	58	9/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	62	9/13/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	65	9/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	69	9/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	72	9/23/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	76	9/27/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	79	9/30/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	83	10/4/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	86	10/7/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	91	10/12/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	93	10/14/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	97	10/18/2021	Continuous	0.00231	0.0000059	<0.00050	1.20	13.2	<0.000010	14.7	1.85	<0.000010	<0.00010	0.00033	0.000669	0.00330	<0.0010	0.00050
14	100	10/21/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	104	10/25/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	107	10/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	111	11/1/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	112	11/2/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	114	11/4/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	118	11/8/2021	Batch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	119	11/9/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	125	11/15/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	128	11/18/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	132	11/22/2021	Continuous	0.00452	<0.0000050	<0.0025	1.41	9.17	<0.000050	13.1	1.91	<0.000050	<0.00050	<0.0015	0.000104	<0.0025	<0.0050	<0.0010
20	139	11/29/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	146	12/6/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	153	12/13/2021	Continuous	0.00321	0.0000084	<0.00250	1.25	9.66	<0.000050	12.5	1.77	<0.000050	<0.00050	<0.00150	<0.000050	<0.00250	<0.0050	<0.00100
22	156	12/16/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	160	12/20/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	168	12/28/2021	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	175	1/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	177	1/6/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	181	1/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	184	1/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	188	1/17/2022	Continuous	0.0101	0.0000091	<0.00250	1.23	8.28	<0.000050	13.5	1.91	<0.000050	<0.00050	<0.00150	<0.000050	<0.00250	<0.0050	<0.00150
27	191	1/20/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	195	1/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	199	1/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E
Raw Data Table
Analytical Laboratory Results - Metals

Week	Days	Date	Mode	SRF Effluent														
				D-Mo (mg/L)	D-Hg (mg/L)	D-Ni (mg/L)	D-K (mg/L)	D-Si (mg/L)	D-Ag(mg/L)	D-Na(mg/L)	D-Sr (mg/L)	D-Tl (mg/L)	D-Sn (mg/L)	D-Ti (mg/L)	D-U(mg/L)	D-V (mg/L)	D-Zn(mg/L)	D-Zr (mg/L)
29	202	1/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	206	2/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	209	2/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	212	2/10/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	216	2/14/2022	Continuous	0.0243	<0.0000050	<0.00250	1.22	7.34	<0.000050	13.1	1.99	<0.000050	<0.00050	<0.00150	0.000123	<0.00250	<0.0050	<0.00100
31	219	2/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	224	2/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	227	2/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	230	2/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	234	3/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	237	3/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	244	3/14/2022	Continuous	0.0391	<0.0000050	<0.00250	1.24	7.17	<0.000050	12.7	2.03	<0.000050	<0.00050	<0.00150	0.000217	<0.00250	<0.0050	<0.00100
35	247	3/17/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	251	3/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	254	3/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	258	3/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	261	3/31/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	265	4/4/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	268	4/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	272	4/11/2022	Continuous	0.0108	<0.0000050	<0.00050	1.32	8.19	<0.000010	14.1	2.08	<0.000010	<0.00010	<0.00030	0.000141	0.00203	0.0025	<0.00020
39	275	4/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	279	4/18/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	282	4/21/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	286	4/25/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	289	4/28/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	293	5/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	296	5/5/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	300	5/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	303	5/12/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	307	5/16/2022	Continuous	0.00595	0.0000056	<0.00250	1.17	9.59	<0.000050	13.3	2.01	<0.000050	<0.00050	<0.00150	0.000079	<0.00250	<0.0050	<0.00100
44	310	5/19/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	315	5/24/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	317	5/26/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	321	5/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	324	6/2/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	328	6/6/2022	Continuous	0.00235	-	<0.00250	1.20	8.96	<0.000050	13.9	1.96	<0.000050	<0.00050	<0.00150	<0.000050	<0.00250	<0.0050	<0.00100
47	331	6/9/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	335	6/13/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	336	6/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	338	6/16/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	342	6/20/2022	Continuous	0.00190	<0.0000050	<0.00050	1.32	9.21	<0.000010	14.1	2.17	<0.000010	<0.00010	<0.00030	0.000030	0.00163	<0.0010	<0.00020
49	345	6/23/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	349	6/27/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	352	6/30/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	356	7/4/2022	Continuous	0.00549	-	<0.00050	1.31	7.93	<0.000010	13.6	2.20	<0.000010	<0.00010	<0.00030	0.000144	0.00232	<0.0010	<0.00030
51	359	7/7/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	363	7/11/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	366	7/14/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	370	7/18/2022	Continuous	0.00200	-	<0.00050	1.33	8.58	<0.000010	13.6	2.10	<0.000010	<0.00010	<0.00030	0.000040	0.00175	<0.0010	<0.00030
53	374	7/22/2022	Continuous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	377	7/25/2022	Continuous	0.0426	<0.0000050	<0.00050	1.31	7.62	<0.000010	13.8	2.10	<0.000010	<0.00010	<0.00030	0.000144	0.00146	0.0037	<0.00020

Note:
- = not analyzed

APPENDIX F

Certificate of Analysis

MOUNT POLLEY MINING CORP.
ATTN: Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 13-JUL-21
Report Date: 01-JUN-22 15:46 (MT)
Version: FINAL REV. 2

Client Phone: 587-830-0392

Certificate of Analysis

Lab Work Order #: L2613417

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers: 17-850466
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2613417-1				
	Description	Water				
	Sampled Date	13-JUL-21				
	Sampled Time	12:00				
	Client ID	INFLUENT - MPMC JCP JUNE 22/21				
Grouping	**Analyte**					
WATER						
Physical Tests	Total Suspended Solids (mg/L)	<3.0				
	Total Dissolved Solids (mg/L)	1210				
	Turbidity (NTU)	0.19				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	81.1				
	Ammonia, Total (as N) (mg/L)	<0.050				
	Bicarbonate (HCO3) (mg/L)	98.9				
	Bromide (Br) (mg/L)	<0.50				
	Carbonate (CO3) (mg/L)	<5.0				
	Chloride (Cl) (mg/L)	2.6				
	Conductivity (EC) (uS/cm)	1340				
	Fluoride (F) (mg/L)	0.15				
	Hardness (as CaCO3) (mg/L)	754				
	Hydroxide (OH) (mg/L)	<5.0				
	Ion Balance (%)	83.6 BL:INT				
	Nitrate and Nitrite (as N) (mg/L)	7.29				
	Nitrate (as N) (mg/L)	7.29				
	Nitrite (as N) (mg/L)	<0.050				
	pH (pH)	7.99				
	Phosphorus (P)-Total (mg/L)	0.0234				
	TDS (Calculated) (mg/L)	1160				
	Sulfate (SO4) (mg/L)	791				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.6				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0116				
	Antimony (Sb)-Total (mg/L)	0.00039				
	Arsenic (As)-Total (mg/L)	0.00108				
	Barium (Ba)-Total (mg/L)	0.0340				
	Beryllium (Be)-Total (mg/L)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	0.050				
	Cadmium (Cd)-Total (mg/L)	0.0000554				
	Calcium (Ca)-Total (mg/L)	214				
	Cesium (Cs)-Total (mg/L)	0.000080				
	Chromium (Cr)-Total (mg/L)	0.00011				
	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	0.0195				
	Iron (Fe)-Total (mg/L)	0.013				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2613417-1				
	Description	Water				
	Sampled Date	13-JUL-21				
	Sampled Time	12:00				
	Client ID	INFLUENT - MPMC JCP JUNE 22/21				
Grouping	**Analyte**					
WATER						
Total Metals	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0029				
	Magnesium (Mg)-Total (mg/L)	44.7				
	Manganese (Mn)-Total (mg/L)	0.00554				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	0.0650				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	1.43				
	Rubidium (Rb)-Total (mg/L)	0.00171				
	Selenium (Se)-Total (mg/L)	0.0786				
	Silicon (Si)-Total (mg/L)	5.35				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	12.0				
	Strontium (Sr)-Total (mg/L)	1.96				
	Sulfur (S)-Total (mg/L)	223				
	Tellurium (Te)-Total (mg/L)	<0.00020				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Thorium (Th)-Total (mg/L)	<0.00010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	0.00064				
	Tungsten (W)-Total (mg/L)	<0.00010				
	Uranium (U)-Total (mg/L)	0.000830				
	Vanadium (V)-Total (mg/L)	0.00065				
	Zinc (Zn)-Total (mg/L)	0.0106				
	Zirconium (Zr)-Total (mg/L)	<0.00020				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0047				
	Antimony (Sb)-Dissolved (mg/L)	0.00043				
	Arsenic (As)-Dissolved (mg/L)	0.00118				
	Barium (Ba)-Dissolved (mg/L)	0.0351				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.050				
	Cadmium (Cd)-Dissolved (mg/L)	0.0000558				
	Calcium (Ca)-Dissolved (mg/L)	228				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2613417-1
	Description	Water
	Sampled Date	13-JUL-21
	Sampled Time	12:00
	Client ID	INFLUENT - MPMC JCP JUNE 22/21
Grouping	**Analyte**	
WATER		
Dissolved Metals	Cesium (Cs)-Dissolved (mg/L)	0.000079
	Chromium (Cr)-Dissolved (mg/L)	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.0188
	Iron (Fe)-Dissolved (mg/L)	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0032
	Magnesium (Mg)-Dissolved (mg/L)	44.8
	Manganese (Mn)-Dissolved (mg/L)	0.00540
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.0704
	Nickel (Ni)-Dissolved (mg/L)	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050
	Potassium (K)-Dissolved (mg/L)	1.47
	Rubidium (Rb)-Dissolved (mg/L)	0.00175
	Selenium (Se)-Dissolved (mg/L)	0.0906
	Silicon (Si)-Dissolved (mg/L)	5.39
	Silver (Ag)-Dissolved (mg/L)	<0.000010
	Sodium (Na)-Dissolved (mg/L)	12.0
	Strontium (Sr)-Dissolved (mg/L)	2.12
	Sulfur (S)-Dissolved (mg/L)	241
	Tellurium (Te)-Dissolved (mg/L)	<0.00020
	Thallium (Tl)-Dissolved (mg/L)	<0.000010
	Thorium (Th)-Dissolved (mg/L)	<0.00010
	Tin (Sn)-Dissolved (mg/L)	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030
	Tungsten (W)-Dissolved (mg/L)	<0.00010
	Uranium (U)-Dissolved (mg/L)	0.000833
	Vanadium (V)-Dissolved (mg/L)	0.00052
	Zinc (Zn)-Dissolved (mg/L)	0.0098
	Zirconium (Zr)-Dissolved (mg/L)	<0.00020
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	<2.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2613417-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2613417-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2613417-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2613417-1
Matrix Spike	Copper (Cu)-Total	MS-B	L2613417-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2613417-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2613417-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-IC-N-CL	Water	Bromide in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

IONBALANCE-CL	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-CL	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH/EC/ALK-CL	Water	pH, Conductivity and Total Alkalinity	APHA 4500H,2510,2320

All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)
pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode.
Alkalinity measurement is based on the sample's capacity to neutralize acid
Conductivity measurement is based on the sample's capacity to convey an electric current

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-850466

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2613417-COFC

COC Number: 17 - 850466

Page of

Report To	Contact and company name below will appear on the final report	Report Format / Distribution
Company:	Golder	Select Report Format: ☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Contact:	Michelle Xu	Quality Control (QC) Report with Report ☑ YES ☐ NO
Phone:	587-810-0392	☐ Compare Results to Criteria on Report - provide details below if box checked
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Street:	2800, 700 - 2nd Street SW	Email 1 or Fax Michelle_Xu@golder.com
City/Province:	Calgary Alberta	Email 2 Sanjana_Akella@golder.com
Postal Code:	T2P 2W2	Email 3 Henia_DuPreez@golder.com
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax
Contact:		Email 2

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	21452039/31400/31427	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Turnaround Time (TAT) Option - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Alkalinity as $CaCO_3$	Anions ($Cl, Br, F, NO_2, NO_3, SO_4$)	~~Sulphide~~	Ammonia as N	Total phosphorus	Total Metals	Dissolved Metals	Total dissolved Solids	Turbidity	Total suspended solids	BOD	Total Organic carbon			SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Influent - MPMC JCP June 22/21	13-7-21		W		X	X		X	X	X	X	X	X	X	X	X				

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
23							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
				7/13	10:52			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 23-JUL-21
Report Date: 06-AUG-21 11:03 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2618151

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Milica Papic
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2618151-1	L2618151-2			
	Description	WATER	WATER			
	Sampled Date	23-JUL-21	23-JUL-21			
	Sampled Time	10:30	10:30			
	Client ID	INFLUENT - MPMC JCP JUNE 22/21	INFLUENT - MPMC JCP 2 JUNE 22/21			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)		896			
	Total Suspended Solids (mg/L)		<3.0			
	Total Dissolved Solids (mg/L)		1180			
	Turbidity (NTU)		0.27			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		86.7			
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)		86.7			
	Ammonia as N (mg/L)		0.0073			
	Bromide (Br) (mg/L)		<0.25			
	Chloride (Cl) (mg/L)		1.67			
	Fluoride (F) (mg/L)		<0.10			
	Nitrate (as N) (mg/L)		4.31			
	Nitrite (as N) (mg/L)		<0.0050			
	Phosphorus (P)-Total (mg/L)		0.0266			
	Sulfate (SO4) (mg/L)		467			
	Sulphide as S (Dissolved) (mg/L)	<0.018	<0.018			
	Sulphide as H2S (Dissolved) (mg/L)	<0.019	<0.019			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)		5.35			
Total Metals	Aluminum (Al)-Total (mg/L)		<0.015 DLDS			
	Antimony (Sb)-Total (mg/L)		<0.00050 DLDS			
	Arsenic (As)-Total (mg/L)		0.00131 DLDS			
	Barium (Ba)-Total (mg/L)		0.0369 DLDS			
	Beryllium (Be)-Total (mg/L)		<0.00050 DLDS			
	Boron (B)-Total (mg/L)		0.070 DLDS			
	Cadmium (Cd)-Total (mg/L)		0.000080 DLDS			
	Calcium (Ca)-Total (mg/L)		275 DLDS			
	Chromium (Cr)-Total (mg/L)		<0.00050 DLDS			
	Cobalt (Co)-Total (mg/L)		<0.00050 DLDS			
	Copper (Cu)-Total (mg/L)		0.0216 DLDS			
	Iron (Fe)-Total (mg/L)		<0.050 DLDS			
	Lead (Pb)-Total (mg/L)		<0.00025 DLDS			
	Lithium (Li)-Total (mg/L)		<0.0050 DLDS			
	Manganese (Mn)-Total (mg/L)		0.00457 DLDS			
	Mercury (Hg)-Total (mg/L)		<0.0000050			
	Molybdenum (Mo)-Total (mg/L)		0.0756 DLDS			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2618151-1	L2618151-2			
	Description	WATER	WATER			
	Sampled Date	23-JUL-21	23-JUL-21			
	Sampled Time	10:30	10:30			
	Client ID	INFLUENT - MPMC JCP JUNE 22/21	INFLUENT - MPMC JCP 2 JUNE 22/21			
Grouping	Analyte					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)		DLDS <0.0025			
	Selenium (Se)-Total (mg/L)		DLDS 0.0879			
	Silver (Ag)-Total (mg/L)		DLDS <0.000050			
	Sodium (Na)-Total (mg/L)		DLDS 13.5			
	Strontium (Sr)-Total (mg/L)		DLDS 2.55			
	Thallium (Tl)-Total (mg/L)		DLDS <0.000050			
	Tin (Sn)-Total (mg/L)		DLDS <0.00050			
	Titanium (Ti)-Total (mg/L)		DLDS <0.0015			
	Tungsten (W)-Total (mg/L)		DLDS <0.00050			
	Uranium (U)-Total (mg/L)		DLDS 0.00102			
	Vanadium (V)-Total (mg/L)		DLDS <0.0025			
	Zinc (Zn)-Total (mg/L)		DLDS <0.015			
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD			
	Dissolved Metals Filtration Location		FIELD			
	Aluminum (Al)-Dissolved (mg/L)		DLDS 0.0050			
	Antimony (Sb)-Dissolved (mg/L)		DLDS <0.00050			
	Arsenic (As)-Dissolved (mg/L)		DLDS 0.00113			
	Barium (Ba)-Dissolved (mg/L)		DLDS 0.0374			
	Beryllium (Be)-Dissolved (mg/L)		DLDS <0.00050			
	Boron (B)-Dissolved (mg/L)		DLDS 0.076			
	Cadmium (Cd)-Dissolved (mg/L)		DLDS 0.000062			
	Calcium (Ca)-Dissolved (mg/L)		DLDS 276			
	Chromium (Cr)-Dissolved (mg/L)		DLDS <0.00050			
	Cobalt (Co)-Dissolved (mg/L)		DLDS <0.00050			
	Copper (Cu)-Dissolved (mg/L)		DLDS 0.0202			
	Iron (Fe)-Dissolved (mg/L)		DLDS <0.050			
	Lead (Pb)-Dissolved (mg/L)		DLDS <0.00025			
	Lithium (Li)-Dissolved (mg/L)		DLDS <0.0050			
	Magnesium (Mg)-Dissolved (mg/L)		DLDS 50.5			
	Manganese (Mn)-Dissolved (mg/L)		DLDS 0.00385			
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)		DLDS 0.0768			
	Nickel (Ni)-Dissolved (mg/L)		DLDS <0.0025			
	Selenium (Se)-Dissolved (mg/L)		DLDS 0.0898			
	Silver (Ag)-Dissolved (mg/L)		DLDS <0.000050			
	Sodium (Na)-Dissolved (mg/L)		DLDS 13.2			
	Strontium (Sr)-Dissolved (mg/L)		DLDS 2.59			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2618151-1	L2618151-2			
	Description	WATER	WATER			
	Sampled Date	23-JUL-21	23-JUL-21			
	Sampled Time	10:30	10:30			
	Client ID	INFLUENT - MPMC JCP JUNE 22/21	INFLUENT - MPMC JCP 2 JUNE 22/21			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)		DLDS <0.000050			
	Tin (Sn)-Dissolved (mg/L)		DLDS <0.00050			
	Titanium (Ti)-Dissolved (mg/L)		DLDS <0.0015			
	Tungsten (W)-Dissolved (mg/L)		DLDS <0.00050			
	Uranium (U)-Dissolved (mg/L)		DLDS 0.000944			
	Vanadium (V)-Dissolved (mg/L)		DLDS <0.0025			
	Zinc (Zn)-Dissolved (mg/L)		DLDS 0.0108			
Aggregate Organics	Biochemical Oxygen Demand (mg/L)		<2.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-CL	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S2-D-COL-VA	Water	Dissolved Sulphide by Colorimetric	APHA 4500 -S E-Auto-Colorimetry

Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the dissolved sulfide concentration in the sample.

S2-D>H2S-CALC-VA	Water	Dissolved Sulphide Calculated as H2S	APHA 4500-S2 SULPHIDE

This calculation converts Dissolved Sulphide as (S2-) and reports it as Dissolved Sulphide as (H2S). Dissolved Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide". This analysis is carried out, on a sample that has had its suspended solids removed by flocculation and settling prior to sample preservation.

SO4-L-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**				**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	on file			○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					**Analysis Request**
Invoice To:	Same as Report ? ☑ Yes ☐ No	**Client / Project Information:**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	~~Golder (WGP)~~	Job #:	21452039/31400/31427			
Contact:	~~Michelle Xu~~	PO / AFE:				
Address:		Legal Site Description:				
Phone:	Fax:	Quote #:	~~MSA dated March 26, 2020~~			
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Metals	Dissolved Metals F/P	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	Influent - MPMC JCP June 22/21	23-07-21	10:30	Water			X										
	Influent - MPMC JCP 2 June 22/21	23-07-21	10:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	

L2618151-COFC

Special Instructions / Regulations / Hazardous Details

~~***Please filter and preserve D-Metals in lab***~~

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			7/23	18:30	18			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 03-AUG-21
Report Date: 05-AUG-21 15:31 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2621932

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2621932-1				
Description	WATER				
Sampled Date	03-AUG-21				
Sampled Time	16:30				
Client ID	INC-03-AUG-2021				
Grouping **Analyte**					
WATER					
Organic / Inorganic Carbon Total Organic Carbon (mg/L)	4.48				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
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< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

L2621932-COFC

Report to:	
Company:	MOUNT POLLEY MINING CORP.
Contact:	Kala Ivens
Address:	PO BOX 12, Likely, BC, V0L 1N0
Phone:	250-790-2215 Fax:

Report Format / Distribution	
☑ Standard	☑ Other
☑ PDF	☑ Excel ☐ Digital ☐ Fax
Email 1:	mxu@golder.com
Email 2:	

Service Requested: (rush - subject to availability)
- ○ Regular (Default)
- ○ Priority (2-3 Business Days) - 50% Surcharge
- ◉ Emergency (1 Business Day) - 100% Surcharge
- ○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To:	Same as Report ? ◉ Yes ○ No
Company:	
Contact:	
Address:	
Phone:	Fax:

Client / Project Information:	
Job #:	21452039/31400/31427
PO / AFE:	
Legal Site Description:	
Quote #:	MSA dated March 26, 2020

Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**	

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Metals	Dissolved Metals F/P	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	INC-03-Aug-2021	03-08-21	4:30	W												X	

Special Instructions / Regulations / Hazardous Details

Please filter and preserve D-Metals in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			8/3	1800	8			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 03-AUG-21
Report Date: 13-AUG-21 15:37 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2621954

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2621954-1	L2621954-2			
	Description	Water	Water			
	Sampled Date	03-AUG-21	03-AUG-21			
	Sampled Time	16:30	16:00			
	Client ID	INC-03-AUG-2021	FB-03-AUG-2021			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	824	<0.50			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	1220	<10			
	Turbidity (NTU)	0.85	<0.10			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	162	<1.0			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	162	<1.0			
	Ammonia as N (mg/L)	0.0280	<0.0050			
	Bromide (Br) (mg/L)	<0.25	<0.050			
	Chloride (Cl) (mg/L)	3.54	<0.10			
	Fluoride (F) (mg/L)	0.32	<0.020			
	Nitrate (as N) (mg/L)	0.063	<0.0050			
	Nitrite (as N) (mg/L)	<0.0050	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0363	<0.0020			
	Sulfate (SO4) (mg/L)	745	<0.050			
	Sulphide as S (Dissolved) (mg/L)	<0.018	<0.018			
	Sulphide as H2S (Dissolved) (mg/L)	<0.019	<0.019			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)		<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0128	<0.0030			
	Antimony (Sb)-Total (mg/L)	0.00130	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00208	<0.00010			
	Barium (Ba)-Total (mg/L)	0.0433	<0.00010			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Boron (B)-Total (mg/L)	0.060	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000608	<0.0000050			
	Calcium (Ca)-Total (mg/L)	281	<0.050			
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Total (mg/L)	0.0169	<0.00010			
	Copper (Cu)-Total (mg/L)	0.0447	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	0.000061	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0066	<0.0010			
	Manganese (Mn)-Total (mg/L)	0.724	<0.00010			
	Mercury (Hg)-Total (mg/L)	0.000156 RRV	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	0.200	<0.000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2621954-1	L2621954-2			
	Description	Water	Water			
	Sampled Date	03-AUG-21	03-AUG-21			
	Sampled Time	16:30	16:00			
	Client ID	INC-03-AUG-2021	FB-03-AUG-2021			
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00137	<0.00050			
	Selenium (Se)-Total (mg/L)	0.0224	<0.000050			
	Silver (Ag)-Total (mg/L)	0.000052	<0.000010			
	Sodium (Na)-Total (mg/L)	15.6	<0.050			
	Strontium (Sr)-Total (mg/L)	1.44 RRV	<0.00020			
	Thallium (Tl)-Total (mg/L)	0.000028	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	0.00032	<0.00030			
	Tungsten (W)-Total (mg/L)	0.00038	<0.00010			
	Uranium (U)-Total (mg/L)	0.00165	<0.000010			
	Vanadium (V)-Total (mg/L)	0.00136	<0.00050			
	Zinc (Zn)-Total (mg/L)	0.0170	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0099	<0.0010			
	Antimony (Sb)-Dissolved (mg/L)	0.00131	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00204	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.0432	<0.00010			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Boron (B)-Dissolved (mg/L)	0.060	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.000586	<0.0000050			
	Calcium (Ca)-Dissolved (mg/L)	278	<0.050			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.0167	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.0345	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0062	<0.0010			
	Magnesium (Mg)-Dissolved (mg/L)	31.5	<0.0050			
	Manganese (Mn)-Dissolved (mg/L)	0.682	<0.00010			
	Mercury (Hg)-Dissolved (mg/L)	0.000112 RRV	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.203	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	0.00131	<0.00050			
	Selenium (Se)-Dissolved (mg/L)	0.0236	<0.000050			
	Silver (Ag)-Dissolved (mg/L)	0.000024	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	15.7	<0.050			
	Strontium (Sr)-Dissolved (mg/L)	1.49 RRV	<0.00020			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2621954-1	L2621954-2			
	Description	Water	Water			
	Sampled Date	03-AUG-21	03-AUG-21			
	Sampled Time	16:30	16:00			
	Client ID	INC-03-AUG-2021	FB-03-AUG-2021			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	0.000026	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030			
	Tungsten (W)-Dissolved (mg/L)	0.00038	<0.00010			
	Uranium (U)-Dissolved (mg/L)	0.00169	<0.000010			
	Vanadium (V)-Dissolved (mg/L)	0.00114	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0164	<0.0010			
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	<2.0	<2.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-CL	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S2-D-COL-VA	Water	Dissolved Sulphide by Colorimetric	APHA 4500 -S E-Auto-Colorimetry

Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the dissolved sulfide concentration in the sample.

S2-D>H2S-CALC-VA	Water	Dissolved Sulphide Calculated as H2S	APHA 4500-S2 SULPHIDE

This calculation converts Dissolved Sulphide as (S2-) and reports it as Dissolved Sulphide as (H2S). Dissolved Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide". This analysis is carried out, on a sample that has had its suspended solids removed by flocculation and settling prior to sample preservation.

SO4-L-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / A
Canada Toll Fr
www.al

L2621954-COFC

COC # _____

Page 1 of 1

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:		Job #: 21452039/31400/31427		Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MSA dated March 26, 2020		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	F/P Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metals	F/P Dissolved Metals	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
	INC-03-Aug-2021	03-08-21	4:30	W	X	X	X	X	X	X	X	X	X	X	X		
	FB-03-Aug-2021	03-08-21	4:00	W	X	X	X	X	X	X	X	X	X	X	X	X	

Special Instructions / Regulations / Hazardous Details

Please filter and preserve D-Metals in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			6/3	1801	8			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 11-AUG-21
Report Date: 12-AUG-21 15:33 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2625663

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2625663-1				
	Description	WATER				
	Sampled Date	11-AUG-21				
	Sampled Time	13:00				
	Client ID	SRF-11-AUG-2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.03				
Total Metals	Selenium (Se)-Total (mg/L)	0.00883 DLDS				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00484 DLDS				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Labor ANALYTICAL CHEMISTRY & **Environmental I**

L2625663-COFC

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Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		◉ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Metals	Dissolved Metals F/P	Total dissolved solids	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-11-Aug-2021	11-Aug-21	1:00 PM	Water												X	

Special Instructions / Regulations / Hazardous Details

Rushed analysis for TOC, T-Se & D-Se
Regular for nitrate

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			8/11	1600				

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 11-AUG-21
Report Date: 17-AUG-21 12:31 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2625675

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2625675-1				
	Description	WATER				
	Sampled Date	11-AUG-21				
	Sampled Time	13:00				
	Client ID	SRF-11-AUG-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Nitrate (as N) (mg/L)	2.79				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

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UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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L2625675-COFC

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Nitrate	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Selenium	Dissolved Selenium F/P	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-11-Aug-2021	11-Aug-21	1:00PM	Water		x				XXX							

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			8/17	1600	16			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 16-AUG-21
Report Date: 19-AUG-21 13:18 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2627309

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2627309-1				
	Description	WATER				
	Sampled Date	16-AUG-21				
	Sampled Time	14:20				
	Client ID	SRF-16-AUG-2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.9				
Total Metals	Selenium (Se)-Total (mg/L)	0.00324 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00491 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Requ
Canada Toll Free: 1 800 668 9
www.alsglobal.com

L2627309-COFC

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		Job #: 21452039/31400/31427		
Contact:	ernie.guevarra@imperialmetals.com	PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Selenium	Dissolved Selenium	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
							F/P			P	F/P					P	
	SRF-16-Aug-2021	16-Aug-21	2:20PM	Water						X	X					X	

Special Instructions / Regulations / Hazardous Details

Please submit the results by thursday (19th) morning.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by: BM	Date: 8/16	Time: 3330	Temperature: 15	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 23-AUG-21
Report Date: 26-AUG-21 12:37 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2630227

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2630227-1				
	Description	WATER				
	Sampled Date	23-AUG-21				
	Sampled Time	10:10				
	Client ID	SRF-23-AUG-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Nitrate (as N) (mg/L)	0.35				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	19.8				
Total Metals	Selenium (Se)-Total (mg/L)	0.00142 DLDS				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00152 DLDS				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2630227-COFC

Report to:		**Report Format / Distribution**			
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other		
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com		
		Email 2:			
Phone:	250-790-2215 Fax:				
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**			
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427		
Contact:		PO / AFE:			
Address:		Legal Site Description:			
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**	

Service Requested: (Rush - subject to availability)

- ○ Regular (Default)
- ◉ Priority (2-3 Business Days) - 50% Surcharge
- ○ Emergency (1 Business Day) - 100% Surcharge
- ○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Selenium	Dissolved Selenium	Total dissolved solis	~~Turbidity~~ nitrate	TSS	BOD	Total Organic Carbon	Number of Containers
							F/P				F/P						
	SRF-23-Aug-2021	23-Aug-21	10:10	Water						X	X		X			X	

Special Instructions / Regulations / Hazardous Details

Please Send the results by Thursday Aug 26th Morning

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			8/23	1342	10			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 02-SEP-21
Report Date: 08-SEP-21 19:50 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2635305

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Milica Papic
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2635305-1				
	Description	WATER				
	Sampled Date	02-SEP-21				
	Sampled Time	10:20				
	Client ID	SRF-02-SEP-2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	35.4				
Total Metals	Aluminum (Al)-Total (mg/L)	DLDS <0.015				
	Antimony (Sb)-Total (mg/L)	DLDS <0.00050				
	Arsenic (As)-Total (mg/L)	DLDS 0.00898				
	Barium (Ba)-Total (mg/L)	DLDS 0.0448				
	Beryllium (Be)-Total (mg/L)	DLDS <0.00050				
	Bismuth (Bi)-Total (mg/L)	DLDS <0.00025				
	Boron (B)-Total (mg/L)	DLDS 0.072				
	Cadmium (Cd)-Total (mg/L)	DLDS 0.000108				
	Calcium (Ca)-Total (mg/L)	DLDS 355				
	Cesium (Cs)-Total (mg/L)	DLDS 0.000214				
	Chromium (Cr)-Total (mg/L)	DLDS <0.00050				
	Cobalt (Co)-Total (mg/L)	DLDS 0.0102				
	Copper (Cu)-Total (mg/L)	DLDS 0.0259				
	Iron (Fe)-Total (mg/L)	DLDS 6.71				
	Lead (Pb)-Total (mg/L)	DLDS 0.00058				
	Lithium (Li)-Total (mg/L)	DLDS <0.0050				
	Magnesium (Mg)-Total (mg/L)	DLDS 44.5				
	Manganese (Mn)-Total (mg/L)	DLDS 2.90				
	Molybdenum (Mo)-Total (mg/L)	DLDS 0.259				
	Nickel (Ni)-Total (mg/L)	DLDS <0.0025				
	Phosphorus (P)-Total (mg/L)	DLDS <0.25				
	Potassium (K)-Total (mg/L)	DLDS 1.22				
	Rubidium (Rb)-Total (mg/L)	DLDS 0.0030				
	Selenium (Se)-Total (mg/L)	DLDS 0.00340				
	Silicon (Si)-Total (mg/L)	DLDS 12.3				
	Silver (Ag)-Total (mg/L)	DLDS <0.000050				
	Sodium (Na)-Total (mg/L)	DLDS 16.5				
	Strontium (Sr)-Total (mg/L)	DLDS 1.78				
	Sulfur (S)-Total (mg/L)	DLDS 257				
	Tellurium (Te)-Total (mg/L)	DLDS <0.0010				
	Thallium (Tl)-Total (mg/L)	DLDS <0.000050				
	Thorium (Th)-Total (mg/L)	DLDS <0.00050				
	Tin (Sn)-Total (mg/L)	DLDS <0.00050				
	Titanium (Ti)-Total (mg/L)	DLDS <0.0015				
	Tungsten (W)-Total (mg/L)	DLDS <0.00050				
	Uranium (U)-Total (mg/L)	DLDS 0.000437				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2635305-1				
	Description	WATER				
	Sampled Date	02-SEP-21				
	Sampled Time	10:20				
	Client ID	SRF-02-SEP-2021				
Grouping	**Analyte**					
WATER						
Total Metals	Vanadium (V)-Total (mg/L)	DLDS <0.0025				
	Zinc (Zn)-Total (mg/L)	DLDS <0.015				
	Zirconium (Zr)-Total (mg/L)	DLDS <0.0010				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0046				
	Antimony (Sb)-Dissolved (mg/L)	DLDS <0.00050				
	Arsenic (As)-Dissolved (mg/L)	DLDS 0.00912				
	Barium (Ba)-Dissolved (mg/L)	DLDS 0.0462				
	Beryllium (Be)-Dissolved (mg/L)	DLDS <0.00050				
	Bismuth (Bi)-Dissolved (mg/L)	DLDS <0.00025				
	Boron (B)-Dissolved (mg/L)	DLDS 0.074				
	Cadmium (Cd)-Dissolved (mg/L)	DLDS 0.000058				
	Calcium (Ca)-Dissolved (mg/L)	DLDS 366				
	Cesium (Cs)-Dissolved (mg/L)	DLDS 0.000234				
	Chromium (Cr)-Dissolved (mg/L)	DLDS <0.00050				
	Cobalt (Co)-Dissolved (mg/L)	DLDS 0.0110				
	Copper (Cu)-Dissolved (mg/L)	DLDS 0.0015				
	Iron (Fe)-Dissolved (mg/L)	DLDS 6.82				
	Lead (Pb)-Dissolved (mg/L)	DLDS <0.00025				
	Lithium (Li)-Dissolved (mg/L)	DLDS <0.0050				
	Magnesium (Mg)-Dissolved (mg/L)	DLDS 46.3				
	Manganese (Mn)-Dissolved (mg/L)	DLDS 3.00				
	Molybdenum (Mo)-Dissolved (mg/L)	DLDS 0.269				
	Nickel (Ni)-Dissolved (mg/L)	DLDS <0.0025				
	Phosphorus (P)-Dissolved (mg/L)	DLDS <0.25				
	Potassium (K)-Dissolved (mg/L)	DLDS 1.32				
	Rubidium (Rb)-Dissolved (mg/L)	DLDS 0.0035				
	Selenium (Se)-Dissolved (mg/L)	DLDS 0.00094				
	Silicon (Si)-Dissolved (mg/L)	DLDS 12.8				
	Silver (Ag)-Dissolved (mg/L)	DLDS <0.000050				
	Sodium (Na)-Dissolved (mg/L)	DLDS 17.3				
	Strontium (Sr)-Dissolved (mg/L)	DLDS 1.83				
	Sulfur (S)-Dissolved (mg/L)	DLDS 270				
	Tellurium (Te)-Dissolved (mg/L)	DLDS <0.0010				
	Thallium (Tl)-Dissolved (mg/L)	DLDS 0.000118				
	Thorium (Th)-Dissolved (mg/L)	DLDS <0.00050				
	Tin (Sn)-Dissolved (mg/L)	DLDS <0.00050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2635305-1				
	Description	WATER				
	Sampled Date	02-SEP-21				
	Sampled Time	10:20				
	Client ID	SRF-02-SEP-2021				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Titanium (Ti)-Dissolved (mg/L)	DLDS <0.0015				
	Tungsten (W)-Dissolved (mg/L)	DLDS <0.00050				
	Uranium (U)-Dissolved (mg/L)	DLDS 0.000481				
	Vanadium (V)-Dissolved (mg/L)	DLDS <0.0025				
	Zinc (Zn)-Dissolved (mg/L)	DLDS <0.0050				
	Zirconium (Zr)-Dissolved (mg/L)	DLDS <0.0010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	Sample was Preserved at the laboratory - T-MET

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Laboratory Control Sample	Magnesium (Mg)-Total	MES	L2635305-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Selenium	Dissolved Selenium F/P	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-02-Sep-2021	02-Sep-21	10:20	Water						X	X					X	

L2635305-COFC

Special Instructions / Regulations / Hazardous Details

Dissolved not preserved, please preserve in lab. Please report results by Tuesday Sept 7, 2021 morning.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date: 9/2	Time: 1345	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 02-SEP-21
Report Date: 13-SEP-21 12:19 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2635309

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2635309-1				
	Description	WATER				
	Sampled Date	02-SEP-21				
	Sampled Time	10:20				
	Client ID	SRF-02-SEP-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Nitrate (as N) (mg/L)	<0.025 DLDS				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**				**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:				○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevara@imperialmetals.com	Job #:	21452039/31400/31427			
Contact:		PO / AFE:				
Address:		Legal Site Description:				
Phone:	Fax:	Quote #:				
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Nitrate	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Selenium	Dissolved Selenium F/P	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-02-Sep-2021	02-Sep-21	10:20	Water		x											

L2635309-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			9/2	1345	14			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 09-SEP-21
Report Date: 20-SEP-21 11:53 (MT)
Version: DRAFT

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2637700

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2637700-1	L2637700-2			
	Description	WATER	WATER			
	Sampled Date	09-SEP-21	09-SEP-21			
	Sampled Time	13:50	14:30			
	Client ID	INF-09-SEP-2021-A	INF-09-SEP-2021-B			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	825	822			
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	1220				
	Turbidity (NTU)	0.19				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	85.4				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	85.4				
	Bromide (Br) (mg/L)	<0.25 DLDS				
	Chloride (Cl) (mg/L)	4.08				
	Fluoride (F) (mg/L)	0.25				
	Nitrate (as N) (mg/L)	6.86				
	Nitrite (as N) (mg/L)	<0.0050 DLDS				
	Phosphorus (P)-Total (mg/L)	0.0279				
	Sulfate (SO4) (mg/L)	725				
	Sulphide as S (Dissolved) (mg/L)	<0.018				
	Sulphide as H2S (Dissolved) (mg/L)	<0.019				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.29				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0086	0.0104			
	Antimony (Sb)-Total (mg/L)	0.00053	0.00057			
	Arsenic (As)-Total (mg/L)	0.00150	0.00154			
	Barium (Ba)-Total (mg/L)	0.0377	0.0381			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.063	0.067			
	Cadmium (Cd)-Total (mg/L)	0.000101	0.000101			
	Calcium (Ca)-Total (mg/L)	255	258			
	Chromium (Cr)-Total (mg/L)	0.00010	0.00014			
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00016			
	Copper (Cu)-Total (mg/L)	0.0197	0.0270			
	Iron (Fe)-Total (mg/L)	<0.010	0.011			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0034	0.0034			
	Magnesium (Mg)-Total (mg/L)	53.4	53.6			
	Manganese (Mn)-Total (mg/L)	0.00151	0.00321			
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2637700-1	L2637700-2			
	Description	WATER	WATER			
	Sampled Date	09-SEP-21	09-SEP-21			
	Sampled Time	13:50	14:30			
	Client ID	INF-09-SEP-2021-A	INF-09-SEP-2021-B			
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.0836	0.0800			
	Nickel (Ni)-Total (mg/L)	0.00151	0.00176			
	Phosphorus (P)-Total (mg/L)	0.060	0.088			
	Potassium (K)-Total (mg/L)	1.52	1.57			
	Selenium (Se)-Total (mg/L)	0.0995	0.0965			
	Silicon (Si)-Total (mg/L)	6.01	6.20			
	Silver (Ag)-Total (mg/L)	<0.000010	0.000011			
	Sodium (Na)-Total (mg/L)	13.9	13.9			
	Strontium (Sr)-Total (mg/L)	2.46	2.40			
	Sulfur (S)-Total (mg/L)	275	280			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Total (mg/L)	0.000910	0.000894			
	Vanadium (V)-Total (mg/L)	0.00055	0.00061			
	Zinc (Zn)-Total (mg/L)	0.0090	0.0123			
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0059	0.0066			
	Antimony (Sb)-Dissolved (mg/L)	0.00050	0.00051			
	Arsenic (As)-Dissolved (mg/L)	0.00131	0.00127			
	Barium (Ba)-Dissolved (mg/L)	0.0364	0.0358			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.062	0.061			
	Cadmium (Cd)-Dissolved (mg/L)	0.0000814	0.0000831			
	Calcium (Ca)-Dissolved (mg/L)	247	250			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.0180	0.0169			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0032	0.0033			
	Magnesium (Mg)-Dissolved (mg/L)	50.3	47.7			
	Manganese (Mn)-Dissolved (mg/L)	0.00120	0.00117			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2637700-1	L2637700-2			
	Description	WATER	WATER			
	Sampled Date	09-SEP-21	09-SEP-21			
	Sampled Time	13:50	14:30			
	Client ID	INF-09-SEP-2021-A	INF-09-SEP-2021-B			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Molybdenum (Mo)-Dissolved (mg/L)	0.0798	0.0813			
	Nickel (Ni)-Dissolved (mg/L)	0.00062	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	1.44	1.43			
	Selenium (Se)-Dissolved (mg/L)	0.110	0.108			
	Silicon (Si)-Dissolved (mg/L)	6.08	6.10			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	13.3	12.8			
	Strontium (Sr)-Dissolved (mg/L)	2.26	2.36			
	Sulfur (S)-Dissolved (mg/L)	285	284			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Dissolved (mg/L)	0.000860	0.000889			
	Vanadium (V)-Dissolved (mg/L)	0.00053	0.00061			
	Zinc (Zn)-Dissolved (mg/L)	0.0082	0.0084			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030			
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	<2.0				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
EXTEMP10	Samples Received with temperature >10 Degrees C - 13°C

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2637700-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2637700-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2637700-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2637700-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2637700-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2637700-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2637700-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2637700-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-CL	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-CL	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

HARDNESS-CALC-CL	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S2-D-COL-VA	Water	Dissolved Sulphide by Colorimetric	APHA 4500 -S E-Auto-Colorimetry

Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the dissolved sulfide concentration in the sample.

S2-D>H2S-CALC-VA	Water	Dissolved Sulphide Calculated as H2S	APHA 4500-S2 SULPHIDE

This calculation converts Dissolved Sulphide as (S2-) and reports it as Dissolved Sulphide as (H2S). Dissolved Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide". This analysis is carried out, on a sample that has had its suspended solids removed by flocculation and settling prior to sample preservation.

SO4-L-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved) F/P	Ammonia	Total Phosphorus	Total Metal	Dissolved Metal F/P	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	INF-09-Sep-2021 A	09-Sep-21	1:50	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-09-Sep-2021 ~~pipe~~ B	09-Sep-21	2:30	Water						X	X						

L2637700-COFC

Special Instructions / Regulations / Hazardous Details

A & B not duplicates

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			9/9	3:40 pm	1.9			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 13-SEP-21
Report Date: 16-SEP-21 08:02 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2638587

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2638587-1				
	Description	WATER				
	Sampled Date	13-SEP-21				
	Sampled Time	11:00				
	Client ID	SRF-13-SEP-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Nitrate (as N) (mg/L)	<0.020				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	11.2				
Total Metals	Selenium (Se)-Total (mg/L)	0.00106 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	LAB				
	Selenium (Se)-Dissolved (mg/L)	0.00190 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

L2638587-COFC

COC #

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:		P
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-13-Sep-2021	13-Sep-21	11:00	Water		X				X	X					X	
						↑ regular TAT please											

Special Instructions / Regulations / Hazardous Details

Service Requested by thursday morning (Sept 16). T-Se and D-Se are not preserved. D-Se not filtered. Please lab filter and preserve. Nitrate regular TAT.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date: 9/13 ~~9/15~~	Time: 2:25	Temperature: 14	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 20-SEP-21
Report Date: 22-SEP-21 21:47 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2641396

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641396-1				
	Description	WATER				
	Sampled Date	20-SEP-21				
	Sampled Time	10:20				
	Client ID	SRF-20-SEP-2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.00				
Total Metals	Selenium (Se)-Total (mg/L)	0.000441 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.000733 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se (P)	Dissolved Se (F/P)	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon (P)	Number of Containers
	SRF-20-Sep-2021	20-Sep-21	10:20	Water						X	X					X	

L2641396-COFC

Special Instructions / Regulations / Hazardous Details

Please send results by Thursday (Sep 23, 21) morning.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			9/20		10			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 27-SEP-21
Report Date: 30-SEP-21 08:00 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2644353

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers: 17-835197
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2644353-1				
	Description	WATER				
	Sampled Date	27-SEP-21				
	Sampled Time	11:00				
	Client ID	SRF-27-SEP-2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.96				
Total Metals	Selenium (Se)-Total (mg/L)	0.00051 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00361 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-835197

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytic Request Form

Canada Toll Free: 1 800 668 9878

L2644353-COFC

COC Number: 17 - 835197

Page of

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corp.
Contact:	Kalu Ivens
Phone:	PO Box 12, Likely BC V0L 1N0
	Company address below will appear on the final report
Street:	
City/Province:	
Postal Code:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
Compare Results to Criteria on Report - provide details below if box checked	☐
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	mxu@golder.com
Email 2	
Email 3	

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)	
Regular [R]	☐ Standard TAT if received by 3 pm - business days - no surcharges apply
PRIORITY (Business Days) 4 day [P4-20%]	☐
3 day [P3-25%]	☐
2 day [P2-50%]	☑
EMERGENCY 1 Business day [E - 100%]	☐
Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)]	☐
Date and Time Required for all E&P TATs:	dd-mmm-yy hh:mm
For tests that can not be performed according to the service level selected, you will be contacted.	

Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	ernie.guevarra@imperialmetals.com
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	2145203916400 B1827	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P Total-Se	P/F Dissolved-Se	P TOC	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	SRF-27-Sep-2021	27-Sep-21	11:00	Water		X	X	X		

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	Please Submit Report by thrusday Sept 30 morning
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
9.7							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
				9/27	1334			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 04-OCT-21
Report Date: 06-OCT-21 17:51 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2646960

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers: 17-835196
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2646960-1				
	Description	WATER				
	Sampled Date	04-OCT-21				
	Sampled Time	11:00				
	Client ID	SRF - 04 - OCT - 2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.25				
Total Metals	Selenium (Se)-Total (mg/L)	0.000410 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00358 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-835196

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2646960-COFC

COC Number: 17 - 835196

Page of

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Mount Polley Mining Group	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Kayla Ivens	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☒
Phone:	PO BOX 12, Likely BC V0L 1N0	☐ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E - 100%] ☐ / Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:		Email 1 or Fax mxu@golder.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:		Email 2	
Postal Code:		Email 3	

Invoice To		Invoice Distribution	
	Same as Report To ☑ YES ☐ NO		
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	
Company:	ernie.guevarra@imperialmetals.com	Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	21452039 / 31400 / 31427	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P	P/F	P											SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
						Total Se	Dissolved Se	Total organic carbon												
	SRF - 04-Oct-2021	04-10-21	11:00	W		X	X	X												

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	Please report results by thursday (Oct 7th) morning.
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐	SIF Observations	Yes ☐	No ☐		
Ice Packs ☐ Ice Cubes ☐	Custody seal intact	Yes ☐	No ☐		
Cooling Initiated ☐					

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
13							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
				08/10/21	1321			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 12-OCT-21
Report Date: 15-OCT-21 09:25 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2649927

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers: 17-834563
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2649927-1				
	Description	WATER				
	Sampled Date	12-OCT-21				
	Sampled Time					
	Client ID	SRF-12-OCT-2021				
Grouping	**Analyte**					
WATER						
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.73				
Total Metals	Selenium (Se)-Total (mg/L)	0.000637 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00253 DTC				
		0.000441				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

SE-D-CCMS-MM+DIG-VA	Water	Dig. Diss. Se in Water (w/MM) by ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS with matrix matching (carbon).

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

17-834563

GLOSSARY OF REPORT TERMS
Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2649927-COFC

COC Number: 17 - 834563

Page of

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Mount Polley Mining Corp	Select Report Format: [X] PDF [X] EXCEL [X] EDD (DIGITAL)	Regular [R] [ ] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Kala Ivens	Quality Control (QC) Report with Report [✓] YES [ ] NO	PRIORITY (Business Days): 4 day [P4-20%] [ ]; 3 day [P3-25%] [ ]; 2 day [P2-50%] [X]
Phone:	250-790-2215	[ ] Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E - 100%] [ ]; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] [ ]
	Company address below will appear on the final report	Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:		Email 1 or Fax mxu@golder.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:		Email 2	
Postal Code:		Email 3	

Invoice To		Invoice Distribution	
	Same as Report To [X] YES [ ] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
	Copy of Invoice with Report [ ] YES [ ] NO	Email 1 or Fax mxu@golder.com	
Company:		Email 2	
Contact:	ernie.guevarra@imperialmetals.com		

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	214520391/314001/314277	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P Total organic carbon	P Total Se	F/P Dissolved Se	F/P Dissolved Se E421	SE-D-CCMS-MM+DIG-VA	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	SRF-12-Oct-2021	12/10/21		W		X	X	X	X			

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? [ ] YES [ ] NO	please send report by thursday (Oct 14th) morning.
Are samples for human consumption/ use? [ ] YES [ ] NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

Ice Packs [✓] Ice Cubes [ ] Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C			
9.1						

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
				10/1 ✓	12:4			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 18-OCT-21
Report Date: 29-OCT-21 13:58 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2652402

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2652402-1	L2652402-2			
	Description	WATER	WATER			
	Sampled Date	18-OCT-21	18-OCT-21			
	Sampled Time	12:20	13:20			
	Client ID	SRF-18-OCT-2021	INF-18-OCT-2021			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	876	782			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	1230	1220			
	Turbidity (NTU)	47.7	0.16			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	467	85.5			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	467	85.5			
	Ammonia as N (mg/L)	0.0138	<0.0050			
	Bromide (Br) (mg/L)	<0.25 DLDS	<0.25 DLDS			
	Chloride (Cl) (mg/L)	12.3	3.24			
	Fluoride (F) (mg/L)	0.20	0.14			
	Nitrate (as N) (mg/L)	0.053	6.84			
	Nitrite (as N) (mg/L)	<0.0050 DLDS	<0.0050 DLDS			
	Phosphorus (P)-Total (mg/L)	0.631	0.0263			
	Sulfate (SO4) (mg/L)	497	746			
	Sulphide as S (Dissolved) (mg/L)	6.57	<0.018			
	Sulphide as H2S (Dissolved) (mg/L)	6.98	<0.019			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	16.0	5.5			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0114	<0.015			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00050			
	Arsenic (As)-Total (mg/L)	0.00936	0.00096			
	Barium (Ba)-Total (mg/L)	0.0338	0.0345			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.00025			
	Boron (B)-Total (mg/L)	0.068	0.052			
	Cadmium (Cd)-Total (mg/L)	0.0000302	0.000051			
	Calcium (Ca)-Total (mg/L)	278	210			
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00050			
	Cobalt (Co)-Total (mg/L)	0.00077	<0.00050			
	Copper (Cu)-Total (mg/L)	0.00989	0.0179			
	Iron (Fe)-Total (mg/L)	0.397	<0.050			
	Lead (Pb)-Total (mg/L)	0.000365	<0.00025			
	Lithium (Li)-Total (mg/L)	0.0021	<0.0050			
	Magnesium (Mg)-Total (mg/L)	40.6	41.3			
	Manganese (Mn)-Total (mg/L)	0.705	0.00125			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2652402-1	L2652402-2			
	Description	WATER	WATER			
	Sampled Date	18-OCT-21	18-OCT-21			
	Sampled Time	12:20	13:20			
	Client ID	SRF-18-OCT-2021	INF-18-OCT-2021			
Grouping	**Analyte**					
WATER						
Total Metals	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	0.00821	0.0711			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.0025			
	Phosphorus (P)-Total (mg/L)	0.690	<0.25			
	Potassium (K)-Total (mg/L)	1.29	1.33			
	Selenium (Se)-Total (mg/L)	0.000586 DTC	0.0873			
	Silicon (Si)-Total (mg/L)	13.1	5.35			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000050			
	Sodium (Na)-Total (mg/L)	14.3	12.9			
	Strontium (Sr)-Total (mg/L)	1.70	2.10			
	Sulfur (S)-Total (mg/L)	177 DTC	241			
	Thallium (Tl)-Total (mg/L)	0.000013	<0.000050			
	Tin (Sn)-Total (mg/L)	0.00011	<0.00050			
	Titanium (Ti)-Total (mg/L)	0.00042	<0.0015			
	Uranium (U)-Total (mg/L)	0.000863	0.00102			
	Vanadium (V)-Total (mg/L)	0.00363	<0.0025			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.015			
	Zirconium (Zr)-Total (mg/L)	0.00043	<0.0010			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0063	0.0051 DLDS			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00050 DLDS			
	Arsenic (As)-Dissolved (mg/L)	0.00808	0.00123 DLDS			
	Barium (Ba)-Dissolved (mg/L)	0.0356	0.0351 DLDS			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.00010 DLDS			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.00025 DLDS			
	Boron (B)-Dissolved (mg/L)	0.059	0.057 DLDS			
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	0.000078 DLDS			
	Calcium (Ca)-Dissolved (mg/L)	278	236 DLDS			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00050 DLDS			
	Cobalt (Co)-Dissolved (mg/L)	0.00018	<0.00050 DLDS			
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.0181 DLDS			
	Iron (Fe)-Dissolved (mg/L)	0.074	<0.050 DLDS			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.00025 DLDS			
	Lithium (Li)-Dissolved (mg/L)	0.0021	<0.0050 DLDS			
	Magnesium (Mg)-Dissolved (mg/L)	43.9	46.8 DLDS			
	Manganese (Mn)-Dissolved (mg/L)	0.749	0.00065			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2652402-1	L2652402-2			
	Description	WATER	WATER			
	Sampled Date	18-OCT-21	18-OCT-21			
	Sampled Time	12:20	13:20			
	Client ID	SRF-18-OCT-2021	INF-18-OCT-2021			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	0.0000059 RRV	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00231	0.0770 DLDS			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.0025 DLDS			
	Phosphorus (P)-Dissolved (mg/L)	0.811	<0.25 DLDS			
	Potassium (K)-Dissolved (mg/L)	1.20	1.43 DLDS			
	Selenium (Se)-Dissolved (mg/L)	0.00778 DTC	0.0887 DLDS			
	Silicon (Si)-Dissolved (mg/L)	13.2	5.43 DLDS			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000050 DLDS			
	Sodium (Na)-Dissolved (mg/L)	14.7	12.9 DLDS			
	Strontium (Sr)-Dissolved (mg/L)	1.85	2.36 DLDS			
	Sulfur (S)-Dissolved (mg/L)	264 DTC	238 DLDS			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000050 DLDS			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00050 DLDS			
	Titanium (Ti)-Dissolved (mg/L)	0.00033	<0.0015 DLDS			
	Uranium (U)-Dissolved (mg/L)	0.000669	0.000852 DLDS			
	Vanadium (V)-Dissolved (mg/L)	0.00330	<0.0025 DLDS			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0088 DLDS			
	Zirconium (Zr)-Dissolved (mg/L)	0.00050	<0.0010 DLDS			
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	14.2	<2.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2652402-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2652402-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2652402-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2652402-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2652402-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2652402-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2652402-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-CL	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-CL	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-CL	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Reference Information

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S2-D-COL-VA	Water	Dissolved Sulphide by Colorimetric	APHA 4500 -S E-Auto-Colorimetry

Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the dissolved sulfide concentration in the sample.

S2-D>H2S-CALC-VA	Water	Dissolved Sulphide Calculated as H2S	APHA 4500-S2 SULPHIDE

This calculation converts Dissolved Sulphide as (S2-) and reports it as Dissolved Sulphide as (H2S). Dissolved Sulphide as (S2-) is determined using procedures adapted from APHA 4500-S2 "Sulphide". This analysis is carried out, on a sample that has had its suspended solids removed by flocculation and settling prior to sample preservation.

SO4-L-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		Report Format / Distribution	Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #: ~~21452039/31400/31427~~	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
							F/P			P except for Hg	F/P except for Hg					P	
	SRF-18-Oct-2021	18-Oct-21	12:20	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-18-Oct-2021	18-Oct-21	1:20	Water	X	X	X	X	X	X	X	X	X	X	X	X	

L2652402-COFC

Special Instructions / Regulations / Hazardous Details

Please lab preserve Total Mercury. The Preservative for INF-18-Oct-2021 spilled please add preservatives in there as well
Please rush SRF-18-Oct-2021 TOC, T-Se & D-Se with 2day TAT and send report by thursday Oct 21.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			10/18	3:30pm	8			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 25-OCT-21
Report Date: 17-NOV-21 14:03 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2655242

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2655242-1 EFF-25-OCT-2021							
Sampled By: CLIENT on 25-OCT-21 @ 14:30							
Matrix: Water							
Calgary Sanitary 14M2012 - Full List							
Ammonia by Fluorescence							
Ammonia, Total (as N)	0.113		0.050	mg/L		16-NOV-21	R5652224
BTEX and Styrene							
Benzene	<0.00050		0.00050	mg/L	01-NOV-21	02-NOV-21	R5634620
Toluene	<0.00050		0.00050	mg/L	01-NOV-21	02-NOV-21	R5634620
Ethylbenzene	<0.00050		0.00050	mg/L	01-NOV-21	02-NOV-21	R5634620
o-Xylene	<0.00050		0.00050	mg/L	01-NOV-21	02-NOV-21	R5634620
m+p-Xylene	<0.00050		0.00050	mg/L	01-NOV-21	02-NOV-21	R5634620
Surrogate: 4-Bromofluorobenzene	80.9		70-130	%	01-NOV-21	02-NOV-21	R5634620
Surrogate: 1,4-Difluorobenzene	101.2		70-130	%	01-NOV-21	02-NOV-21	R5634620
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	89		15	mg/L		26-OCT-21	R5633770
Chemical Oxygen Demand (COD)							
Chemical Oxygen Demand	184		10	mg/L		28-OCT-21	R5632168
Chloride in Water by IC							
Chloride (Cl)	3.4		2.5	mg/L		26-OCT-21	R5634884
Cyanide, Total							
Cyanide, Total	0.0620		0.0020	mg/L		28-OCT-21	R5631797
EPA 8260 Volatile Organics - single parm							
Methylene chloride	<0.0010		0.0010	mg/L	01-NOV-21	02-NOV-21	R5634620
Chloroform	<0.0010		0.0010	mg/L	01-NOV-21	02-NOV-21	R5634620
Trichloroethene	0.0024		0.0010	mg/L	01-NOV-21	02-NOV-21	R5634620
Tetrachloroethene	<0.0010		0.0010	mg/L	01-NOV-21	02-NOV-21	R5634620
1,1,2,2-Tetrachloroethane	<0.0050		0.0050	mg/L	01-NOV-21	02-NOV-21	R5634620
1,4-Dichlorobenzene	<0.0010		0.0010	mg/L	01-NOV-21	02-NOV-21	R5634620
1,2-Dichlorobenzene	<0.0010		0.0010	mg/L	01-NOV-21	02-NOV-21	R5634620
Surrogate: 1,4-Difluorobenzene	101.2		70-130	%	01-NOV-21	02-NOV-21	R5634620
Surrogate: 4-Bromofluorobenzene	80.9		70-130	%	01-NOV-21	02-NOV-21	R5634620
Surrogate: 3,4-Dichlorotoluene	95.4		70-130	%	01-NOV-21	02-NOV-21	R5634620
Fluoride in Water by IC							
Fluoride (F)	<0.10	DLDS	0.10	mg/L		26-OCT-21	R5634884
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		26-OCT-21	R5634884
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		26-OCT-21	R5634884
Oil and Grease-Gravimetric							
Hydrocarbons,Recoverable	<5.0		5.0	mg/L		03-NOV-21	R5635411
Oil and Grease-Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		03-NOV-21	R5633974
PCBs in Water							
Aroclor 1016	<0.030	DLM	0.030	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1221	<0.030	DLM	0.030	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1232	<0.030	DLM	0.030	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1242	<0.030	DLM	0.030	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1248	<0.030	DLM	0.030	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1254	<0.010		0.010	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1260	<0.010		0.010	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1262	<0.010		0.010	ug/L	01-NOV-21	01-NOV-21	R5633988
Aroclor 1268	<0.010		0.010	ug/L	01-NOV-21	01-NOV-21	R5633988
Total PCBs	<0.070	DLM	0.070	ug/L	01-NOV-21	01-NOV-21	R5633988
Surrogate: Decachlorobiphenyl	123.8		60-140	%	01-NOV-21	01-NOV-21	R5633988
Surrogate: Tetrachloro-m-xylene	74.4		60-140	%	01-NOV-21	01-NOV-21	R5633988

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2655242-1 EFF-25-OCT-2021							
Sampled By: CLIENT on 25-OCT-21 @ 14:30							
Matrix: Water							
Pensky-Martens Closed Cup Flashpoint							
Flash Point	>75		30.0	Deg. C		28-OCT-21	R5631817
Pesticides, Organochlorine in Water							
Hexachlorobenzene	<0.0080		0.0080	ug/L	29-OCT-21	04-NOV-21	R5632714
Surrogate: Tetrachloro-m-xylene	81.4		40-130	%	29-OCT-21	04-NOV-21	R5632714
Phenol (4AAP)							
Phenols (4AAP)	0.0026		0.0010	mg/L		29-OCT-21	R5633751
Sulfate in Water by IC							
Sulfate (SO4)	548		1.5	mg/L		26-OCT-21	R5634884
Sum of Xylene Isomer Concentrations							
Xylenes	<0.00071		0.00071	mg/L		02-NOV-21	
Total Kjeldahl Nitrogen by Fluorescence							
Total Kjeldahl Nitrogen	3.37	DLM	0.40	mg/L		05-NOV-21	R5636751
Total Mercury in Water by CVAAS							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		28-OCT-21	R5632182
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.034	DLM	0.015	mg/L		02-NOV-21	R5634686
Antimony (Sb)-Total	<0.00050	DLM	0.00050	mg/L		02-NOV-21	R5634686
Arsenic (As)-Total	0.00254	DLM	0.00050	mg/L		02-NOV-21	R5634686
Beryllium (Be)-Total	<0.00050	DLM	0.00050	mg/L		02-NOV-21	R5634686
Bismuth (Bi)-Total	<0.00025	DLM	0.00025	mg/L		02-NOV-21	R5634686
Boron (B)-Total	0.071	DLM	0.050	mg/L		02-NOV-21	R5634686
Cadmium (Cd)-Total	<0.000025	DLM	0.000025	mg/L		02-NOV-21	R5634686
Chromium (Cr)-Total	<0.00050	DLM	0.00050	mg/L		02-NOV-21	R5634686
Cobalt (Co)-Total	0.00078	DLM	0.00050	mg/L		02-NOV-21	R5634686
Copper (Cu)-Total	0.0051	DLM	0.0025	mg/L		02-NOV-21	R5634686
Iron (Fe)-Total	1.44	DLM	0.050	mg/L		02-NOV-21	R5634686
Lead (Pb)-Total	<0.00025	DLM	0.00025	mg/L		02-NOV-21	R5634686
Manganese (Mn)-Total	0.934	DLM	0.00050	mg/L		02-NOV-21	R5634686
Molybdenum (Mo)-Total	0.0425	DLM	0.00025	mg/L		02-NOV-21	R5634686
Nickel (Ni)-Total	<0.0025	DLM	0.0025	mg/L		02-NOV-21	R5634686
Selenium (Se)-Total	0.00203	DLM	0.00025	mg/L		02-NOV-21	R5634686
Silver (Ag)-Total	<0.000050	DLM	0.000050	mg/L		02-NOV-21	R5634686
Thallium (Tl)-Total	<0.000050	DLM	0.000050	mg/L		02-NOV-21	R5634686
Tin (Sn)-Total	<0.00050	DLM	0.00050	mg/L		02-NOV-21	R5634686
Titanium (Ti)-Total	<0.0015	DLM	0.0015	mg/L		02-NOV-21	R5634686
Vanadium (V)-Total	0.0041	DLM	0.0025	mg/L		02-NOV-21	R5634686
Zinc (Zn)-Total	<0.015	DLM	0.015	mg/L		02-NOV-21	R5634686
Total P in Water by Colour							
Phosphorus (P)-Total	2.22	DLHC	0.10	mg/L		04-NOV-21	R5636152
Total Sulphide Low Level by Colorimetric							
Sulphide as S	7.09		0.0075	mg/L		27-OCT-21	R5629999
Total Suspended Solids							
Total Suspended Solids	123		3.0	mg/L		30-OCT-21	R5633743
pH							
pH	7.59		0.10	pH		31-OCT-21	R5634423

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BTXS-HS-MS-CL	Water	BTEX and Styrene	EPA 8260C/5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTEX Target compound concentrations are measured using mass spectrometry detection.

CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

COD-T-COL-CL	Water	Chemical Oxygen Demand (COD)	APHA 5220 D Colorimetry

Samples are analyzed using the closed reflux colourimetric method

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

FLASH-PMCC-AUTO-CL	Waste	Pensky-Martens Closed Cup Flashpoint	ASTM D-93

A brass cup of specified dimensions, filled to the inner mark with test sample and fitted with a cover, is heated and the sample stirred at specified rates, using one of 3 defined procedures. An ignition source is directed into the cup at regular intervals until a flash is detected. The flash point is the lowest temperature corrected for barometric pressure, at which the vapour of the sample ignites.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HOG-CL	Water	Oil and Grease-Gravimetric	BC MOE Lab Manual (Oil & Grease) (mod)

This technique employs a hexane extraction of a water material, followed by filtration of the decanted solvent into an evaporation container. The solvent is evaporated in a pre-weighed dish, and the oil content is calculated from the weight of oil and grease recovered. For hydrocarbons determination, silica gel is used to remove any polar compounds in the extraction solvent and is then filtered into a pre-weighed pan where the solvent is evaporated, and the oil content is calculated from the weight

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OCP-ROUTINE-WT	Water	Pesticides, Organochlorine in Water	SW846 8270

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Samples are extracted using a solvent mixture and the resulting extracts are analyzed on GC/MSD			
OGG-CL	Water	Oil and Grease-Gravimetric	BC MOE Lab Manual (Oil & Grease) (mod)
This technique employs a hexane extraction of a water material, followed by filtration of the decanted solvent into an evaporation container. The solvent is evaporated in a pre-weighed dish, and the oil content is calculated from the weight of oil and grease recovered			
P-T-COL-CL	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PCB9-ED-WT	Water	PCBs in Water	SW846 8270
PH-CL	Water	pH	APHA 4500 H-Electrode
pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
S2-L-T-COL-VA	Water	Total Sulphide Low Level by Colorimetric	APHA 4500 -S E-Auto-Colorimetry
Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the total sulfide concentration in the sample.			
SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TKN-F-CL	Water	Total Kjeldahl Nitrogen by Fluorescence	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			
VOC-MISC-CL	Water	EPA 8260 Volatile Organics - single parm	EPA 5021A/8260C
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection			
XYLENES-CALC-CL	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Calculation of Total Xylenes			
Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: MOUNT POLLEY MINING CORP.
PO Box 12
Likely BC V0L 1N0
Contact: Kala Ivens / Michelle Xu

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-CL	**Water**							
Batch R5633770								
WG3649851-3 DUP		**L2655242-1**						
Biochemical Oxygen Demand		89	108		mg/L	20	30	26-OCT-21
WG3649851-2 LCS								
Biochemical Oxygen Demand			97.2		%		85-115	26-OCT-21
WG3649851-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	26-OCT-21
BTXS-HS-MS-CL	**Water**							
Batch R5634620								
WG3650856-3 DUP		**L2655242-1**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-NOV-21
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-NOV-21
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-NOV-21
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-NOV-21
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-NOV-21
WG3650856-2 LCS								
Benzene			98.1		%		70-130	02-NOV-21
Toluene			100.4		%		70-130	02-NOV-21
Ethylbenzene			87.2		%		70-130	02-NOV-21
o-Xylene			87.9		%		70-130	02-NOV-21
m+p-Xylene			90.9		%		70-130	02-NOV-21
WG3650856-1 MB								
Benzene			<0.00050		mg/L		0.0005	02-NOV-21
Toluene			<0.00050		mg/L		0.0005	02-NOV-21
Ethylbenzene			<0.00050		mg/L		0.0005	02-NOV-21
o-Xylene			<0.00050		mg/L		0.0005	02-NOV-21
m+p-Xylene			<0.00050		mg/L		0.0005	02-NOV-21
Surrogate: 4-Bromofluorobenzene			80.2		%		70-130	02-NOV-21
Surrogate: 1,4-Difluorobenzene			99.2		%		70-130	02-NOV-21
WG3650856-4 MS		**L2655242-1**						
Benzene			94.7		%		50-140	02-NOV-21
Toluene			97.9		%		50-140	02-NOV-21
Ethylbenzene			95.5		%		50-140	02-NOV-21
o-Xylene			95.6		%		50-140	02-NOV-21
m+p-Xylene			94.4		%		50-140	02-NOV-21
CL-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-CL	**Water**							
Batch R5634884								
WG3651183-2 LCS								
Chloride (Cl)			104.4		%		90-110	26-OCT-21
WG3651183-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	26-OCT-21
CN-TOT-WT	**Water**							
Batch R5631797								
WG3647766-22 LCS								
Cyanide, Total			95.3		%		80-120	28-OCT-21
WG3647766-21 MB								
Cyanide, Total			<0.0020		mg/L		0.002	28-OCT-21
COD-T-COL-CL	**Water**							
Batch R5632168								
WG3648120-2 LCS								
Chemical Oxygen Demand			96.9		%		85-115	28-OCT-21
WG3648120-1 MB								
Chemical Oxygen Demand			<10		mg/L		10	28-OCT-21
F-IC-N-CL	**Water**							
Batch R5634884								
WG3651183-2 LCS								
Fluoride (F)			104.1		%		90-110	26-OCT-21
WG3651183-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	26-OCT-21
HG-T-CVAA-CL	**Water**							
Batch R5632182								
WG3648082-2 LCS								
Mercury (Hg)-Total			98.2		%		80-120	28-OCT-21
WG3648082-1 MB								
Mercury (Hg)-Total			<0.000005		mg/L		0.000005	28-OCT-21
HOG-CL	**Water**							
Batch R5635411								
WG3651820-2 LCS								
Hydrocarbons,Recoverable			71.3		%		70-130	03-NOV-21
WG3651820-1 MB								
Hydrocarbons,Recoverable			<5.0		mg/L		5	03-NOV-21
MET-T-CCMS-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL	**Water**							
Batch R5634686								
WG3648943-2 LCS		**TMRM**						
Aluminum (Al)-Total			93.4		%		80-120	02-NOV-21
Antimony (Sb)-Total			93.2		%		80-120	02-NOV-21
Arsenic (As)-Total			92.7		%		80-120	02-NOV-21
Beryllium (Be)-Total			89.3		%		80-120	02-NOV-21
Bismuth (Bi)-Total			91.4		%		80-120	02-NOV-21
Boron (B)-Total			88.5		%		80-120	02-NOV-21
Cadmium (Cd)-Total			89.2		%		80-120	02-NOV-21
Chromium (Cr)-Total			93.4		%		80-120	02-NOV-21
Cobalt (Co)-Total			92.4		%		80-120	02-NOV-21
Copper (Cu)-Total			87.2		%		80-120	02-NOV-21
Iron (Fe)-Total			90.4		%		80-120	02-NOV-21
Lead (Pb)-Total			88.9		%		80-120	02-NOV-21
Manganese (Mn)-Total			93.1		%		80-120	02-NOV-21
Molybdenum (Mo)-Total			90.4		%		80-120	02-NOV-21
Nickel (Ni)-Total			91.8		%		80-120	02-NOV-21
Selenium (Se)-Total			83.0		%		80-120	02-NOV-21
Silver (Ag)-Total			92.9		%		80-120	02-NOV-21
Thallium (Tl)-Total			84.8		%		80-120	02-NOV-21
Tin (Sn)-Total			90.1		%		80-120	02-NOV-21
Titanium (Ti)-Total			81.2		%		80-120	02-NOV-21
Vanadium (V)-Total			90.4		%		80-120	02-NOV-21
Zinc (Zn)-Total			90.9		%		80-120	02-NOV-21
WG3648943-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	02-NOV-21
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Boron (B)-Total			<0.010		mg/L		0.01	02-NOV-21
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	02-NOV-21
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Copper (Cu)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Iron (Fe)-Total			<0.010		mg/L		0.01	02-NOV-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL	**Water**							
Batch R5634686								
WG3648943-1 MB								
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Selenium (Se)-Total			<0.000050		mg/L		0.00005	02-NOV-21
Silver (Ag)-Total			<0.000010		mg/L		0.00001	02-NOV-21
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	02-NOV-21
Tin (Sn)-Total			<0.00010		mg/L		0.0001	02-NOV-21
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	02-NOV-21
Vanadium (V)-Total			<0.00050		mg/L		0.0005	02-NOV-21
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-NOV-21
NH3-F-CL	**Water**							
Batch R5652224								
WG3659999-2 LCS								
Ammonia, Total (as N)			100.5		%		85-115	16-NOV-21
WG3659999-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	16-NOV-21
NO2-IC-N-CL	**Water**							
Batch R5634884								
WG3651183-2 LCS								
Nitrite (as N)			104.6		%		90-110	26-OCT-21
WG3651183-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	26-OCT-21
NO3-IC-N-CL	**Water**							
Batch R5634884								
WG3651183-2 LCS								
Nitrate (as N)			103.7		%		90-110	26-OCT-21
WG3651183-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	26-OCT-21
OCP-ROUTINE-WT	**Water**							
Batch R5632714								
WG3648320-2 LCS								
Hexachlorobenzene			110.5		%		50-150	03-NOV-21
WG3648320-1 MB								
Hexachlorobenzene			<0.0080		ug/L		0.008	03-NOV-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OCP-ROUTINE-WT	**Water**							
Batch R5632714								
WG3648320-1 MB								
Surrogate: Tetrachloro-m-xylene			100.5		%		40-130	03-NOV-21
OGG-CL	**Water**							
Batch R5633974								
WG3649902-2 LCS								
Oil and Grease			81.0		%		70-130	01-NOV-21
WG3649902-1 MB								
Oil and Grease			<5.0		mg/L		5	01-NOV-21
P-T-COL-CL	**Water**							
Batch R5636152								
WG3652629-6 LCS								
Phosphorus (P)-Total			115.6		%		80-120	04-NOV-21
WG3652629-5 MB								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	04-NOV-21
PCB9-ED-WT	**Water**							
Batch R5633988								
WG3648320-2 LCS								
Aroclor 1242			118.9		%		60-140	01-NOV-21
Aroclor 1248			96.9		%		60-140	01-NOV-21
Aroclor 1254			102.5		%		60-140	01-NOV-21
Aroclor 1260			103.6		%		60-140	01-NOV-21
WG3648320-1 MB								
Aroclor 1016			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1221			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1232			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1242			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1248			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1254			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1260			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1262			<0.010		ug/L		0.01	01-NOV-21
Aroclor 1268			<0.010		ug/L		0.01	01-NOV-21
Surrogate: Decachlorobiphenyl			105.3		%		60-140	01-NOV-21
Surrogate: Tetrachloro-m-xylene			88.0		%		60-140	01-NOV-21
PH-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-CL	**Water**							
Batch R5634423								
WG3650647-2 LCS								
pH			7.00		pH		6.9-7.1	31-OCT-21
PHENOLS-4AAP-WT	**Water**							
Batch R5633751								
WG3647216-2 LCS								
Phenols (4AAP)			99.9		%		85-115	29-OCT-21
WG3647216-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	29-OCT-21
S2-L-T-COL-VA	**Water**							
Batch R5629999								
WG3647186-2 LCS								
Sulphide as S			104.7		%		75-125	27-OCT-21
WG3647186-1 MB								
Sulphide as S			<0.0015		mg/L		0.0015	27-OCT-21
SO4-IC-N-CL	**Water**							
Batch R5634884								
WG3651183-2 LCS								
Sulfate (SO4)			105.7		%		90-110	26-OCT-21
WG3651183-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	26-OCT-21
TKN-F-CL	**Water**							
Batch R5636751								
WG3653373-2 LCS								
Total Kjeldahl Nitrogen			105.7		%		75-125	05-NOV-21
WG3653373-1 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	05-NOV-21
TSS-CL	**Water**							
Batch R5633743								
WG3648528-2 LCS								
Total Suspended Solids			100.3		%		85-115	30-OCT-21
WG3648528-1 MB								
Total Suspended Solids			<3.0		mg/L		3	30-OCT-21
VOC-MISC-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-MISC-CL	**Water**							
Batch R5634620								
WG3650856-3 DUP		**L2655242-1**						
Methylene chloride		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	02-NOV-21
Chloroform		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	02-NOV-21
Trichloroethene		0.0024	<0.0010	DUP-H	mg/L	N/A	30	02-NOV-21
Tetrachloroethene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	02-NOV-21
1,1,2,2-Tetrachloroethane		<0.0050	<0.0050	RPD-NA	mg/L	N/A	30	02-NOV-21
1,4-Dichlorobenzene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	02-NOV-21
1,2-Dichlorobenzene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	02-NOV-21
WG3650856-2 LCS								
Methylene chloride			93.2		%		70-130	02-NOV-21
Chloroform			104.1		%		70-130	02-NOV-21
Trichloroethene			105.2		%		70-130	02-NOV-21
Tetrachloroethene			106.5		%		70-130	02-NOV-21
1,1,2,2-Tetrachloroethane			91.8		%		70-130	02-NOV-21
1,4-Dichlorobenzene			109.0		%		70-130	02-NOV-21
1,2-Dichlorobenzene			106.2		%		70-130	02-NOV-21
WG3650856-1 MB								
Methylene chloride			<0.0010		mg/L		0.001	02-NOV-21
Chloroform			<0.0010		mg/L		0.001	02-NOV-21
Trichloroethene			<0.0010		mg/L		0.001	02-NOV-21
Tetrachloroethene			<0.0010		mg/L		0.001	02-NOV-21
1,1,2,2-Tetrachloroethane			<0.0050		mg/L		0.005	02-NOV-21
1,4-Dichlorobenzene			<0.0010		mg/L		0.001	02-NOV-21
1,2-Dichlorobenzene			<0.0010		mg/L		0.001	02-NOV-21
Surrogate: 1,4-Difluorobenzene			99.2		%		70-130	02-NOV-21
Surrogate: 4-Bromofluorobenzene			80.2		%		70-130	02-NOV-21
Surrogate: 3,4-Dichlorotoluene			126.0		%		70-130	02-NOV-21
WG3650856-4 MS		**L2655242-1**						
Methylene chloride			86.5		%		70-130	02-NOV-21
Chloroform			98.5		%		70-130	02-NOV-21
Trichloroethene			100.6		%		70-130	02-NOV-21
Tetrachloroethene			99.1		%		70-130	02-NOV-21
1,1,2,2-Tetrachloroethane			97.3		%		70-130	02-NOV-21
1,4-Dichlorobenzene			116.0		%		70-130	02-NOV-21
1,2-Dichlorobenzene			115.6		%		70-130	02-NOV-21
FLASH-PMCC-AUTO-CL	**Waste**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FLASH-PMCC-AUTO-CL	**Waste**							
Batch R5631817								
WG3647964-2 DUP		**L2655242-1**						
Flash Point		>75	>75	RPD-NA	Deg. C	N/A	5	28-OCT-21
WG3647964-1 LCS								
Flash Point			49.8		Deg. C		48-58	28-OCT-21

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	25-OCT-21 14:30	31-OCT-21 22:00	0.25	151	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2655242 were received on 25-OCT-21 15:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Calgary Sanitary 14M2012 - Full list	Number of Containers
	Eff-25-Oct-2021	25-Oct-21	2:30	Water	X	

L2655242-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			10/25	15:11	26			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 25-OCT-21
Report Date: 27-OCT-21 08:06 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2655248

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2655248-1				
	Description	Water				
	Sampled Date	25-OCT-21				
	Sampled Time	14:13				
	Client ID	SRF-25-OCT-2021				
Grouping	**Analyte**					
WATER						
Total Metals	Selenium (Se)-Total (mg/L)	0.000807 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00481 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-25-Oct-2021	25-Oct-21	2:13	Water						X	X						

L2655248-COFC

Special Instructions / Regulations / Hazardous Details

Please submit report by Thrus day, Oct 28th.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			10/25	1550	20			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 01-NOV-21
Report Date: 15-NOV-21 12:36 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2657840

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2657840-1				
	Description	WATER				
	Sampled Date	01-NOV-21				
	Sampled Time	10:15				
	Client ID	SRF-01-NOV-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Sulfate (SO4) (mg/L)	471				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	8.5				
Total Metals	Selenium (Se)-Total (mg/L)	0.00066 DLDS				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.0144 DTSE				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DTSE	Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2: Sanjana_Akella@golder.com	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: ~~21452039/31400/31427~~	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-01-Nov-2021	01-Nov-21	1045	Water	X					X	X					X	

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			11/1	1255	10			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 03-NOV-21
Report Date: 04-NOV-21 17:29 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2658490

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2658490-1				
	Description	WATER				
	Sampled Date	02-NOV-21				
	Sampled Time	15:10				
	Client ID	SRF-02-NOV-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Sulfate (SO4) (mg/L)	633				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	17.6				
Total Metals	Selenium (Se)-Total (mg/L)	0.00154 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00643 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

L2658490-COFC

m

COC # ______

Report to:	
Company:	MOUNT POLLEY MINING CORP.
Contact:	Kala Ivens
Address:	PO BOX 12, Likely, BC, V0L 1N0
Phone:	250-790-2215 Fax:
Invoice To:	Same as Report ? (●) Yes ( ) No
Company:	ernie.guevarra@imperialmetals.com
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	

☑ Standard ☑ Other
☑ PDF ☑ Excel ☐ Digital ☐ Fax

Email 1: mxu@golder.com
Email 2: Sanjana_Akella@golder.com

Client / Project Information:
Job #: 21452039/31400/31427
PO / AFE:
Legal Site Description:
Quote #:
ALS Contact: Can Dang
Sampler:

Service Requested: (rush - subject to availability)
( ) Regular (Default)
(●) Priority (2-3 Business Days) - 50% Surcharge
( ) Emergency (1 Business Day) - 100% Surcharge
( ) For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request
Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
										P	F/P					P	
	SRF-02-Nov-2021	02-Nov-21	15:10	Water	X					X	X					X	

Special Instructions / Regulations / Hazardous Details

Please report by Thursday EOD.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by: [signature]	Date: 11/3	Time: 555	Temperature: 7	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens
PO Box 12
Likely BC V0L 1N0

Date Received: 04-NOV-21
Report Date: 12-NOV-21 13:13 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2659506

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2659506-1				
	Description	WATER				
	Sampled Date	04-NOV-21				
	Sampled Time	12:10				
	Client ID	SRF-04-NOV-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Sulfate (SO4) (mg/L)	687				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.8				
Total Metals	Selenium (Se)-Total (mg/L)	0.00070 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00177				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

L2659506-COFC

COC #

Page 1 of 1

Report to:		**Service Requested:** (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	○ Regular (Default)
Contact: Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	◉ Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
	Email 2: Sanjana_Akella@golder.com	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-790-2215 Fax:		
Invoice To: Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	
Company: ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:** Can Dang	**Sampler:**

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-04-Nov-2021	04-Nov-21	12:10	Water	X					X	X					X	

Special Instructions / Regulations / Hazardous Details

Please report by ~~Thursday EOD~~ Monday, Nov 8, 2021

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by: [signature]	Date: 11/4	Time: 255pm	Temperature: 1.0	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 08-NOV-21
Report Date: 15-NOV-21 12:00 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2660428

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers: 17-831839
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2660428-1				
	Description	WATER				
	Sampled Date	08-NOV-21				
	Sampled Time	13:45				
	Client ID	SRF-08-NOV-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Sulfate (SO4) (mg/L)	705				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.9				
Total Metals	Selenium (Se)-Total (mg/L)	0.000933				
Dissolved Metals	Dissolved Metals Filtration Location	LAB				
	Selenium (Se)-Dissolved (mg/L)	0.00104				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Selenium (Se)-Total	MS-B	L2660428-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-831839

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	Sanjana_Akella@golder.com	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-08-Nov-2021	08-Nov-21	1:45	Water	X					X	X					X	

L2660428-COFC

Special Instructions / Regulations / Hazardous Details

Please report by Thursday EOD.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
		Lovepreet	08/11	3:15PM	20C			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 15-NOV-21
Report Date: 18-NOV-21 13:32 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2662728

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2662728-1				
	Description	WATER				
	Sampled Date	15-NOV-21				
	Sampled Time	10:20				
	Client ID	SRF-15-NOV-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Sulfate (SO4) (mg/L)	727				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.0				
Total Metals	Selenium (Se)-Total (mg/L)	0.00227 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00320 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

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COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	○ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	◉ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2: Sanjana_Akella@golder.com	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: ~~21452039/31400/31427~~	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-15-Nov-2021	15-Nov-21	16:25	Water	X					X	X					X	

L2662728-COFC

Special Instructions / Regulations / Hazardous Details

Please report by Thursday EOD.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			11/15	1355	16			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 22-NOV-21
Report Date: 01-DEC-21 14:47 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2664965

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/21400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2664965-1	L2664965-2			
	Description	WATER	WATER			
	Sampled Date	22-NOV-21	22-NOV-21			
	Sampled Time	11:15	10:45			
	Client ID	SRF-22-NOV-2021	INF-22-NOV-2021			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	788	768			
	Total Suspended Solids (mg/L)	185	3.0			
	Total Dissolved Solids (mg/L)	1790	1170			
	Turbidity (NTU)	191	0.15			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	281	83.6			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	281	83.6			
	Ammonia as N (mg/L)	0.898	0.0052			
	Bromide (Br) (mg/L)	DLDS <0.25	DLDS <0.25			
	Chloride (Cl) (mg/L)	548	3.20			
	Fluoride (F) (mg/L)	DLDS <0.10	0.14			
	Nitrate (as N) (mg/L)	0.029	6.87			
	Nitrite (as N) (mg/L)	DLDS <0.0050	0.0066			
	Phosphorus (P)-Total (mg/L)	DLHC 1.15	0.0139			
	Sulfate (SO4) (mg/L)	663	740			
	Sulphide as S (Dissolved) (mg/L)	2.41	<0.018			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.66	5.98			
Total Metals	Aluminum (Al)-Total (mg/L)	DLDS <0.015	DLDS <0.015			
	Antimony (Sb)-Total (mg/L)	DLDS <0.00050	DLDS 0.00073			
	Arsenic (As)-Total (mg/L)	DLDS 0.00374	DLDS 0.00125			
	Barium (Ba)-Total (mg/L)	DLDS 0.0334	DLDS 0.0356			
	Beryllium (Be)-Total (mg/L)	DLDS <0.00010	DLDS <0.00010			
	Bismuth (Bi)-Total (mg/L)	DLDS <0.00025	DLDS <0.00025			
	Boron (B)-Total (mg/L)	DLDS 0.065	DLDS 0.065			
	Cadmium (Cd)-Total (mg/L)	DLDS 0.000028	DLDS 0.000069			
	Calcium (Ca)-Total (mg/L)	DLDS 264	DLDS 253			
	Chromium (Cr)-Total (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Cobalt (Co)-Total (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Copper (Cu)-Total (mg/L)	DLDS 0.0041	DLDS 0.0177			
	Iron (Fe)-Total (mg/L)	DLDS 0.154	DLDS <0.050			
	Lead (Pb)-Total (mg/L)	DLDS <0.00025	DLDS <0.00025			
	Lithium (Li)-Total (mg/L)	DLDS <0.0050	DLDS <0.0050			
	Magnesium (Mg)-Total (mg/L)	DLDS 42.1	DLDS 45.1			
	Manganese (Mn)-Total (mg/L)	DLDS 0.436	DLDS 0.00078			
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2664965-1	L2664965-2			
	Description	WATER	WATER			
	Sampled Date	22-NOV-21	22-NOV-21			
	Sampled Time	11:15	10:45			
	Client ID	SRF-22-NOV-2021	INF-22-NOV-2021			
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	DLDS 0.00655	DLDS 0.0786			
	Nickel (Ni)-Total (mg/L)	DLDS <0.0025	DLDS <0.0025			
	Phosphorus (P)-Total (mg/L)	DLDS 1.18	DLDS <0.25			
	Potassium (K)-Total (mg/L)	DLDS 1.45	DLDS 1.53			
	Selenium (Se)-Total (mg/L)	DLDS 0.00181	DLDS 0.0857			
	Silicon (Si)-Total (mg/L)	DLDS 9.33	DLDS 5.50			
	Silver (Ag)-Total (mg/L)	DLDS <0.000050	DLDS <0.000050			
	Sodium (Na)-Total (mg/L)	DLDS 13.7	DLDS 12.7			
	Strontium (Sr)-Total (mg/L)	DLDS 1.91	DLDS 2.33			
	Sulfur (S)-Total (mg/L)	DLDS 243	DLDS 265			
	Thallium (Tl)-Total (mg/L)	DLDS <0.000050	DLDS <0.000050			
	Tin (Sn)-Total (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Titanium (Ti)-Total (mg/L)	DLDS <0.0015	DLDS <0.0015			
	Uranium (U)-Total (mg/L)	DLDS 0.000112	DLDS 0.00105			
	Vanadium (V)-Total (mg/L)	DLDS <0.0025	DLDS <0.0025			
	Zinc (Zn)-Total (mg/L)	DLDS <0.015	DLDS <0.015			
	Zirconium (Zr)-Total (mg/L)	DLDS <0.0010	DLDS <0.0010			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	DLDS 0.0062	DLDS 0.0072			
	Antimony (Sb)-Dissolved (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Arsenic (As)-Dissolved (mg/L)	DLDS 0.00349	DLDS 0.00107			
	Barium (Ba)-Dissolved (mg/L)	DLDS 0.0327	DLDS 0.0350			
	Beryllium (Be)-Dissolved (mg/L)	DLDS <0.00010	DLDS <0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	DLDS <0.00025	DLDS <0.00025			
	Boron (B)-Dissolved (mg/L)	DLDS 0.063	DLDS 0.062			
	Cadmium (Cd)-Dissolved (mg/L)	DLDS <0.000025	DLDS 0.000056			
	Calcium (Ca)-Dissolved (mg/L)	DLDS 247	DLDS 235			
	Chromium (Cr)-Dissolved (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Cobalt (Co)-Dissolved (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Copper (Cu)-Dissolved (mg/L)	DLDS 0.0013	DLDS 0.0168			
	Iron (Fe)-Dissolved (mg/L)	DLDS 0.122	DLDS <0.050			
	Lead (Pb)-Dissolved (mg/L)	DLDS <0.00025	DLDS <0.00025			
	Lithium (Li)-Dissolved (mg/L)	DLDS <0.0050	DLDS <0.0050			
	Magnesium (Mg)-Dissolved (mg/L)	DLDS 41.3	DLDS 43.7			
	Manganese (Mn)-Dissolved (mg/L)	DLDS 0.416	DLDS <0.00050			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2664965-1	L2664965-2			
	Description	WATER	WATER			
	Sampled Date	22-NOV-21	22-NOV-21			
	Sampled Time	11:15	10:45			
	Client ID	SRF-22-NOV-2021	INF-22-NOV-2021			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Molybdenum (Mo)-Dissolved (mg/L)	DLDS 0.00452	DLDS 0.0754			
	Nickel (Ni)-Dissolved (mg/L)	DLDS <0.0025	DLDS <0.0025			
	Phosphorus (P)-Dissolved (mg/L)	DLDS 1.27	DLDS <0.25			
	Potassium (K)-Dissolved (mg/L)	DLDS 1.41	DLDS 1.45			
	Selenium (Se)-Dissolved (mg/L)	DLDS 0.00125	DLDS 0.0821			
	Silicon (Si)-Dissolved (mg/L)	DLDS 9.17	DLDS 5.40			
	Silver (Ag)-Dissolved (mg/L)	DLDS <0.000050	DLDS <0.000050			
	Sodium (Na)-Dissolved (mg/L)	DLDS 13.1	DLDS 12.1			
	Strontium (Sr)-Dissolved (mg/L)	DLDS 1.91	DLDS 2.25			
	Sulfur (S)-Dissolved (mg/L)	DLDS 231	DLDS 241			
	Thallium (Tl)-Dissolved (mg/L)	DLDS <0.000050	DLDS <0.000050			
	Tin (Sn)-Dissolved (mg/L)	DLDS <0.00050	DLDS <0.00050			
	Titanium (Ti)-Dissolved (mg/L)	DLDS <0.0015	DLDS <0.0015			
	Uranium (U)-Dissolved (mg/L)	DLDS 0.000104	DLDS 0.00103			
	Vanadium (V)-Dissolved (mg/L)	DLDS <0.0025	DLDS <0.0025			
	Zinc (Zn)-Dissolved (mg/L)	DLDS <0.0050	DLDS 0.0071			
	Zirconium (Zr)-Dissolved (mg/L)	DLDS <0.0010	DLDS <0.0010			
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	4.6	<2.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2664965-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2664965-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2664965-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2664965-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2664965-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2664965-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2664965-1, -2
Matrix Spike	Ammonia as N	MS-B	L2664965-1, -2
Matrix Spike	Phosphorus (P)-Total	MS-B	L2664965-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-CL	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-CL	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-L-IC-CL	Water	Fluoride	APHA 4110 B-Ion Chromatography
HARDNESS-CALC-CL	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Reference Information

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HG-T-CVAA-CL	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S2-D-COL-VA	Water	Dissolved Sulphide by Colorimetric	APHA 4500 -S E-Auto-Colorimetry

Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S", if reported, represent the maximum possible H2S concentration based on the dissolved sulfide concentration in the sample.

SO4-L-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
							F/P			P	P/F					P	
	SRF-22-Nov-2021	22-Nov-21	11:15	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-22-Nov-2021	22-Nov-21	10:45	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	~~DUP-22-Nov-2021~~	~~22-Nov-21~~		~~Water~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	

L2664965-COFC

Special Instructions / Regulations / Hazardous Details

Please preserve and field filter Hg from amber glass vial.
BOD for SRF not collected

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			11/22	2:25pm	17			

MOUNT POLLEY MINING CORP.
ATTN: Kala Ivens / Michelle Xu
PO Box 12
Likely BC V0L 1N0

Date Received: 29-NOV-21
Report Date: 08-DEC-21 16:27 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L2667258

Project P.O. #: NOT SUBMITTED
Job Reference: 21452039/31400/31427
C of C Numbers:
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2667258-1				
	Description	WATER				
	Sampled Date	29-NOV-21				
	Sampled Time	10:15				
	Client ID	SRF-29-NOV-2021				
Grouping	**Analyte**					
WATER						
Anions and Nutrients	Nitrate (as N) (mg/L)	0.029				
	Sulfate (SO4) (mg/L)	751				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.8				
Total Metals	Selenium (Se)-Total (mg/L)	0.00179 DTC				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Selenium (Se)-Dissolved (mg/L)	0.00355 DTC				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-CL	Water	Total Organic Carbon	APHA 5310 B-Instrumental

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report to:	
Company:	MOUNT POLLEY MINING CORP.
Contact:	Kala Ivens
Address:	PO BOX 12, Likely, BC, V0L 1N0
Phone:	250-790-2215 Fax:
Invoice To:	Same as Report ? (●) Yes ( ) No
Company:	ernie.guevarra@imperialmetals.com
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	

Report Format / Distribution			
☑ Standard	☑ Other		
☑ PDF	☑ Excel	☐ Digital	☐ Fax
Email 1:	mxu@golder.com		
Email 2:			

Client / Project Information:	
Job #:	21452039/31400/31427
PO / AFE:	
Legal Site Description:	
Quote #:	
ALS Contact:	Can Dang
Sampler:	

Service Requested: (rush - subject to availability)

- (●) Regular (Default)
- ( ) Priority (2-3 Business Days) - 50% Surcharge
- ( ) Emergency (1 Business Day) - 100% Surcharge
- ( ) For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se (F)	Dissolved Se (F/P)	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon (P)	Number of Containers
	SRF-29-Nov-2021	29-Nov-21	10:15	Water	X					X	X					X	

L2667258-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			11/29	1216	19			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2106382**	Page	: 1 of 3
Amendment	: **1**		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 299 5600	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 06-Dec-2021 12:19
PO	: 5500052166	Date Analysis Commenced	: 06-Dec-2021
C-O-C number	: ----	Issue Date	: 14-Dec-2021 12:53
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-06-Dec-2021	----	----	----	----
					Client sampling date / time	06-Dec-2021 09:30	----	----	----	----
					CG2106382-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		708	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		6.46	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00250	----	----	----	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00146	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2106382**	Page	: 1 of 4
Amendment	: 1		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 06-Dec-2021 12:19
PO	: 5500052166	Issue Date	: 14-Dec-2021 12:53
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-06-Dec-2021	E235.SO4-L	06-Dec-2021	----	----	----		06-Dec-2021	28 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-06-Dec-2021	E421	06-Dec-2021	10-Dec-2021	----	----		10-Dec-2021	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-06-Dec-2021	E355-L	06-Dec-2021	06-Dec-2021	----	----		06-Dec-2021	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-06-Dec-2021	E420	06-Dec-2021	----	----	----		09-Dec-2021	180 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	364188	1	3	33.3	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	360636	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	363494	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	360472	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	364188	1	3	33.3	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	360636	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	363494	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	360472	1	8	12.5	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	364188	1	3	33.3	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	360636	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	363494	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	360472	1	8	12.5	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	364188	1	3	33.3	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	360636	0	1	0.0	5.0	×
Total Metals in Water by CRC ICPMS	E420	363494	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	360472	1	8	12.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO_3.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2106382**	Page	: 1 of 4
Amendment	: **1**		

Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 06-Dec-2021 12:19
PO	: 5500052166	Date Analysis Commenced	: 06-Dec-2021
C-O-C number	: ----	Issue Date	: 14-Dec-2021 12:53
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 360636)											
CG2106382-001	SRF-06-Dec-2021	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	708	711	0.414%	20%	----
Organic / Inorganic Carbon (QC Lot: 360472)											
CG2106382-001	SRF-06-Dec-2021	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	6.46	6.20	4.05%	20%	----
Total Metals (QC Lot: 363494)											
CG2106353-008	Anonymous	selenium, total	7782-49-2	E420	0.250	mg/L	7.36 µg/L	0.00690	6.40%	20%	----
Dissolved Metals (QC Lot: 364188)											
CG2106376-013	Anonymous	selenium, dissolved	7782-49-2	E421	0.000250	mg/L	0.000869	0.000834	0.000035	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 360636)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 360472)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 363494)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 364188)						
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 360636)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	104	90.0	110	----
Organic / Inorganic Carbon (QCLot: 360472)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	94.2	80.0	120	----
Total Metals (QCLot: 363494)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.3	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 360472)										
CG2106382-001	SRF-06-Dec-2021	carbon, total organic [TOC]	----	E355-L	26.1 mg/L	23.9 mg/L	109	70.0	130	----
Total Metals (QCLot: 363494)										
CG2106353-008	Anonymous	selenium, total	7782-49-2	E420	0.498 mg/L	0.4 mg/L	125	70.0	130	----
Dissolved Metals (QCLot: 364188)										
CG2106376-014	Anonymous	selenium, dissolved	7782-49-2	E421	0.358 mg/L	0.4 mg/L	89.6	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report to:		Report Format / Distribution	Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		

Invoice To:	Same as Report ? ◉ Yes ○ No	Client / Project Information:
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427
Contact:		PO / AFE:
Address:		Legal Site Description:
Phone:	Fax:	Quote #: MPINC100 / CG2021MPMC100005

Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
					P					F/P						P	
	SRF-06-Dec-2021	06-Dec-21	10:30	Water	X					X	X					X	
																	rushed
					Rushed												2 days
					2 days												TAT
					TAT												

Environmental Division
Calgary
Work Order Reference
CG2106382

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

TOC & sulphate rushed with 2 days TAT, please send report thursday (Dec 9) morning.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			12/6	1319	17			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2106683**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 13-Dec-2021 12:30
PO	: Not Submitted	Date Analysis Commenced	: 13-Dec-2021
C-O-C number	: ----	Issue Date	: 21-Dec-2021 08:26
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	Client Id	*Comment*
CG2106683-003	DUP-13-DEC-2021	Hg for DUP(sample ID) Preservative spilled, please preserve again @ lab if needed.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-13-DEC-2021	INF-13-DEC-2021	DUP-13-DEC-2021	----	----
					Client sampling date / time	13-Dec-2021 10:50	13-Dec-2021 11:50	13-Dec-2021 10:50	----	----
						CG2106683-001	CG2106683-002	CG2106683-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		767	809	784	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		791	771	802	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1200	1220	1210	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L		337	324	324	----	----
turbidity	----	E121	0.10	NTU		109	<0.10	107	----	----
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L		224	88.6	221	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.492	<0.0050	0.502	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	<0.250 DLDS	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.88	2.86	2.95	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.202	0.189	0.198	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.108	6.75	0.120	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.82 DLHC	0.0076	1.97 DLHC	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		618	740	630	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		7.83	5.45	7.59	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L		15.1	<0.0015	15.7	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397	0.0016	mg/L		16.1	<0.0016	16.7	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		<0.0150 DLDS	<0.0150 DLDS	<0.0150 DLDS	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00050 DLDS	0.00061	<0.00050 DLDS	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00391	0.00110	0.00400	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0310	0.0367	0.0309	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000100 DLDS	0.000103	<0.000100 DLDS	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.061	0.057	0.060	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000250 DLDS	0.0000499	0.0000287	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		250	237	253	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-13-DEC-2021	INF-13-DEC-2021	DUP-13-DEC-2021	----	----
					Client sampling date / time	13-Dec-2021 10:50	13-Dec-2021 11:50	13-Dec-2021 10:50	----	----
						CG2106683-001	CG2106683-002	CG2106683-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00707	0.0179	0.00730	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.088	<0.050 DLDS	0.090	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		40.4	43.6	41.3	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.363	0.00062	0.380	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050 DTC	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00496	0.0821	0.00531	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		1.96	<0.250 DLDS	1.81	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.29	1.50	1.31	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000714	0.0892	0.000970	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		10.0	5.69	10.2	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		12.6	12.1	12.8	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		1.83	2.33	1.87	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		202	242	202	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	<0.00150 DLDS	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		<0.000050 DLDS	0.00105	0.000060	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00268	<0.00250 DLDS	0.00284	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0150 DLDS	<0.0150 DLDS	<0.0150 DLDS	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	<0.00100 DLDS	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0053	0.0076	0.0066	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00371	0.00124	0.00349	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0296	0.0368	0.0301	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-13-DEC-2021	INF-13-DEC-2021	DUP-13-DEC-2021	----	----
					Client sampling date / time	13-Dec-2021 10:50	13-Dec-2021 11:50	13-Dec-2021 10:50	----	----
						CG2106683-001	CG2106683-002	CG2106683-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	<0.000100 DLDS	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.060	0.060	0.060	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000250 DLDS	0.0000525	<0.0000250 DLDS	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		243	250	248	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00218	0.0172	0.00228	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.057	<0.050 DLDS	0.063	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		38.9	44.9	39.9	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.363	<0.00050 DLDS	0.366	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		0.0000084 DTC, RRV	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00321	0.0819	0.00329	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.71	<0.250 DLDS	1.84	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.25	1.55	1.23	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00647	0.0886	0.00746	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		9.66	5.86	9.88	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		12.5	12.5	12.4	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		1.77	2.33	1.85	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		294	253	294	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	<0.00150 DLDS	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		<0.000050 DLDS	0.00104	0.000050	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	0.0066	<0.0050 DLDS	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	<0.00100 DLDS	----	----

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					Client sample ID	SRF-13-DEC-2021	INF-13-DEC-2021	DUP-13-DEC-2021	----	----
					Client sampling date / time	13-Dec-2021 10:50	13-Dec-2021 11:50	13-Dec-2021 10:50	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**CG2106683-001**	**CG2106683-002**	**CG2106683-003**	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		7.5	<2.0	7.4	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2106683**	Page	: 1 of 14
Client	: **Mount Polley Mining Corporation**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 13-Dec-2021 12:30
PO	: Not Submitted	Issue Date	: 21-Dec-2021 08:26
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Aggregate Organics	QC-367814-002	----	biochemical oxygen demand [BOD]	----	E550	79.2 % LCS-ND	85.0-115%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
LCS-ND	*Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] DUP-13-DEC-2021	E550	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] INF-13-DEC-2021	E550	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] SRF-13-DEC-2021	E550	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) DUP-13-DEC-2021	E298	13-Dec-2021	13-Dec-2021	----	----		13-Dec-2021	28 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) INF-13-DEC-2021	E298	13-Dec-2021	13-Dec-2021	----	----		13-Dec-2021	28 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SRF-13-DEC-2021	E298	13-Dec-2021	13-Dec-2021	----	----		13-Dec-2021	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE DUP-13-DEC-2021	E235.Br-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-13-DEC-2021	E235.Br-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF-13-DEC-2021	E235.Br-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
DUP-13-DEC-2021	E235.Cl-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-13-DEC-2021	E235.Cl-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF-13-DEC-2021	E235.Cl-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
DUP-13-DEC-2021	E235.F	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-13-DEC-2021	E235.F	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF-13-DEC-2021	E235.F	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
DUP-13-DEC-2021	E235.NO3-L	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-13-DEC-2021	E235.NO3-L	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-13-DEC-2021	E235.NO3-L	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP-13-DEC-2021	E235.NO2-L	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-13-DEC-2021	E235.NO2-L	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-13-DEC-2021	E235.NO2-L	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
DUP-13-DEC-2021	E235.SO4-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-13-DEC-2021	E235.SO4-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-13-DEC-2021	E235.SO4-L	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
DUP-13-DEC-2021	E372-U	13-Dec-2021	18-Dec-2021	----	----		18-Dec-2021	28 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
INF-13-DEC-2021	E372-U	13-Dec-2021	18-Dec-2021	----	----		18-Dec-2021	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SRF-13-DEC-2021	E372-U	13-Dec-2021	18-Dec-2021	----	----		18-Dec-2021	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUP-13-DEC-2021	E509	13-Dec-2021	14-Dec-2021	----	----		14-Dec-2021	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
INF-13-DEC-2021	E509	13-Dec-2021	14-Dec-2021	----	----		14-Dec-2021	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF-13-DEC-2021	E509	13-Dec-2021	14-Dec-2021	----	----		14-Dec-2021	28 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
DUP-13-DEC-2021	E421	13-Dec-2021	14-Dec-2021	----	----		14-Dec-2021	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-13-DEC-2021	E421	13-Dec-2021	14-Dec-2021	----	----		14-Dec-2021	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-13-DEC-2021	E421	13-Dec-2021	14-Dec-2021	----	----		14-Dec-2021	180 days	1 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
DUP-13-DEC-2021	E397	13-Dec-2021	----	----	----		14-Dec-2021	7 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-13-DEC-2021	E397	13-Dec-2021	----	----	----		14-Dec-2021	7 days	1 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
SRF-13-DEC-2021	E397	13-Dec-2021	----	----	----		14-Dec-2021	7 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
DUP-13-DEC-2021	E355-L	13-Dec-2021	13-Dec-2021	----	----		13-Dec-2021	28 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
INF-13-DEC-2021	E355-L	13-Dec-2021	13-Dec-2021	----	----		13-Dec-2021	28 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-13-DEC-2021	E355-L	13-Dec-2021	13-Dec-2021	----	----		13-Dec-2021	28 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP-13-DEC-2021	E290	13-Dec-2021	----	----	----		14-Dec-2021	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
INF-13-DEC-2021	E290	13-Dec-2021	----	----	----		14-Dec-2021	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-13-DEC-2021	E290	13-Dec-2021	----	----	----		14-Dec-2021	14 days	1 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
DUP-13-DEC-2021	E162	13-Dec-2021	----	----	----		15-Dec-2021	7 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE										
INF-13-DEC-2021	E162	13-Dec-2021	----	----	----		15-Dec-2021	7 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-13-DEC-2021	E162	13-Dec-2021	----	----	----		15-Dec-2021	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
DUP-13-DEC-2021	E160-H	13-Dec-2021	----	----	----		15-Dec-2021	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-13-DEC-2021	E160-H	13-Dec-2021	----	----	----		15-Dec-2021	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-13-DEC-2021	E160-H	13-Dec-2021	----	----	----		15-Dec-2021	7 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
DUP-13-DEC-2021	E121	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-13-DEC-2021	E121	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-13-DEC-2021	E121	13-Dec-2021	----	----	----		14-Dec-2021	3 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
DUP-13-DEC-2021	E508	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-13-DEC-2021	E508	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-13-DEC-2021	E508	13-Dec-2021	----	----	----		14-Dec-2021	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
DUP-13-DEC-2021	E420	13-Dec-2021	----	----	----		14-Dec-2021	180 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-13-DEC-2021	E420	13-Dec-2021	----	----	----		14-Dec-2021	180 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-13-DEC-2021	E420	13-Dec-2021	----	----	----		14-Dec-2021	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	367551	1	7	14.2	5.0	✓
Ammonia by Fluorescence	E298	366758	1	3	33.3	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	367814	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	367276	1	13	7.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	367272	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	366954	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	366994	1	4	25.0	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	367854	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	367271	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	367273	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	367274	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	367275	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	367193	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	366955	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	366995	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	366571	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	366768	1	20	5.0	5.0	✓
TSS by Gravimetry	E160-H	367208	1	4	25.0	5.0	✓
Turbidity by Nephelometry	E121	367393	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	367551	1	7	14.2	5.0	✓
Ammonia by Fluorescence	E298	366758	1	3	33.3	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	367814	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	367276	1	13	7.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	367272	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	366954	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	366994	1	4	25.0	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	367854	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	367271	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	367273	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	367274	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	367275	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	367193	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	366955	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	366995	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	366571	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	366768	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry	E160-H	367208	1	4	25.0	5.0	✓
Turbidity by Nephelometry	E121	367393	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	367551	1	7	14.2	5.0	✓
Ammonia by Fluorescence	E298	366758	1	3	33.3	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	367814	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	367276	1	13	7.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	367272	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	366954	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	366994	1	4	25.0	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	367854	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	367271	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	367273	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	367274	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	367275	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	367193	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	366955	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	366995	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	366571	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	366768	1	20	5.0	5.0	✓
TSS by Gravimetry	E160-H	367208	1	4	25.0	5.0	✓
Turbidity by Nephelometry	E121	367393	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	366758	1	3	33.3	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	367276	1	13	7.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	367272	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	366954	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	366994	1	4	25.0	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	367854	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	367271	1	13	7.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	367273	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	367274	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	367275	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	366955	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	366995	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	366571	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	366768	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160-H Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397 Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as $CaCO_3$), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2106683**	Page	: 1 of 16
Client	: Mount Polley Mining Corporation	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 13-Dec-2021 12:30
PO	: Not Submitted	Date Analysis Commenced	: 13-Dec-2021
C-O-C number	: ----	Issue Date	: 21-Dec-2021 08:26
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 367193)											
CG2106597-002	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	275	274	0.546%	20%	----
Physical Tests (QC Lot: 367208)											
CG2106664-002	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	11.0	10.4	0.6	Diff <2x LOR	----
Physical Tests (QC Lot: 367393)											
CG2106202-013	Anonymous	turbidity	----	E121	0.10	NTU	0.48	0.51	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 367551)											
CG2106683-001	SRF-13-DEC-2021	alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	224	237	5.73%	20%	----
Anions and Nutrients (QC Lot: 366758)											
CG2106683-001	SRF-13-DEC-2021	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	0.492	0.475	0.0170	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 366768)											
CG2106673-007	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0143	0.0139	0.0004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 367271)											
CG2106683-001	SRF-13-DEC-2021	fluoride	16984-48-8	E235.F	0.100	mg/L	0.202	0.196	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 367272)											
CG2106683-001	SRF-13-DEC-2021	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	2.88	2.82	0.06	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 367273)											
CG2106683-001	SRF-13-DEC-2021	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.108	0.108	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 367274)											
CG2106683-001	SRF-13-DEC-2021	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 367275)											
CG2106683-001	SRF-13-DEC-2021	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	618	617	0.161%	20%	----
Anions and Nutrients (QC Lot: 367276)											
CG2106683-001	SRF-13-DEC-2021	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 366571)											
CG2106683-001	SRF-13-DEC-2021	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	7.83	7.54	3.69%	20%	----
Dissolved Sulfides (QC Lot: 367854)											
CG2106593-001	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	0.0021	<0.0015	0.0006	Diff <2x LOR	----
Total Metals (QC Lot: 366955)											
CG2106405-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 366995)											
CG2106683-001	SRF-13-DEC-2021	aluminum, total	7429-90-5	E420	0.0150	mg/L	<0.0150	<0.0150	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 366995) - continued											
CG2106683-001	SRF-13-DEC-2021	antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00050	mg/L	0.00391	0.00379	0.00012	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00050	mg/L	0.0310	0.0302	2.73%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.050	mg/L	0.061	0.061	0.0005	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.250	mg/L	250	247	1.04%	20%	----
		chromium, total	7440-47-3	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00250	mg/L	0.00707	0.00672	0.00035	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.050	mg/L	0.088	0.086	0.002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.500	mg/L	40.4	40.1	0.778%	20%	----
		manganese, total	7439-96-5	E420	0.00050	mg/L	0.363	0.370	1.73%	20%	----
		molybdenum, total	7439-98-7	E420	0.000250	mg/L	0.00496	0.00496	0.0433%	20%	----
		nickel, total	7440-02-0	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.250	mg/L	1.96	1.88	0.078	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.500	mg/L	1.29	1.27	0.019	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000250	mg/L	0.000714	0.000643	0.000071	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.50	mg/L	10.0	9.79	2.39%	20%	----
		silver, total	7440-22-4	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.250	mg/L	12.6	12.4	1.51%	20%	----
		strontium, total	7440-24-6	E420	0.00100	mg/L	1.83	1.84	0.559%	20%	----
		sulfur, total	7704-34-9	E420	2.50	mg/L	202	202	0.495%	20%	----
		thallium, total	7440-28-0	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00250	mg/L	0.00268	0.00270	0.00002	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0150	mg/L	<0.0150	<0.0150	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 366954)											
CG2106464-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 366994)											
CG2106683-001	SRF-13-DEC-2021	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0053	0.0067	0.0014	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00371	0.00363	0.00008	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0296	0.0302	2.10%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	0.060	0.061	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	243	249	2.60%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	0.00218	0.00211	0.00007	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	0.057	0.057	0.000007	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.500	mg/L	38.9	40.9	5.02%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.363	0.367	1.08%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00321	0.00326	1.54%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	1.71	1.89	0.187	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.500	mg/L	1.25	1.27	0.017	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000250	mg/L	0.00647	0.00724	11.2%	20%	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	9.66	10.0	3.47%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	12.5	12.8	2.73%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	1.77	1.77	0.432%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	294	302	2.61%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	<0.000050	0.000053	0.000003	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 367814)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Aggregate Organics (QC Lot: 367814) - continued											
CG2106670-009	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 367193)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 367208)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 367393)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 367551)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 366758)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 366768)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 367271)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 367272)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 367273)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 367274)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 367275)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 367276)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 366571)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 367854)						
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 366955)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 366995)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 366995) - continued						
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 366954)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 366994)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 366994) - continued						
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 367814)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 367193)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.0	85.0	115	----
Physical Tests (QCLot: 367208)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	96.8	85.0	115	----
Physical Tests (QCLot: 367393)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 367551)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 366758)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	93.3	85.0	115	----
Anions and Nutrients (QCLot: 366768)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	94.1	80.0	120	----
Anions and Nutrients (QCLot: 367271)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 367272)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 367273)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 367274)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.9	90.0	110	----
Anions and Nutrients (QCLot: 367275)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 367276)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Organic / Inorganic Carbon (QCLot: 366571)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	109	80.0	120	----
Dissolved Sulfides (QCLot: 367854)									
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	0.08 mg/L	89.6	80.0	120	----
Total Metals (QCLot: 366955)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	91.0	80.0	120	----
Total Metals (QCLot: 366995)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 366995) - continued									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.3	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	99.9	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.0	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.5	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.9	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	94.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.5	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	108	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	105	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	97.9	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	106	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	97.6	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.5	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	99.8	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	109	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.7	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.9	80.0	120	----
Dissolved Metals (QCLot: 366994)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 366994) - continued									
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	107	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.3	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.3	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	100	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.7	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	113	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	107	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	107	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	105	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	110	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
Aggregate Organics (QCLot: 367814)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	# 79.2	85.0	115	LCS-ND

Qualifiers

Qualifier	Description
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 366758)										
CG2106683-002	INF-13-DEC-2021	ammonia, total (as N)	7664-41-7	E298	0.0973 mg/L	0.1 mg/L	97.3	75.0	125	----
Anions and Nutrients (QCLot: 366768)										
CG2106673-008	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0582 mg/L	0.0676 mg/L	86.1	70.0	130	----
Anions and Nutrients (QCLot: 367271)										
CG2106683-002	INF-13-DEC-2021	fluoride	16984-48-8	E235.F	0.936 mg/L	1 mg/L	93.6	75.0	125	----
Anions and Nutrients (QCLot: 367272)										
CG2106683-002	INF-13-DEC-2021	chloride	16887-00-6	E235.Cl-L	95.7 mg/L	100 mg/L	95.7	75.0	125	----
Anions and Nutrients (QCLot: 367273)										
CG2106683-002	INF-13-DEC-2021	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 367274)										
CG2106683-002	INF-13-DEC-2021	nitrite (as N)	14797-65-0	E235.NO2-L	0.467 mg/L	0.5 mg/L	93.4	75.0	125	----
Anions and Nutrients (QCLot: 367275)										
CG2106683-002	INF-13-DEC-2021	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 367276)										
CG2106683-002	INF-13-DEC-2021	bromide	24959-67-9	E235.Br-L	0.409 mg/L	0.5 mg/L	81.9	75.0	125	----
Organic / Inorganic Carbon (QCLot: 366571)										
CG2106683-001	SRF-13-DEC-2021	carbon, total organic [TOC]	----	E355-L	27.7 mg/L	23.9 mg/L	116	70.0	130	----
Dissolved Sulfides (QCLot: 367854)										
CG2106593-002	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.0950 mg/L	0.1 mg/L	95.0	75.0	125	----
Total Metals (QCLot: 366955)										
CG2106405-002	Anonymous	mercury, total	7439-97-6	E508	0.0000988 mg/L	0.0001 mg/L	98.8	70.0	130	----
Total Metals (QCLot: 366995)										
CG2106683-001	SRF-13-DEC-2021	aluminum, total	7429-90-5	E420	2.08 mg/L	2 mg/L	104	70.0	130	----
		antimony, total	7440-36-0	E420	0.239 mg/L	0.2 mg/L	120	70.0	130	----
		arsenic, total	7440-38-2	E420	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		barium, total	7440-39-3	E420	0.211 mg/L	0.2 mg/L	106	70.0	130	----
		beryllium, total	7440-41-7	E420	0.415 mg/L	0.4 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.109 mg/L	0.1 mg/L	109	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 366995) - continued										
CG2106683-001	SRF-13-DEC-2021	boron, total	7440-42-8	E420	1.09 mg/L	1 mg/L	109	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0443 mg/L	0.04 mg/L	111	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.424 mg/L	0.4 mg/L	106	70.0	130	----
		cobalt, total	7440-48-4	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		copper, total	7440-50-8	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		iron, total	7439-89-6	E420	21.4 mg/L	20 mg/L	107	70.0	130	----
		lead, total	7439-92-1	E420	0.219 mg/L	0.2 mg/L	109	70.0	130	----
		lithium, total	7439-93-2	E420	0.999 mg/L	1 mg/L	99.9	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.230 mg/L	0.2 mg/L	115	70.0	130	----
		nickel, total	7440-02-0	E420	0.430 mg/L	0.4 mg/L	107	70.0	130	----
		phosphorus, total	7723-14-0	E420	100 mg/L	100 mg/L	100	70.0	130	----
		potassium, total	7440-09-7	E420	42.5 mg/L	40 mg/L	106	70.0	130	----
		selenium, total	7782-49-2	E420	0.428 mg/L	0.4 mg/L	107	70.0	130	----
		silicon, total	7440-21-3	E420	102 mg/L	100 mg/L	102	70.0	130	----
		silver, total	7440-22-4	E420	0.0447 mg/L	0.04 mg/L	112	70.0	130	----
		sodium, total	7440-23-5	E420	24.1 mg/L	20 mg/L	120	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0456 mg/L	0.04 mg/L	114	70.0	130	----
		tin, total	7440-31-5	E420	0.223 mg/L	0.2 mg/L	112	70.0	130	----
		titanium, total	7440-32-6	E420	0.403 mg/L	0.4 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	0.0469 mg/L	0.04 mg/L	117	70.0	130	----
		vanadium, total	7440-62-2	E420	1.08 mg/L	1 mg/L	108	70.0	130	----
		zinc, total	7440-66-6	E420	4.25 mg/L	4 mg/L	106	70.0	130	----
		zirconium, total	7440-67-7	E420	0.447 mg/L	0.4 mg/L	112	70.0	130	----
Dissolved Metals (QCLot: 366954)										
CG2106464-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000109 mg/L	0.0001 mg/L	109	70.0	130	----
Dissolved Metals (QCLot: 366994)										
CG2106683-001	SRF-13-DEC-2021	aluminum, dissolved	7429-90-5	E421	1.84 mg/L	2 mg/L	91.8	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.177 mg/L	0.2 mg/L	88.6	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.180 mg/L	0.2 mg/L	90.1	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.363 mg/L	0.4 mg/L	90.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 366994) - continued										
CG2106683-001	SRF-13-DEC-2021	bismuth, dissolved	7440-69-9	E421	0.0867 mg/L	0.1 mg/L	86.7	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.942 mg/L	1 mg/L	94.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.361 mg/L	0.4 mg/L	90.2	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.180 mg/L	0.2 mg/L	90.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.174 mg/L	0.2 mg/L	87.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.1 mg/L	20 mg/L	90.6	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.892 mg/L	1 mg/L	89.2	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.195 mg/L	0.2 mg/L	97.6	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.367 mg/L	0.4 mg/L	91.8	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	87.8 mg/L	100 mg/L	87.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	36.8 mg/L	40 mg/L	92.1	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.372 mg/L	0.4 mg/L	93.0	70.0	130	----
		silicon, dissolved	7440-21-3	E421	86.8 mg/L	100 mg/L	86.8	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0348 mg/L	0.04 mg/L	87.0	70.0	130	----
		sodium, dissolved	7440-23-5	E421	18.9 mg/L	20 mg/L	94.6	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0395 mg/L	0.04 mg/L	98.7	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.191 mg/L	0.2 mg/L	95.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.348 mg/L	0.4 mg/L	87.1	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.912 mg/L	1 mg/L	91.2	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.68 mg/L	4 mg/L	92.1	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.377 mg/L	0.4 mg/L	94.3	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-13-Dec-2021	13-Dec-21	10:50	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-13-Dec-2021	13-Dec-21	11:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	DUP-13-Dec-2021	13-Dec-21	10:50	Water	x	x	x	x	x	x	x	x	x	x	x	x	

Environmental Division
Calgary
Work Order Reference
CG2106683

Telephone: 1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Hg for Dup had preservative spilled, please preserve again @ lab if needed.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			12/13	12:30	5			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2106975**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 299 5600	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 20-Dec-2021 11:30
PO	: 5500052166	Date Analysis Commenced	: 20-Dec-2021
C-O-C number	: ----	Issue Date	: 28-Dec-2021 17:34
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SRF-20-DEC-2021**	**----**	**----**	**----**	**----**
					Client sampling date / time	20-Dec-2021 10:20	----	----	----	----
						CG2106975-001	--------	--------	--------	--------
						Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.86	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00129	----	----	----	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000897	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **CG2106975**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 20-Dec-2021 11:30
PO	: 5500052166	Date Analysis Commenced	: 20-Dec-2021
C-O-C number	: ----	Issue Date	: 28-Dec-2021 17:34
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 373010)											
CG2106975-001	SRF-20-DEC-2021	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.86	5.11	0.24	Diff <2x LOR	----
Total Metals (QC Lot: 374442)											
CG2106975-001	SRF-20-DEC-2021	selenium, total	7782-49-2	E420	0.000050	mg/L	0.00129	0.00138	6.82%	20%	----
Dissolved Metals (QC Lot: 374555)											
CG2106975-001	SRF-20-DEC-2021	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000897	0.000865	3.66%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 373010)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 374442)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 374555)						
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 373010)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	100	80.0	120	----
Total Metals (QCLot: 374442)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.8	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.6	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 373010)										
CG2106975-001	SRF-20-DEC-2021	carbon, total organic [TOC]	----	E355-L	23.7 mg/L	23.9 mg/L	99.0	70.0	130	----
Total Metals (QCLot: 374442)										
CG2106975-001	SRF-20-DEC-2021	selenium, total	7782-49-2	E420	0.466 mg/L	0.4 mg/L	116	70.0	130	----
Dissolved Metals (QCLot: 374555)										
CG2106975-001	SRF-20-DEC-2021	selenium, dissolved	7782-49-2	E421	0.423 mg/L	0.4 mg/L	106	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

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Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-20-Dec-2021	20-Dec-21	10:20	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2106975

Telephone: +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
					17		DEC 20, 202 11:30 AM	

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2107219**	Page	: 1 of 3
Amendment	: **1**		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Dec-2021 12:45
PO	:	Date Analysis Commenced	: 28-Dec-2021
C-O-C number	: ----	Issue Date	: 11-Jan-2022 11:42
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

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Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-28-Dec-2021	----	----	----	----
					Client sampling date / time	28-Dec-2021 11:05	----	----	----	----
					CG2107219-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.48	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000514	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00102 DTC	----	----	----	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.0112 DTC	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2107219**	Page	: 1 of 4
Amendment	: 1		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Dec-2021 12:45
PO	:	Issue Date	: 11-Jan-2022 11:42
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-28-Dec-2021	E421	28-Dec-2021	29-Dec-2021	----	----		29-Dec-2021	180 days	1 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-28-Dec-2021	E423BSe	28-Dec-2021	09-Jan-2022	----	----		10-Jan-2022	180 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-28-Dec-2021	E355-L	28-Dec-2021	28-Dec-2021	----	----		29-Dec-2021	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-28-Dec-2021	E420	28-Dec-2021	----	----	----		29-Dec-2021	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	383333	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377971	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	378009	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	377421	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	383333	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377971	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	378009	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	377421	1	10	10.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	383333	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377971	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	378009	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	377421	1	10	10.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	383333	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377971	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	378009	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	377421	1	10	10.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2107219**	Page	: 1 of 4
Amendment	: **1**		

Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Dec-2021 12:45
PO	:	Date Analysis Commenced	: 28-Dec-2021
C-O-C number	: ----	Issue Date	: 11-Jan-2022 11:42
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 377421)											
CG2107202-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 378009)											
CG2107190-009	Anonymous	selenium, total	7782-49-2	E420	0.250	mg/L	7.28 µg/L	0.00734	0.936%	20%	----
Dissolved Metals (QC Lot: 377971)											
CG2107190-015	Anonymous	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 383333)											
CG2107219-001	SRF-28-Dec-2021	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000514	0.000518	0.753%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 377421)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 378009)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 377971)						
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 383333)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 377421)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	114	80.0	120	----
Total Metals (QCLot: 378009)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	87.2	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.8	80.0	120	----
Dissolved Metals (QCLot: 383333)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	103	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 377421)										
CG2107202-001	Anonymous	carbon, total organic [TOC]	----	E355-L	26.0 mg/L	23.9 mg/L	109	70.0	130	----
Total Metals (QCLot: 378009)										
CG2107190-009	Anonymous	selenium, total	7782-49-2	E420	0.438 mg/L	0.4 mg/L	110	70.0	130	----
Dissolved Metals (QCLot: 377971)										
CG2107190-015	Anonymous	selenium, dissolved	7782-49-2	E421	0.334 mg/L	0.4 mg/L	83.6	70.0	130	----
Dissolved Metals (QCLot: 383333)										
FJ2200028-001	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**				**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:				○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427			
Contact:		PO / AFE:				
Address:		Legal Site Description:				
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001			
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-28-Dec-2021	28-Dec-21	11:05	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2107219

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
		AMAN	12-28-2021	12:45 pm	10.12C			

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidy	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-28-Dec-2021	28-Dec-21	11:05	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2107219

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by: AMAN	Date: 12-28-2021	Time: 12:45 pm	Temperature: 10.12C	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2200043**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Jan-2022 15:55
PO	: 5500052166	Date Analysis Commenced	: 05-Jan-2022
C-O-C number	: ----	Issue Date	: 11-Jan-2022 17:55
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Baxter		Metals, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTSE	*Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-4-Jan-2022	Eff-4-Jan-2022-Old	Eff-4-Jan-2022-New	----	----
					Client sampling date / time	04-Jan-2022 10:30	04-Jan-2022 13:00	04-Jan-2022 13:00	----	----
						CG2200043-001	CG2200043-002	CG2200043-003	--------	--------
						Result	Result	Result	----	----
Anions and Nutrients										
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		702	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.87	----	----	----	----
Total Sulfides										
sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L		----	0.319	5.34	----	----
sulfide, total (as H2S)	7783-06-4	E395	0.0016	mg/L		----	0.339	5.68	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		<0.000250 DTSE, RRV	----	----	----	----
Dissolved Metals										
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00344 DTSE	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2200043**	Page	: 1 of 4
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Jan-2022 15:55
PO	: 5500052166	Issue Date	: 11-Jan-2022 17:55
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-4-Jan-2022	E235.SO4-L	04-Jan-2022	----	----	----		05-Jan-2022	28 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-4-Jan-2022	E421	04-Jan-2022	06-Jan-2022	----	----		06-Jan-2022	180 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-4-Jan-2022	E355-L	04-Jan-2022	05-Jan-2022	----	----		05-Jan-2022	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-4-Jan-2022	E420	04-Jan-2022	----	----	----		06-Jan-2022	180 days	2 days	✓
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
Eff-4-Jan-2022-New	E395	04-Jan-2022	----	----	----		10-Jan-2022	7 days	6 days	✓
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
Eff-4-Jan-2022-Old	E395	04-Jan-2022	----	----	----		10-Jan-2022	7 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	381489	1	1	100.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	380734	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	381490	1	5	20.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	380776	1	7	14.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	383550	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	381489	1	1	100.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	380734	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	381490	1	5	20.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	380776	1	7	14.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	383550	1	18	5.5	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	381489	1	1	100.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	380734	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	381490	1	5	20.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	380776	1	7	14.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	383550	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	381489	1	1	100.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	380734	0	1	0.0	5.0	×
Total Metals in Water by CRC ICPMS	E420	381490	1	5	20.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	380776	1	7	14.2	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	383550	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Sulfide by Colourimetry (Automated Flow)	E395 Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the total sulfide concentration in the sample. The H_2S calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO_3.

QUALITY CONTROL REPORT

Work Order	: **CG2200043**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Jan-2022 15:55
PO	: 5500052166	Date Analysis Commenced	: 05-Jan-2022
C-O-C number	: ----	Issue Date	: 11-Jan-2022 17:55
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Baxter		Metals, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 380734)											
CG2200043-001	SRF-4-Jan-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	702	704	0.323%	20%	----
Organic / Inorganic Carbon (QC Lot: 380776)											
CG2200043-001	SRF-4-Jan-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.87	5.89	0.400%	20%	----
Total Sulfides (QC Lot: 383550)											
CG2200043-002	Eff-4-Jan-2022-Old	sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	0.319	0.322	0.848%	20%	----
Total Metals (QC Lot: 381490)											
CG2200011-009	Anonymous	selenium, total	7782-49-2	E420	0.250	mg/L	7.82 µg/L	0.00800	2.31%	20%	----
Dissolved Metals (QC Lot: 381489)											
CG2200011-015	Anonymous	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 380734)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 380776)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Sulfides (QCLot: 383550)						
sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 381490)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 381489)						
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 380734)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	100	90.0	110	----
Organic / Inorganic Carbon (QCLot: 380776)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	110	80.0	120	----
Total Sulfides (QCLot: 383550)									
sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	0.08 mg/L	86.0	80.0	120	----
Total Metals (QCLot: 381490)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	92.0	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	94.0	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 380776)										
CG2200043-001	SRF-4-Jan-2022	carbon, total organic [TOC]	----	E355-L	25.8 mg/L	23.9 mg/L	108	70.0	130	----
Total Sulfides (QCLot: 383550)										
CG2200043-003	Eff-4-Jan-2022-New	sulfide, total (as S)	18496-25-8	E395	9.76 mg/L	10 mg/L	97.6	75.0	125	----
Total Metals (QCLot: 381490)										
CG2200011-009	Anonymous	selenium, total	7782-49-2	E420	0.348 mg/L	0.4 mg/L	86.9	70.0	130	----
Dissolved Metals (QCLot: 381489)										
CG2200011-015	Anonymous	selenium, dissolved	7782-49-2	E421	0.348 mg/L	0.4 mg/L	87.1	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-4-Jan-2022	04-Jan-22	10:10	Water	X					X	X					X	
	Eff-4-Jan-2022-Old	04-Jan-22	11:00	"			X										
	Eff-4-Jan-2022-New	04-Jan-22	11:00	"			X										

Environmental Division
Calgary
Work Order Reference
CG2200043

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			4	3:55pm				

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2200235**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 10-Jan-2022 12:00
PO	:	Date Analysis Commenced	: 11-Jan-2022
C-O-C number	: ----	Issue Date	: 19-Jan-2022 07:03
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Dissolved selenium results higher than total likely due to presence of volatile selenium; matrix matched dissolved selenium test is recommended.

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: SRF-10-JAN-2022	----	----	----	----
Client sampling date / time					10-Jan-2022 10:15	----	----	----	----
					CG2200235-001	--------	--------	--------	--------
					Result	----	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.35	----	----	----	----
Total Metals									
selenium, total	7782-49-2	E420	0.000050	mg/L	0.00112 DTC	----	----	----	----
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00592 DTC	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2200235**	Page	: 1 of 4
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 10-Jan-2022 12:00
PO	:	Issue Date	: 19-Jan-2022 07:03
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
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LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-10-JAN-2022	E421	10-Jan-2022	11-Jan-2022	----	----		11-Jan-2022	180 days	1 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-10-JAN-2022	E355-L	10-Jan-2022	11-Jan-2022	----	----		12-Jan-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-10-JAN-2022	E420	10-Jan-2022	----	----	----		12-Jan-2022	180 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	384153	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	385029	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	384514	1	5	20.0	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	384153	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	385029	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	384514	1	5	20.0	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	384153	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	385029	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	384514	1	5	20.0	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	384153	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	385029	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	384514	1	5	20.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO_3.

QUALITY CONTROL REPORT

Work Order	: **CG2200235**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 10-Jan-2022 12:00
PO	:	Date Analysis Commenced	: 11-Jan-2022
C-O-C number	: ----	Issue Date	: 19-Jan-2022 07:03
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 384514)											
CG2200235-001	SRF-10-JAN-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.35	4.69	0.34	Diff <2x LOR	----
Total Metals (QC Lot: 385029)											
CG2200235-001	SRF-10-JAN-2022	selenium, total	7782-49-2	E420	0.000050	mg/L	0.00112	0.00104	7.55%	20%	----
Dissolved Metals (QC Lot: 384153)											
CG2200196-002	Anonymous	selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.0222	0.0228	2.81%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 384514)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 385029)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 384153)						
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 384514)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	91.7	80.0	120	----
Total Metals (QCLot: 385029)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.2	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 384514)										
CG2200235-001	SRF-10-JAN-2022	carbon, total organic [TOC]	----	E355-L	4.89 mg/L	5 mg/L	97.9	70.0	130	----
Total Metals (QCLot: 385029)										
CG2200279-005	Anonymous	selenium, total	7782-49-2	E420	0.446 mg/L	0.4 mg/L	112	70.0	130	----
Dissolved Metals (QCLot: 384153)										
CG2200204-015	Anonymous	selenium, dissolved	7782-49-2	E421	0.379 mg/L	0.4 mg/L	94.8	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**				**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:				○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427			
Contact:		PO / AFE:				
Address:		Legal Site Description:				
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001			
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-10-Jan-2022	10-Jan-22	11:15	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2200235

Telephone: +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
					9C		Jan 10, 2022 1:00pm	

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2200510**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 17-Jan-2022 15:20
PO	:	Date Analysis Commenced	: 18-Jan-2022
C-O-C number	: ----	Issue Date	: 26-Jan-2022 15:28
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Olivia Gu	Lab Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLB	*Detection Limit Raised. Analyte detected at comparable level in Method Blank.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-17-JAN-2022	INF-17-JAN-2022	----	----	----
					Client sampling date / time	17-Jan-2022 10:18	17-Jan-2022 10:45	----	----	----
						CG2200510-001	CG2200510-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		123	83.3	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		123	83.3	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		824	821	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		842	843	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1230	990	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		6.9	3.5	----	----	----
turbidity	----	E121	0.10	NTU		1.85	<0.10	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.609	0.0067	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		3.64	2.40	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.175	0.145	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0640	6.54	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.69 DLHC	0.0076	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		757	751	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.45	4.48	----	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L		1.14	0.0018	----	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397	0.0016	mg/L		1.21	0.0019	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0082	0.0072	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00043	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00210	0.00131	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0301	0.0361	----	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000020	<0.000020	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SRF-17-JAN-2022	INF-17-JAN-2022	----	----	----
					Client sampling date / time	17-Jan-2022 10:18	17-Jan-2022 10:45	----	----	----
Analyte	CAS Number	Method	LOR	Unit		CG2200510-001	CG2200510-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.062	0.060	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000828	0.0000564	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		259	255	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00049	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.0172	0.0164	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.330	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000111	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0030	0.0034	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		47.5	50.0	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.364	0.00044	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		0.0000094 RRV	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0103	0.0787	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		1.90	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.25	1.43	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000858 DTC	0.105	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		8.60	5.88	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		15.0	14.6	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		1.87	2.26	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		270	271	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000048	0.00102	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00182 DLB	0.00099 DLB	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0032	0.0072	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Dissolved Metals										

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-17-JAN-2022	INF-17-JAN-2022	----	----	----
					Client sampling date / time	17-Jan-2022 10:18	17-Jan-2022 10:45	----	----	----
						CG2200510-001	CG2200510-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0085	0.0102	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00050	<0.00050	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00185	0.00110	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0295	0.0338	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000250	<0.000250	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.063	0.062	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000356	0.0000408	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		253	248	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00250	<0.00250	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00050	<0.00050	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00760	0.0164	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.296	<0.050	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000250	<0.000250	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0050	<0.0050	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		46.7	49.0	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.346	<0.00050	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		0.0000091 RRV	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0101	0.0773	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00250	<0.00250	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.90	<0.250	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.23	1.40	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00197 DTC	0.0861	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		8.28	5.59	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000050	<0.000050	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		13.5	13.1	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		1.91	2.28	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		249	238	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000050	<0.000050	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00050	<0.00050	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00150	<0.00150	----	----	----

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					Client sample ID	SRF-17-JAN-2022	INF-17-JAN-2022	----	----	----
					Client sampling date / time	17-Jan-2022 10:18	17-Jan-2022 10:45	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**CG2200510-001**	**CG2200510-002**	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		<0.000050	0.000882	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00250	<0.00250	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050	0.0062	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		<0.00150	<0.00150	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	<2.0	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2200510**	Page	: 1 of 12
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 17-Jan-2022 15:20
PO	:	Issue Date	: 26-Jan-2022 15:28
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-389021-001	----	vanadium, total	7440-62-2	E420	0.00076 MB-LOR mg/L	0.0005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-17-JAN-2022	E550	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF-17-JAN-2022	E550	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-17-JAN-2022	E298	17-Jan-2022	18-Jan-2022	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF-17-JAN-2022	E298	17-Jan-2022	18-Jan-2022	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-17-JAN-2022	E235.Br-L	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF-17-JAN-2022	E235.Br-L	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-17-JAN-2022	E235.Cl-L	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF-17-JAN-2022	E235.Cl-L	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-17-JAN-2022	E235.F	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF-17-JAN-2022	E235.F	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-17-JAN-2022	E235.NO3-L	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-17-JAN-2022	E235.NO3-L	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-17-JAN-2022	E235.NO2-L	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-17-JAN-2022	E235.NO2-L	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-17-JAN-2022	E235.SO4-L	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-17-JAN-2022	E235.SO4-L	17-Jan-2022	----	----	----		18-Jan-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
INF-17-JAN-2022	E372-U	17-Jan-2022	19-Jan-2022	----	----		19-Jan-2022	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SRF-17-JAN-2022	E372-U	17-Jan-2022	19-Jan-2022	----	----		19-Jan-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
INF-17-JAN-2022	E509	17-Jan-2022	25-Jan-2022	----	----		25-Jan-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF-17-JAN-2022	E509	17-Jan-2022	25-Jan-2022	----	----		25-Jan-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-17-JAN-2022	E421	17-Jan-2022	18-Jan-2022	----	----		18-Jan-2022	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-17-JAN-2022	E421	17-Jan-2022	18-Jan-2022	----	----		18-Jan-2022	180 days	1 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-17-JAN-2022	E397	17-Jan-2022	----	----	----		20-Jan-2022	7 days	3 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
SRF-17-JAN-2022	E397	17-Jan-2022	----	----	----		20-Jan-2022	7 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
INF-17-JAN-2022	E355-L	17-Jan-2022	18-Jan-2022	----	----		18-Jan-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-17-JAN-2022	E355-L	17-Jan-2022	18-Jan-2022	----	----		18-Jan-2022	28 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
INF-17-JAN-2022	E290	17-Jan-2022	----	----	----		18-Jan-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-17-JAN-2022	E290	17-Jan-2022	----	----	----		18-Jan-2022	14 days	1 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
INF-17-JAN-2022	E162	17-Jan-2022	----	----	----		23-Jan-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-17-JAN-2022	E162	17-Jan-2022	----	----	----		23-Jan-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-17-JAN-2022	E160	17-Jan-2022	----	----	----		24-Jan-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-17-JAN-2022	E160	17-Jan-2022	----	----	----		24-Jan-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-17-JAN-2022	E121	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-17-JAN-2022	E121	17-Jan-2022	----	----	----		18-Jan-2022	3 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-17-JAN-2022	E508	17-Jan-2022	----	----	----		25-Jan-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-17-JAN-2022	E508	17-Jan-2022	----	----	----		25-Jan-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-17-JAN-2022	E420	17-Jan-2022	----	----	----		18-Jan-2022	180 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-17-JAN-2022	E420	17-Jan-2022	----	----	----		18-Jan-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	389187	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	389195	1	18	5.5	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	389625	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	389357	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	389358	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	394011	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	389033	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	391007	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	389362	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	389359	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	389360	1	15	6.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	389361	1	4	25.0	5.0	✓
TDS by Gravimetry	E162	390024	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	394016	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	389021	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	389279	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	389394	1	3	33.3	5.0	✓
TSS by Gravimetry	E160	390028	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	389351	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	389187	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	389195	1	18	5.5	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	389625	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	389357	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	389358	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	394011	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	389033	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	391007	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	389362	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	389359	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	389360	1	15	6.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	389361	1	4	25.0	5.0	✓
TDS by Gravimetry	E162	390024	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	394016	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	389021	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	389279	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	389394	1	3	33.3	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry	E160	390028	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	389351	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	389187	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	389195	1	18	5.5	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	389625	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	389357	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	389358	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	394011	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	389033	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	391007	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	389362	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	389359	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	389360	1	15	6.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	389361	1	4	25.0	5.0	✓
TDS by Gravimetry	E162	390024	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	394016	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	389021	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	389279	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	389394	1	3	33.3	5.0	✓
TSS by Gravimetry	E160	390028	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	389351	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	389195	1	18	5.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	389357	1	15	6.6	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	389358	1	15	6.6	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	394011	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	389033	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	391007	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	389362	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	389359	1	15	6.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	389360	1	15	6.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	389361	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	394016	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	389021	1	11	9.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	389279	1	8	12.5	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	389394	1	3	33.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397 Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as $CaCO_3$), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2200510**	Page	: 1 of 17
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 17-Jan-2022 15:20
PO	:	Date Analysis Commenced	: 18-Jan-2022
C-O-C number	: ----	Issue Date	: 26-Jan-2022 15:28
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Olivia Gu	Lab Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 389187)											
CG2200501-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	539	528	2.12%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	539	528	2.12%	20%	----
Physical Tests (QC Lot: 389351)											
CG2200499-001	Anonymous	turbidity	----	E121	0.10	NTU	0.90	0.86	0.04	Diff <2x LOR	----
Physical Tests (QC Lot: 390024)											
CG2200510-001	SRF-17-JAN-2022	solids, total dissolved [TDS]	----	E162	20	mg/L	1230	1200	2.58%	20%	----
Physical Tests (QC Lot: 390028)											
FJ2200106-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	20.5	18.9	1.6	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 389195)											
CG2200501-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	2.23	2.21	0.922%	20%	----
Anions and Nutrients (QC Lot: 389357)											
CG2200510-001	SRF-17-JAN-2022	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 389358)											
CG2200510-001	SRF-17-JAN-2022	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	3.64	3.53	0.11	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 389359)											
CG2200510-001	SRF-17-JAN-2022	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.0640	0.0614	0.0026	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 389360)											
CG2200510-001	SRF-17-JAN-2022	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 389361)											
CG2200510-001	SRF-17-JAN-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	757	756	0.127%	20%	----
Anions and Nutrients (QC Lot: 389362)											
CG2200510-001	SRF-17-JAN-2022	fluoride	16984-48-8	E235.F	0.100	mg/L	0.175	0.174	0.0004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 389394)											
CG2200510-001	SRF-17-JAN-2022	phosphorus, total	7723-14-0	E372-U	0.0400	mg/L	1.69	1.70	0.212%	20%	----
Organic / Inorganic Carbon (QC Lot: 389279)											
CG2200510-001	SRF-17-JAN-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.45	4.50	0.04	Diff <2x LOR	----
Dissolved Sulfides (QC Lot: 391007)											
CG2200503-001	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	<0.0015	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 389021)											
CG2200463-011	Anonymous	aluminum, total	7429-90-5	E420	0.0150	mg/L	<0.0150	<0.0150	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00050	mg/L	0.00068	<0.00050	0.00018	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00050	mg/L	0.0109	0.0110	0.612%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000250	mg/L	0.000472	0.000531	11.7%	20%	----
		calcium, total	7440-70-2	E420	0.250	mg/L	278	269	3.24%	20%	----
		chromium, total	7440-47-3	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00050	mg/L	0.0151	0.0151	0.465%	20%	----
		copper, total	7440-50-8	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.050	mg/L	0.142	0.140	0.002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0050	mg/L	0.0615	0.0622	1.03%	20%	----
		magnesium, total	7439-95-4	E420	0.0250	mg/L	169	170	0.678%	20%	----
		manganese, total	7439-96-5	E420	0.00050	mg/L	0.417	0.416	0.167%	20%	----
		molybdenum, total	7439-98-7	E420	0.000250	mg/L	0.0192	0.0188	2.05%	20%	----
		nickel, total	7440-02-0	E420	0.00250	mg/L	0.0579	0.0576	0.392%	20%	----
		phosphorus, total	7723-14-0	E420	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.250	mg/L	4.23	4.24	0.199%	20%	----
		selenium, total	7782-49-2	E420	0.250	mg/L	8.41 µg/L	0.00902	6.97%	20%	----
		silicon, total	7440-21-3	E420	0.50	mg/L	2.91	2.94	0.04	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.250	mg/L	7.15	7.19	0.614%	20%	----
		strontium, total	7440-24-6	E420	0.00100	mg/L	0.364	0.349	4.16%	20%	----
		sulfur, total	7704-34-9	E420	2.50	mg/L	298	301	0.871%	20%	----
		thallium, total	7440-28-0	E420	0.000050	mg/L	0.000110	0.000094	0.000015	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000050	mg/L	0.0129	0.0129	0.146%	20%	----
		vanadium, total	7440-62-2	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0150	mg/L	0.0230	0.0216	0.0014	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Total Metals (QC Lot: 394016)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 394016) - continued											
CG2200454-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000111	0.0000087	0.0000024	Diff <2x LOR	----
Dissolved Metals (QC Lot: 389033)											
CG2200494-014	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0064	0.0059	0.0006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	0.00125	<0.00050	0.00075	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00126	<0.00050	0.00076	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0641	0.0635	0.888%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	0.0000900	0.0000950	0.0000050	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	264	270	2.40%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	0.000528	<0.000250	0.000278	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0296	0.0304	0.0008	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	173	169	2.82%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00136	0.00110	0.000258	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	0.00292	0.00308	0.00016	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	2.60	2.55	2.01%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000250	mg/L	0.161	0.159	0.960%	20%	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	4.00	3.94	1.48%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	0.000092	<0.000050	0.000042	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	3.29	3.27	0.526%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	0.234	0.231	1.44%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	286	283	1.09%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.00837	0.00828	1.09%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 389033) - continued											
CG2200494-014	Anonymous	zirconium, dissolved	7440-67-7	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 394011)											
CG2200510-001	SRF-17-JAN-2022	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	0.0000091	0.0000096	0.0000004	Diff <2x LOR	----
Aggregate Organics (QC Lot: 389625)											
CG2200503-006	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 389187)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 389351)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 390024)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 390028)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 389195)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 389357)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 389358)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 389359)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 389360)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 389361)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 389362)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 389394)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 389279)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 391007)						
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 389021)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 389021) - continued						
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	# 0.00076	MB-LOR
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 394016)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 389033)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 389033) - continued						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 394011)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 389625)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 389187)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	106	85.0	115	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 389351)									
turbidity	----	E121	0.1	NTU	200 NTU	94.8	85.0	115	----
Physical Tests (QCLot: 390024)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.2	85.0	115	----
Physical Tests (QCLot: 390028)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 389195)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.4	85.0	115	----
Anions and Nutrients (QCLot: 389357)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	98.5	85.0	115	----
Anions and Nutrients (QCLot: 389358)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 389359)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 389360)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 389361)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 389362)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.2	90.0	110	----
Anions and Nutrients (QCLot: 389394)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 389279)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	99.4	80.0	120	----
Dissolved Sulfides (QCLot: 391007)									
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	0.08 mg/L	98.1	80.0	120	----
Total Metals (QCLot: 389021)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 389021) - continued									
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.9	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.2	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.9	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	113	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.0	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	108	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	107	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.7	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	112	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	89.9	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	110	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.4	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.6	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	91.9	80.0	120	----
Total Metals (QCLot: 394016)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	91.8	80.0	120	----
Dissolved Metals (QCLot: 389033)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 389033) - continued									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.1	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	103	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.4	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	114	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	106	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	96.4	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.5	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	100	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.4	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	92.2	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.8	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.7	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	93.3	80.0	120	----
Aggregate Organics (QCLot: 389625)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	88.5	85.0	115	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 389195)										
CG2200501-005	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0924 mg/L	0.1 mg/L	92.4	75.0	125	----
Anions and Nutrients (QCLot: 389357)										
CG2200546-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.537 mg/L	0.5 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 389358)										
CG2200546-001	Anonymous	chloride	16887-00-6	E235.Cl-L	109 mg/L	100 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 389359)										
CG2200546-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.73 mg/L	2.5 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 389360)										
CG2200546-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.547 mg/L	0.5 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 389361)										
CG2200546-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4-L	111 mg/L	100 mg/L	111	75.0	125	----
Anions and Nutrients (QCLot: 389362)										
CG2200546-001	Anonymous	fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 389394)										
CG2200510-002	INF-17-JAN-2022	phosphorus, total	7723-14-0	E372-U	0.0589 mg/L	0.0676 mg/L	87.1	70.0	130	----
Organic / Inorganic Carbon (QCLot: 389279)										
CG2200510-001	SRF-17-JAN-2022	carbon, total organic [TOC]	----	E355-L	5.21 mg/L	5 mg/L	104	70.0	130	----
Dissolved Sulfides (QCLot: 391007)										
CG2200503-002	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.106 mg/L	0.1 mg/L	106	75.0	125	----
Total Metals (QCLot: 389021)										
CG2200463-011	Anonymous	aluminum, total	7429-90-5	E420	2.35 mg/L	2 mg/L	117	70.0	130	----
		antimony, total	7440-36-0	E420	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----
		arsenic, total	7440-38-2	E420	0.225 mg/L	0.2 mg/L	112	70.0	130	----
		barium, total	7440-39-3	E420	0.224 mg/L	0.2 mg/L	112	70.0	130	----
		beryllium, total	7440-41-7	E420	0.444 mg/L	0.4 mg/L	111	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0942 mg/L	0.1 mg/L	94.2	70.0	130	----
		boron, total	7440-42-8	E420	1.05 mg/L	1 mg/L	105	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0449 mg/L	0.04 mg/L	112	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 389021) - continued										
CG2200463-011	Anonymous	calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.466 mg/L	0.4 mg/L	116	70.0	130	----
		cobalt, total	7440-48-4	E420	0.232 mg/L	0.2 mg/L	116	70.0	130	----
		copper, total	7440-50-8	E420	0.224 mg/L	0.2 mg/L	112	70.0	130	----
		iron, total	7439-89-6	E420	23.2 mg/L	20 mg/L	116	70.0	130	----
		lead, total	7439-92-1	E420	0.192 mg/L	0.2 mg/L	96.3	70.0	130	----
		lithium, total	7439-93-2	E420	1.17 mg/L	1 mg/L	117	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.221 mg/L	0.2 mg/L	111	70.0	130	----
		nickel, total	7440-02-0	E420	0.465 mg/L	0.4 mg/L	116	70.0	130	----
		phosphorus, total	7723-14-0	E420	123 mg/L	100 mg/L	123	70.0	130	----
		potassium, total	7440-09-7	E420	44.2 mg/L	40 mg/L	110	70.0	130	----
		selenium, total	7782-49-2	E420	0.465 mg/L	0.4 mg/L	116	70.0	130	----
		silicon, total	7440-21-3	E420	103 mg/L	100 mg/L	103	70.0	130	----
		silver, total	7440-22-4	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		sodium, total	7440-23-5	E420	17.6 mg/L	20 mg/L	88.2	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	----
		tin, total	7440-31-5	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		titanium, total	7440-32-6	E420	0.452 mg/L	0.4 mg/L	113	70.0	130	----
		uranium, total	7440-61-1	E420	0.0488 mg/L	0.04 mg/L	122	70.0	130	----
		vanadium, total	7440-62-2	E420	1.16 mg/L	1 mg/L	116	70.0	130	----
		zinc, total	7440-66-6	E420	4.55 mg/L	4 mg/L	114	70.0	130	----
		zirconium, total	7440-67-7	E420	0.431 mg/L	0.4 mg/L	108	70.0	130	----
Total Metals (QCLot: 394016)										
CG2200454-002	Anonymous	mercury, total	7439-97-6	E508	0.000104 mg/L	0.0001 mg/L	104	70.0	130	----
Dissolved Metals (QCLot: 389033)										
CG2200494-015	Anonymous	aluminum, dissolved	7429-90-5	E421	1.78 mg/L	2 mg/L	88.8	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.176 mg/L	0.2 mg/L	87.8	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.174 mg/L	0.2 mg/L	87.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.178 mg/L	0.2 mg/L	89.2	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.371 mg/L	0.4 mg/L	92.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0822 mg/L	0.1 mg/L	82.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.927 mg/L	1 mg/L	92.7	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 389033) - continued										
CG2200494-015	Anonymous	cadmium, dissolved	7440-43-9	E421	0.0362 mg/L	0.04 mg/L	90.6	70.0	130	----
		calcium, dissolved	7440-70-2	E421	36.4 mg/L	40 mg/L	90.9	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.357 mg/L	0.4 mg/L	89.2	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.181 mg/L	0.2 mg/L	90.4	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.181 mg/L	0.2 mg/L	90.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.1 mg/L	20 mg/L	90.6	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.182 mg/L	0.2 mg/L	91.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.907 mg/L	1 mg/L	90.7	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	8.93 mg/L	10 mg/L	89.3	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.179 mg/L	0.2 mg/L	89.7	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.182 mg/L	0.2 mg/L	91.2	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.357 mg/L	0.4 mg/L	89.4	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	88.0 mg/L	100 mg/L	88.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	33.9 mg/L	40 mg/L	84.7	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.348 mg/L	0.4 mg/L	87.1	70.0	130	----
		silicon, dissolved	7440-21-3	E421	85.6 mg/L	100 mg/L	85.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0334 mg/L	0.04 mg/L	83.6	70.0	130	----
		sodium, dissolved	7440-23-5	E421	18.6 mg/L	20 mg/L	92.9	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	173 mg/L	200 mg/L	86.5	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0329 mg/L	0.04 mg/L	82.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.170 mg/L	0.2 mg/L	84.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.375 mg/L	0.4 mg/L	93.9	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0335 mg/L	0.04 mg/L	83.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.899 mg/L	1 mg/L	89.9	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.43 mg/L	4 mg/L	85.7	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.371 mg/L	0.4 mg/L	92.7	70.0	130	----
Dissolved Metals (QCLot: 394011)										
CG2200510-002	INF-17-JAN-2022	mercury, dissolved	7439-97-6	E509	0.0000990 mg/L	0.0001 mg/L	99.0	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**				**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:				○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**				Please indicate below Filtered, Preserved or both (F, P, F/P).
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427			
Contact:		PO / AFE:				
Address:		Legal Site Description:				
Phone:	Fax:	Quote #:	CG2021MPMC1000001			
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
						F/P			P	F/P						P	
	SRF-17-Jan-2021	17-Jan-22	10:18	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-17-Jan-2021	17-Jan-22	10:47	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2200510

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			1/17	320	19			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2200752**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 24-Jan-2022 10:55
PO	: Not Submitted	Date Analysis Commenced	: 24-Jan-2022
C-O-C number	: ----	Issue Date	: 28-Jan-2022 17:26
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Dissolved selenium results higher than total likely due to presence of volatile selenium; matrix matched dissolved selenium test is recommended.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-24-JAN-2022	----	----	----	----
					Client sampling date / time	24-Jan-2022 09:45	----	----	----	----
					CG2200752-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.81	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000713	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000961	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2200752**	Page	: 1 of 4
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 24-Jan-2022 10:55
PO	: Not Submitted	Issue Date	: 28-Jan-2022 17:26
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-24-JAN-2022	E423BSe	24-Jan-2022	28-Jan-2022	----	----		28-Jan-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-24-JAN-2022	E355-L	24-Jan-2022	24-Jan-2022	----	----		24-Jan-2022	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-24-JAN-2022	E420	24-Jan-2022	----	----	----		25-Jan-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	396754	1	12	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	394243	1	1	100.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	393694	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	396754	1	12	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	394243	1	1	100.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	393694	1	1	100.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	396754	1	12	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	394243	1	1	100.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	393694	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	396754	1	12	8.3	5.0	✓
Total Metals in Water by CRC ICPMS	E420	394243	0	1	0.0	5.0	×
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	393694	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2200752**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 24-Jan-2022 10:55
PO	: Not Submitted	Date Analysis Commenced	: 24-Jan-2022
C-O-C number	: ----	Issue Date	: 28-Jan-2022 17:26
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 393694)											
CG2200752-001	SRF-24-JAN-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.81	5.03	0.22	Diff <2x LOR	----
Total Metals (QC Lot: 394243)											
CG2200752-001	SRF-24-JAN-2022	selenium, total	7782-49-2	E420	0.000050	mg/L	0.000961	0.000959	0.230%	20%	----
Dissolved Metals (QC Lot: 396754)											
FJ2200240-001	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.0244	0.0256	4.86%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 393694)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 394243)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 396754)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 393694)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	98.8	80.0	120	----
Total Metals (QCLot: 394243)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	90.9	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	101	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 393694)										
CG2200752-001	SRF-24-JAN-2022	carbon, total organic [TOC]	----	E355-L	5.21 mg/L	5 mg/L	104	70.0	130	----
Dissolved Metals (QCLot: 396754)										
FJ2200240-002	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0390 mg/L	0.04 mg/L	97.5	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-24-Jan-2022	24-Jan-22	9:45	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2200752

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by: Amber M.	Date: Jun. 29	Time: 10:55 am	Temperature: 22	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2201042**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 31-Jan-2022 10:44
PO	: 5500052166	Date Analysis Commenced	: 31-Jan-2022
C-O-C number	: ----	Issue Date	: 04-Feb-2022 14:50
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SRF-31-JAN-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	31-Jan-2022 09:14	----	----	----	----
						CG2201042-001	--------	--------	--------	--------
						Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.04	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00155	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00220	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2201042**	Page	: 1 of 4
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 31-Jan-2022 10:44
PO	: 5500052166	Issue Date	: 04-Feb-2022 14:50
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-31-JAN-2022	E423BSe	31-Jan-2022	03-Feb-2022	----	----		03-Feb-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (lab preserved) SRF-31-JAN-2022	E355-L	31-Jan-2022	31-Jan-2022	3 days	0 days	✓	02-Feb-2022	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SRF-31-JAN-2022	E420	31-Jan-2022	----	----	----		03-Feb-2022	180 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	401018	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	400562	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	399041	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	401018	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	400562	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	399041	1	4	25.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	401018	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	400562	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	399041	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	401018	1	17	5.8	5.0	✓
Total Metals in Water by CRC ICPMS	E420	400562	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	399041	1	4	25.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2201042**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 31-Jan-2022 10:44
PO	: 5500052166	Date Analysis Commenced	: 31-Jan-2022
C-O-C number	: ----	Issue Date	: 04-Feb-2022 14:50
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

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This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

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DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 399041)											
CG2201053-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 400562)											
CG2200994-009	Anonymous	selenium, total	7782-49-2	E420	0.250	mg/L	7.49 µg/L	0.00759	1.42%	20%	----
Dissolved Metals (QC Lot: 401018)											
CG2201042-001	SRF-31-JAN-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00155	0.00154	0.528%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 399041)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 400562)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 401018)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 399041)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Total Metals (QCLot: 400562)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	91.1	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	103	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 399041)										
CG2201053-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.83 mg/L	5 mg/L	116	70.0	130	----
Total Metals (QCLot: 400562)										
CG2200994-009	Anonymous	selenium, total	7782-49-2	E420	0.415 mg/L	0.4 mg/L	104	70.0	130	----
Dissolved Metals (QCLot: 401018)										
FJ2200298-001	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report to:	
Company:	MOUNT POLLEY MINING CORP.
Contact:	Kala Ivens
Address:	PO BOX 12, Likely, BC, V0L 1N0
Phone:	250-790-2215 Fax:
Invoice To:	Same as Report ? ◉ Yes ○ No
Company:	ernie.guevarra@imperialmetals.com
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	

Report Format / Distribution	
☑ Standard ☑ Other	
☑ PDF ☑ Excel ☐ Digital ☐ Fax	
Email 1:	mxu@golder.com
Email 2:	
Client / Project Information:	
Job #:	21452039/31400/31427
PO / AFE:	
Legal Site Description:	
Quote #:	MPMC100 / CG2021MPMC1000001
ALS Contact:	Can Dang **Sampler:**

Service Requested: (rush - subject to availability)
- ◉ Regular (Default)
- ○ Priority (2-3 Business Days) - 50% Surcharge
- ○ Emergency (1 Business Day) - 100% Surcharge
- ○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request
Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se (P)	Dissolved Se (F/P) (E423BSe)	Total dissolved solis	Turbidity	TSS	BOD	Total Organic Carbon (P)	Number of Containers
	SRF-31-Jan-2022	31-Jan-22	10:14	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2201042

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			1/31	1144	10			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2201338**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 07-Feb-2022 13:40
PO	: Not Submitted	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022 12:16
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SRF-7-FEB-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	07-Feb-2022 10:35	----	----	----	----
						CG2201338-001	--------	--------	--------	--------
						Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.43	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00106	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00177	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2201338**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 07-Feb-2022 13:40
PO	: Not Submitted	Issue Date	: 14-Feb-2022 12:16
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-7-FEB-2022	E423BSe	07-Feb-2022	11-Feb-2022	----	----		11-Feb-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (lab preserved) SRF-7-FEB-2022	E355-L	07-Feb-2022	08-Feb-2022	3 days	1 days	✓	09-Feb-2022	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SRF-7-FEB-2022	E420	07-Feb-2022	----	----	----		08-Feb-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	407731	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405069	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	405058	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	407731	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405069	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	405058	1	4	25.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	407731	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405069	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	405058	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	407731	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	405069	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	405058	1	4	25.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2201338**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 07-Feb-2022 13:40
PO	: Not Submitted	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022 12:16
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 405058)											
EO2200730-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	19.2	19.2	0.0260%	20%	----
Total Metals (QC Lot: 405069)											
CG2201270-001	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	0.000322	0.000313	0.000009	Diff <2x LOR	----
Dissolved Metals (QC Lot: 407731)											
FJ2200378-004	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00610	0.00613	0.524%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 405058)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 405069)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 407731)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 405058)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	110	80.0	120	----
Total Metals (QCLot: 405069)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	91.4	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	102	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 405058)										
EO2200730-001	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 405069)										
CG2201270-001	Anonymous	selenium, total	7782-49-2	E420	0.360 mg/L	0.4 mg/L	90.0	70.0	130	----
Dissolved Metals (QCLot: 407731)										
FJ2200378-005	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-7-Feb-2022	07-Feb-22	10:35	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2201338

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			2/7	1340	16			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2201669**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Feb-2022 11:12
PO	:	Date Analysis Commenced	: 14-Feb-2022
C-O-C number	: ----	Issue Date	: 24-Feb-2022 08:52
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	Client Id	*Comment*
CG2201669-001	SRF-14-Feb-2021	Sample analysis indicated possible toxic effect, reported result should be considered a minimum possible BOD.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
RRR	*Refer to report comments for issues regarding this analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-Feb-2021	INF-14-Feb-02021	----	----	----
					Client sampling date / time	14-Feb-2022 09:10	14-Feb-2022 09:25	----	----	----
						CG2201669-001	CG2201669-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		117	86.2	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		117	86.2	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		794	782	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		810	803	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1170	1130	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		1.09	0.12	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.584	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.58	3.22	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.197	0.169	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0868	6.55	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0113	<0.0050 DLDS	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.33 DLHC	0.0077	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		738	736	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.46	4.56	----	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L		0.715	<0.0015	----	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397	0.0016	mg/L		0.760	<0.0016	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		<0.0150 DLDS	<0.0150 DLDS	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00197	0.00111	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0309	0.0362	----	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-Feb-2021	INF-14-Feb-02021	----	----	----
					Client sampling date / time	14-Feb-2022 09:10	14-Feb-2022 09:25	----	----	----
						CG2201669-001	CG2201669-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
boron, total	7440-42-8	E420	0.010	mg/L		0.064	0.063	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000402	0.0000552	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		246	240	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.0114	0.0166	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.256	<0.050 DLDS	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		47.5	49.5	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.224	<0.00050 DLDS	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0263	0.0801	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		1.53	<0.250 DLDS	----	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.23	1.46	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00141 DTC	0.0905	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		7.54	6.04	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		13.3	13.3	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		2.04	2.39	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		260	264	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000124	0.000932	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0150 DLDS	<0.0150 DLDS	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0074	0.0062	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-Feb-2021	INF-14-Feb-02021	----	----	----
					Client sampling date / time	14-Feb-2022 09:10	14-Feb-2022 09:25	----	----	----
						CG2201669-001	CG2201669-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00184	0.00115	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0309	0.0355	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.061	0.059	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000254	0.0000559	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		242	236	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00347	0.0156	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.234	<0.050 DLDS	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		46.1	46.8	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.225	<0.00050 DLDS	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0243	0.0774	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.48	<0.250 DLDS	----	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.22	1.38	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.00351 DTC	0.0907	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		7.34	5.56	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		13.1	12.5	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		1.99	2.25	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		258	249	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000123	0.000914	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SRF-14-Feb-2021	INF-14-Feb-02021	----	----	----
					Client sampling date / time	14-Feb-2022 09:10	14-Feb-2022 09:25	----	----	----
Analyte	CAS Number	Method	LOR	Unit		CG2201669-001	CG2201669-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	0.0093	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		319 RRR	<2.0	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2201669**	Page	: 1 of 12
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Feb-2022 11:12
PO	:	Issue Date	: 24-Feb-2022 08:52
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-14-Feb-02021	E550	14-Feb-2022	----	----	----		14-Feb-2022	3 days	0 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF-14-Feb-2021	E550	14-Feb-2022	----	----	----		14-Feb-2022	3 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-14-Feb-02021	E298	14-Feb-2022	15-Feb-2022	----	----		15-Feb-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF-14-Feb-2021	E298	14-Feb-2022	15-Feb-2022	----	----		15-Feb-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-14-Feb-02021	E235.Br-L	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF-14-Feb-2021	E235.Br-L	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-14-Feb-02021	E235.Cl-L	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF-14-Feb-2021	E235.Cl-L	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-14-Feb-02021	E235.F	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF-14-Feb-2021	E235.F	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-14-Feb-02021	E235.NO3-L	14-Feb-2022	----	----	----		14-Feb-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-14-Feb-2021	E235.NO3-L	14-Feb-2022	----	----	----		14-Feb-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-14-Feb-02021	E235.NO2-L	14-Feb-2022	----	----	----		14-Feb-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-14-Feb-2021	E235.NO2-L	14-Feb-2022	----	----	----		14-Feb-2022	3 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-14-Feb-02021	E235.SO4-L	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-14-Feb-2021	E235.SO4-L	14-Feb-2022	----	----	----		14-Feb-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
INF-14-Feb-02021	E372-U	14-Feb-2022	18-Feb-2022	----	----		18-Feb-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SRF-14-Feb-2021	E372-U	14-Feb-2022	18-Feb-2022	----	----		18-Feb-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
INF-14-Feb-02021	E509	14-Feb-2022	18-Feb-2022	----	----		18-Feb-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF-14-Feb-2021	E509	14-Feb-2022	18-Feb-2022	----	----		18-Feb-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-14-Feb-02021	E421	14-Feb-2022	15-Feb-2022	----	----		15-Feb-2022	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-14-Feb-2021	E421	14-Feb-2022	15-Feb-2022	----	----		15-Feb-2022	180 days	1 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-14-Feb-02021	E397	14-Feb-2022	----	----	----		16-Feb-2022	7 days	2 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
SRF-14-Feb-2021	E397	14-Feb-2022	----	----	----		16-Feb-2022	7 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
INF-14-Feb-02021	E355-L	14-Feb-2022	14-Feb-2022	----	----		15-Feb-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-14-Feb-2021	E355-L	14-Feb-2022	14-Feb-2022	----	----		15-Feb-2022	28 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
INF-14-Feb-02021	E290	14-Feb-2022	----	----	----		15-Feb-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-14-Feb-2021	E290	14-Feb-2022	----	----	----		15-Feb-2022	14 days	1 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
INF-14-Feb-02021	E162	14-Feb-2022	----	----	----		18-Feb-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-14-Feb-2021	E162	14-Feb-2022	----	----	----		18-Feb-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-14-Feb-02021	E160	14-Feb-2022	----	----	----		19-Feb-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-14-Feb-2021	E160	14-Feb-2022	----	----	----		19-Feb-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-14-Feb-02021	E121	14-Feb-2022	----	----	----		16-Feb-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-14-Feb-2021	E121	14-Feb-2022	----	----	----		16-Feb-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-14-Feb-02021	E508	14-Feb-2022	----	----	----		18-Feb-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-14-Feb-2021	E508	14-Feb-2022	----	----	----		18-Feb-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-14-Feb-02021	E420	14-Feb-2022	----	----	----		15-Feb-2022	180 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-14-Feb-2021	E420	14-Feb-2022	----	----	----		15-Feb-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	410447	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	410522	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	410041	1	13	7.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	409994	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	409995	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	413586	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	410456	1	12	8.3	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	411639	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	409993	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	409996	1	2	50.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	409997	1	2	50.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	409999	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	411724	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413587	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	410722	1	13	7.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	410074	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	409952	1	9	11.1	5.0	✓
TSS by Gravimetry	E160	411733	1	6	16.6	5.0	✓
Turbidity by Nephelometry	E121	411344	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	410447	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	410522	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	410041	1	13	7.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	409994	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	409995	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	413586	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	410456	1	12	8.3	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	411639	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	409993	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	409996	1	2	50.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	409997	1	2	50.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	409999	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	411724	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413587	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	410722	1	13	7.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	410074	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	409952	1	9	11.1	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry	E160	411733	1	6	16.6	5.0	✓
Turbidity by Nephelometry	E121	411344	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	410447	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	410522	1	19	5.2	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	410041	1	13	7.6	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	409994	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	409995	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	413586	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	410456	1	12	8.3	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	411639	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	409993	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	409996	1	2	50.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	409997	1	2	50.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	409999	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	411724	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413587	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	410722	1	13	7.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	410074	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	409952	1	9	11.1	5.0	✓
TSS by Gravimetry	E160	411733	1	6	16.6	5.0	✓
Turbidity by Nephelometry	E121	411344	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	410522	1	19	5.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	409994	1	3	33.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	409995	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	413586	1	9	11.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	410456	1	12	8.3	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	411639	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	409993	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	409996	1	2	50.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	409997	1	2	50.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	409999	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	413587	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	410722	1	13	7.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	410074	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	409952	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397 Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H_2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as $CaCO_3$), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2201669**	Page	: 1 of 16
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Feb-2022 11:12
PO	:	Date Analysis Commenced	: 14-Feb-2022
C-O-C number	: ----	Issue Date	: 24-Feb-2022 08:52
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 410447)											
CG2201661-004	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	478	474	0.798%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	478	474	0.798%	20%	----
Physical Tests (QC Lot: 411344)											
CG2201669-001	SRF-14-Feb-2021	turbidity	----	E121	0.10	NTU	1.09	1.09	0.002	Diff <2x LOR	----
Physical Tests (QC Lot: 411724)											
CG2201669-001	SRF-14-Feb-2021	solids, total dissolved [TDS]	----	E162	20	mg/L	1170	1180	0.725%	20%	----
Physical Tests (QC Lot: 411733)											
CG2201647-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	8.8	8.4	0.4	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 409952)											
CG2201628-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0040	mg/L	0.127	0.125	1.51%	20%	----
Anions and Nutrients (QC Lot: 409993)											
CG2201571-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.380	0.356	6.55%	20%	----
Anions and Nutrients (QC Lot: 409994)											
CG2201571-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 409995)											
CG2201571-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.40	0.38	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 409996)											
CG2201571-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.200	0.204	1.78%	20%	----
Anions and Nutrients (QC Lot: 409997)											
CG2201571-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 409999)											
CG2201669-001	SRF-14-Feb-2021	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	738	746	1.14%	20%	----
Anions and Nutrients (QC Lot: 410522)											
CG2201661-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.211	0.215	1.55%	20%	----
Organic / Inorganic Carbon (QC Lot: 410074)											
CG2201669-001	SRF-14-Feb-2021	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.46	4.55	0.09	Diff <2x LOR	----
Dissolved Sulfides (QC Lot: 411639)											
CG2201617-001	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	<0.0015	0	Diff <2x LOR	----
Total Metals (QC Lot: 410722)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 410722) - continued											
CG2201641-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000287	0.000287	0.00000004	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	0.00050	0.000004	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 413587)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 413587) - continued											
CG2201469-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 410456)											
CG2201601-024	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	0.00088	0.00088	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00060	0.00055	0.00006	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.00970	0.00988	1.84%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.100	mg/L	<0.100 µg/L	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0250	mg/L	0.248 µg/L	0.000228	0.0000203	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	226	224	0.862%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.50	mg/L	9.55 µg/L	0.00950	0.550%	20%	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0491	0.0488	0.0003	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	153	154	0.902%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.108	0.108	0.166%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00523	0.00539	2.96%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	0.0377	0.0382	1.33%	20%	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	3.14	3.18	0.988%	20%	----
		selenium, dissolved	7782-49-2	E421	0.250	mg/L	31.7 µg/L	0.0321	1.15%	20%	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	3.09	3.08	0.241%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	4.36	4.28	1.83%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	0.308	0.308	0.00219%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	267	268	0.449%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	0.000184	0.000179	0.000005	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.00910	0.00915	0.564%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	0.0148	0.0169	0.0022	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 410456) - continued											
CG2201601-024	Anonymous	zirconium, dissolved	7440-67-7	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 413586)											
CG2201669-001	SRF-14-Feb-2021	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 410041)											
CG2201617-004	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	5.9	4.5	26.9%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 410447)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 411344)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 411724)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 411733)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 409952)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 409993)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 409994)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 409995)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 409996)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 409997)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 409999)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 410522)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 410074)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 411639)						
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 410722)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 410722) - continued						
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 413587)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 410456)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 410456) - continued						
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 413586)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 410041)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 410041) - continued						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 410447)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	109	85.0	115	----
Physical Tests (QCLot: 411344)									
turbidity	----	E121	0.1	NTU	200 NTU	98.5	85.0	115	----
Physical Tests (QCLot: 411724)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	92.6	85.0	115	----
Physical Tests (QCLot: 411733)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 409952)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	104	80.0	120	----
Anions and Nutrients (QCLot: 409993)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 409994)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	108	85.0	115	----
Anions and Nutrients (QCLot: 409995)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	99.3	90.0	110	----
Anions and Nutrients (QCLot: 409996)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 409997)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 409999)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 410522)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Organic / Inorganic Carbon (QCLot: 410074)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	95.2	80.0	120	----
Dissolved Sulfides (QCLot: 411639)									
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	0.08 mg/L	90.4	80.0	120	----
Total Metals (QCLot: 410722)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	94.4	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 410722) - continued									
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.9	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	92.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.9	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	95.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.5	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	95.7	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.4	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	108	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.7	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.7	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.1	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	101	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	96.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.4	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	96.6	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	96.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.0	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.2	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.6	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	92.5	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.6	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	99.0	80.0	120	----
Total Metals (QCLot: 413587)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Dissolved Metals (QCLot: 410456)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	93.3	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 410456) - continued									
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	95.6	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	91.5	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.5	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.5	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	95.2	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.4	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.8	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.8	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.8	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.4	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.1	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.1	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	96.0	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.0	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	94.4	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.1	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	94.6	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	98.7	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	94.1	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.1	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.0	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	89.5	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	96.2	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.3	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.8	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	96.4	80.0	120	----
Aggregate Organics (QCLot: 410041)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	94.5	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 409952)										
CG2201628-002	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.0676 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 409993)										
CG2201669-001	SRF-14-Feb-2021	fluoride	16984-48-8	E235.F	0.963 mg/L	1 mg/L	96.3	75.0	125	----
Anions and Nutrients (QCLot: 409994)										
CG2201669-001	SRF-14-Feb-2021	bromide	24959-67-9	E235.Br-L	0.597 mg/L	0.5 mg/L	119	75.0	125	----
Anions and Nutrients (QCLot: 409995)										
CG2201669-001	SRF-14-Feb-2021	chloride	16887-00-6	E235.Cl-L	114 mg/L	100 mg/L	114	75.0	125	----
Anions and Nutrients (QCLot: 409996)										
CG2201669-001	SRF-14-Feb-2021	nitrate (as N)	14797-55-8	E235.NO3-L	2.72 mg/L	2.5 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 409997)										
CG2201669-001	SRF-14-Feb-2021	nitrite (as N)	14797-65-0	E235.NO2-L	0.546 mg/L	0.5 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 409999)										
CG2201669-002	INF-14-Feb-02021	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 410522)										
CG2201661-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 410074)										
CG2201669-001	SRF-14-Feb-2021	carbon, total organic [TOC]	----	E355-L	5.14 mg/L	5 mg/L	103	70.0	130	----
Dissolved Sulfides (QCLot: 411639)										
CG2201617-002	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.100 mg/L	0.1 mg/L	100	75.0	125	----
Total Metals (QCLot: 410722)										
CG2201688-001	Anonymous	aluminum, total	7429-90-5	E420	1.80 mg/L	2 mg/L	89.8	70.0	130	----
		antimony, total	7440-36-0	E420	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		arsenic, total	7440-38-2	E420	0.181 mg/L	0.2 mg/L	90.6	70.0	130	----
		barium, total	7440-39-3	E420	0.192 mg/L	0.2 mg/L	95.9	70.0	130	----
		beryllium, total	7440-41-7	E420	0.363 mg/L	0.4 mg/L	90.7	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0873 mg/L	0.1 mg/L	87.3	70.0	130	----
		boron, total	7440-42-8	E420	0.994 mg/L	1 mg/L	99.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 410722) - continued										
CG2201688-001	Anonymous	calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.372 mg/L	0.4 mg/L	93.1	70.0	130	----
		cobalt, total	7440-48-4	E420	0.185 mg/L	0.2 mg/L	92.5	70.0	130	----
		copper, total	7440-50-8	E420	0.188 mg/L	0.2 mg/L	93.8	70.0	130	----
		iron, total	7439-89-6	E420	18.6 mg/L	20 mg/L	92.8	70.0	130	----
		lead, total	7439-92-1	E420	0.188 mg/L	0.2 mg/L	94.0	70.0	130	----
		lithium, total	7439-93-2	E420	0.972 mg/L	1 mg/L	97.2	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.252 mg/L	0.2 mg/L	126	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.191 mg/L	0.2 mg/L	95.5	70.0	130	----
		nickel, total	7440-02-0	E420	0.374 mg/L	0.4 mg/L	93.4	70.0	130	----
		phosphorus, total	7723-14-0	E420	94.4 mg/L	100 mg/L	94.4	70.0	130	----
		potassium, total	7440-09-7	E420	37.5 mg/L	40 mg/L	93.8	70.0	130	----
		selenium, total	7782-49-2	E420	0.381 mg/L	0.4 mg/L	95.3	70.0	130	----
		silicon, total	7440-21-3	E420	91.4 mg/L	100 mg/L	91.4	70.0	130	----
		silver, total	7440-22-4	E420	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	192 mg/L	200 mg/L	96.2	70.0	130	----
		thallium, total	7440-28-0	E420	0.0351 mg/L	0.04 mg/L	87.7	70.0	130	----
		tin, total	7440-31-5	E420	0.180 mg/L	0.2 mg/L	90.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.374 mg/L	0.4 mg/L	93.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.0356 mg/L	0.04 mg/L	89.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.936 mg/L	1 mg/L	93.6	70.0	130	----
		zinc, total	7440-66-6	E420	3.74 mg/L	4 mg/L	93.4	70.0	130	----
		zirconium, total	7440-67-7	E420	0.403 mg/L	0.4 mg/L	101	70.0	130	----
Total Metals (QCLot: 413587)										
CG2201641-001	Anonymous	mercury, total	7439-97-6	E508	0.000105 mg/L	0.0001 mg/L	105	70.0	130	----
Dissolved Metals (QCLot: 410456)										
CG2201661-017	Anonymous	aluminum, dissolved	7429-90-5	E421	1.67 mg/L	2 mg/L	83.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.162 mg/L	0.2 mg/L	81.1	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.173 mg/L	0.2 mg/L	86.6	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.330 mg/L	0.4 mg/L	82.6	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0844 mg/L	0.1 mg/L	84.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.861 mg/L	1 mg/L	86.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 410456) - continued										
CG2201661-017	Anonymous	cadmium, dissolved	7440-43-9	E421	0.0352 mg/L	0.04 mg/L	88.0	70.0	130	----
		calcium, dissolved	7440-70-2	E421	34.5 mg/L	40 mg/L	86.2	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.351 mg/L	0.4 mg/L	87.8	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.174 mg/L	0.2 mg/L	87.3	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.176 mg/L	0.2 mg/L	88.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	17.6 mg/L	20 mg/L	87.8	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.180 mg/L	0.2 mg/L	89.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.861 mg/L	1 mg/L	86.1	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	8.40 mg/L	10 mg/L	84.0	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.177 mg/L	0.2 mg/L	88.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.172 mg/L	0.2 mg/L	86.0	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.353 mg/L	0.4 mg/L	88.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	84.5 mg/L	100 mg/L	84.5	70.0	130	----
		potassium, dissolved	7440-09-7	E421	33.9 mg/L	40 mg/L	84.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.352 mg/L	0.4 mg/L	87.9	70.0	130	----
		silicon, dissolved	7440-21-3	E421	82.6 mg/L	100 mg/L	82.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0344 mg/L	0.04 mg/L	85.9	70.0	130	----
		sodium, dissolved	7440-23-5	E421	17.3 mg/L	20 mg/L	86.7	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.180 mg/L	0.2 mg/L	89.8	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	173 mg/L	200 mg/L	86.7	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0333 mg/L	0.04 mg/L	83.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.163 mg/L	0.2 mg/L	81.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.340 mg/L	0.4 mg/L	85.0	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0340 mg/L	0.04 mg/L	85.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.863 mg/L	1 mg/L	86.3	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.59 mg/L	4 mg/L	89.7	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.354 mg/L	0.4 mg/L	88.6	70.0	130	----
Dissolved Metals (QCLot: 413586)										
CG2201669-002	INF-14-Feb-02021	mercury, dissolved	7439-97-6	E509	0.000100 mg/L	0.0001 mg/L	100	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
							P/F			P	F/P					P	
	SRF-14-Feb-2021	14-Feb-22	10:10	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-14-Feb-2021	14-Feb-22	10:25	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2201669

Telephone : - 1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date: 2/14	Time: 12:12	Temperature: 2.1	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2201960**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 22-Feb-2022 13:40
PO	:	Date Analysis Commenced	: 22-Feb-2022
C-O-C number	: ----	Issue Date	: 04-Mar-2022 13:08
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SRF-22-FEB-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	22-Feb-2022 10:41	----	----	----	----
						CG2201960-001	--------	--------	--------	--------
						Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.02	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00120	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00197	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2201960**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 22-Feb-2022 13:40
PO	:	Issue Date	: 04-Mar-2022 13:08
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-22-FEB-2022	E423BSe	22-Feb-2022	01-Mar-2022	----	----		02-Mar-2022	180 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-22-FEB-2022	E355-L	22-Feb-2022	22-Feb-2022	----	----		22-Feb-2022	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-22-FEB-2022	E420	22-Feb-2022	----	----	----		23-Feb-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	420457	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	415885	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	415409	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	420457	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	415885	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	415409	1	3	33.3	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	420457	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	415885	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	415409	1	3	33.3	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	420457	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	415885	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	415409	1	3	33.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2201960**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 22-Feb-2022 13:40
PO	:	Date Analysis Commenced	: 22-Feb-2022
C-O-C number	: ----	Issue Date	: 04-Mar-2022 13:08
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 415409)											
FC2200281-001	Anonymous	carbon, total organic [TOC]	----	E355-L	2.50	mg/L	31.3	35.7	13.1%	20%	----
Total Metals (QC Lot: 415885)											
CG2201956-001	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 420457)											
CG2201960-001	SRF-22-FEB-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00120	0.00112	6.68%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 415409)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 415885)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 420457)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 415409)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----
Total Metals (QCLot: 415885)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.7	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	108	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 415409)										
FC2200281-001	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 415885)										
CG2201956-001	Anonymous	selenium, total	7782-49-2	E420	0.451 mg/L	0.4 mg/L	113	70.0	130	----
Dissolved Metals (QCLot: 420457)										
VA22A4039-005	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0400 mg/L	0.04 mg/L	100	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Total dissolved solis	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-22-Feb-2022	22-Feb-22	10:41	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2201960

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			2/22	1340	19			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2202220**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Feb-2022 13:20
PO	: Not Submitted	Date Analysis Commenced	: 28-Feb-2022
C-O-C number	: ----	Issue Date	: 04-Mar-2022 16:17
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)				Client sample ID	**SRF-28-FEB-2022**	**----**	**----**	**----**	**----**
				Client sampling date / time	28-Feb-2022 12:00	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2202220-001**	--------	--------	--------	--------
					Result	----	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.15	----	----	----	----
Metals									
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00142	----	----	----	----
Total Metals									
copper, total	7440-50-8	E420	0.00050	mg/L	0.00875	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.00172	----	----	----	----
Dissolved Metals									
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00196	----	----	----	----
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2202220**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Feb-2022 13:20
PO	: Not Submitted	Issue Date	: 04-Mar-2022 16:17
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-28-FEB-2022	E421	28-Feb-2022	01-Mar-2022	----	----		01-Mar-2022	180 days	1 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-28-FEB-2022	E423BSe	28-Feb-2022	03-Mar-2022	----	----		03-Mar-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-28-FEB-2022	E355-L	28-Feb-2022	28-Feb-2022	----	----		01-Mar-2022	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-28-FEB-2022	E420	28-Feb-2022	----	----	----		02-Mar-2022	180 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	422222	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	420306	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421440	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	420089	1	6	16.6	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	422222	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	420306	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421440	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	420089	1	6	16.6	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	422222	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	420306	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421440	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	420089	1	6	16.6	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	422222	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	420306	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	421440	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	420089	1	6	16.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2202220**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Feb-2022 13:20
PO	: Not Submitted	Date Analysis Commenced	: 28-Feb-2022
C-O-C number	: ----	Issue Date	: 04-Mar-2022 16:17
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 420089)											
CG2202206-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.49	1.35	0.14	Diff <2x LOR	----
Total Metals (QC Lot: 421440)											
CG2202206-001	Anonymous	copper, total	7440-50-8	E420	0.00050	mg/L	0.0139	0.0143	2.30%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000328	0.000298	0.000029	Diff <2x LOR	----
Dissolved Metals (QC Lot: 420306)											
CG2202206-001	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.0118	0.0119	0.845%	20%	----
Dissolved Metals (QC Lot: 422222)											
CG2202220-001	SRF-28-FEB-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00142	0.00137	4.05%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 420089)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 421440)						
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 420306)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 422222)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 420089)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	98.6	80.0	120	----
Total Metals (QCLot: 421440)									
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.4	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.2	80.0	120	----
Dissolved Metals (QCLot: 420306)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.1	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	104	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 420089)										
CG2202206-001	Anonymous	carbon, total organic [TOC]	----	E355-L	4.89 mg/L	5 mg/L	97.9	70.0	130	----
Total Metals (QCLot: 421440)										
CG2202206-001	Anonymous	copper, total	7440-50-8	E420	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.381 mg/L	0.4 mg/L	95.2	70.0	130	----
Dissolved Metals (QCLot: 420306)										
CG2202210-017	Anonymous	copper, dissolved	7440-50-8	E421	0.188 mg/L	0.2 mg/L	94.3	70.0	130	----
Dissolved Metals (QCLot: 422222)										
FJ2200529-001	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se and Cu (P)	Dissolved Se (E423BSe) (P/F)	Dissolved Copper (F/P)	Turbidity	TSS	BOD	Total Organic Carbon (P)	Number of Containers
	SRF-28-Feb-2022	28-Feb-22	12:00	Water						X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2202220

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			28	1320	15			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2202565**	Page	: 1 of 2
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 07-Mar-2022 13:20
PO	: Not Submitted	Date Analysis Commenced	: 07-Mar-2022
C-O-C number	: ----	Issue Date	: 16-Mar-2022 12:02
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

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>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					*Client sample ID*	**SRF-7-MAR-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	07-Mar-2022 10:35	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2202565-001**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.03	----	----	----	----
Metals									
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00299	----	----	----	----
Total Metals									
selenium, total	7782-49-2	E420	0.000050	mg/L	0.00552	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2202565**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 07-Mar-2022 13:20
PO	: Not Submitted	Issue Date	: 16-Mar-2022 12:02
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-7-MAR-2022	E423BSe	07-Mar-2022	10-Mar-2022	180 days	3 days	✓	14-Mar-2022	177 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SRF-7-MAR-2022	E355-L	07-Mar-2022	07-Mar-2022	28 days	0 days	✓	07-Mar-2022	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SRF-7-MAR-2022	E420	07-Mar-2022	----	----	----		07-Mar-2022	180 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	428795	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	426131	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	426105	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	428795	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	426131	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	426105	1	1	100.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	428795	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	426131	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	426105	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	428795	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	426131	1	2	50.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	426105	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2202565**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 07-Mar-2022 13:20
PO	: Not Submitted	Date Analysis Commenced	: 07-Mar-2022
C-O-C number	: ----	Issue Date	: 16-Mar-2022 12:02
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 426105)											
CG2202565-001	SRF-7-MAR-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.03	5.16	2.68%	20%	----
Total Metals (QC Lot: 426131)											
CG2202493-005	Anonymous	selenium, total	7782-49-2	E420	0.250	mg/L	13.4 µg/L	0.0134	0.559%	20%	----
Dissolved Metals (QC Lot: 428795)											
CG2202565-001	SRF-7-MAR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00299	0.00294	1.58%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 426105)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 426131)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 428795)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 426105)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Total Metals (QCLot: 426131)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	94.2	80.0	120	----
Dissolved Metals (QCLot: 428795)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	102	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 426105)										
CG2202565-001	SRF-7-MAR-2022	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 426131)										
CG2202565-001	SRF-7-MAR-2022	selenium, total	7782-49-2	E420	0.400 mg/L	0.4 mg/L	99.9	70.0	130	----
Dissolved Metals (QCLot: 428795)										
VA22A4743-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0852 mg/L	0.08 mg/L	106	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang **Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se and Cu (P)	Dissolved Se (E423BSe) (F/P)	Dissolved Copper (F/P)	Turbidity	TSS	BOD	Total Organic Carbon (P)	Number of Containers
	SRF-7-Mar-2022	07-Mar-22	10:35	Water						X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2202565

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
							MAR 7, 2022 13:20.	

CERTIFICATE OF ANALYSIS

Work Order	: **CG2202897**	Page	: 1 of 7
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Mar-2022 15:07
PO	: Not Submitted	Date Analysis Commenced	: 15-Mar-2022
C-O-C number	: ----	Issue Date	: 23-Mar-2022 10:51
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Samples Received with temperature >15 °C

Client request : (Sample ID : INF) D-Hg bottle broke, used amber vial galss for D-Hg and preservative in Lab

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
DTSE	*Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-MAR-2022	INF-14-MAR-2022	DUP-14-MAR-2022	----	----
					Client sampling date / time	14-Mar-2022 12:30	14-Mar-2022 13:00	14-Mar-2022 12:30	----	----
						CG2202897-001	CG2202897-002	CG2202897-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		117	85.8	111	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		117	85.8	111	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		754	750	749	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		787	773	786	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1120	1190	1130	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	<3.0	5.6	----	----
turbidity	----	E121	0.10	NTU		1.55	<0.10	1.70	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.535	<0.0050	0.543	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	<0.250 DLDS	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.64	2.64	2.75	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.175	0.165	0.173	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.284	6.54	0.242	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0056	<0.0050 DLDS	0.0106	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.30 DLHC	0.0041	1.29 DLHC	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		744	745	743	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.55	4.98	4.85	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397-H	0.010	mg/L		0.408	<0.010	0.391	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397-H	0.011	mg/L		0.434	<0.011	0.416	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00298	0.0942	0.00279	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		<0.0150 DLDS	<0.0150 DLDS	<0.0150 DLDS	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00145	0.00108	0.00168	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0295	0.0320	0.0298	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-MAR-2022	INF-14-MAR-2022	DUP-14-MAR-2022	----	----
					Client sampling date / time	14-Mar-2022 12:30	14-Mar-2022 13:00	14-Mar-2022 12:30	----	----
						CG2202897-001	CG2202897-002	CG2202897-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	<0.000100 DLDS	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.065	0.063	0.064	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000250 DLDS	0.0000445	<0.0000250 DLDS	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		242	240	242	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00304	0.0144	0.00310	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.351	<0.050 DLDS	0.355	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		44.4	42.2	44.1	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.216	<0.00050 DLDS	0.215	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0344	0.0804	0.0362	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		1.32	<0.250 DLDS	1.25	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.24	1.37	1.24	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000693 DTSE	0.0849	0.000923 DTSE	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		7.66	5.71	7.71	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		12.6	11.6	12.7	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		2.05	2.42	2.11	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		248	248	254	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	<0.00150 DLDS	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000156 DTC	0.000968	0.000166	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0150 DLDS	<0.0150 DLDS	<0.0150 DLDS	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	<0.00100 DLDS	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-MAR-2022	INF-14-MAR-2022	DUP-14-MAR-2022	----	----
					Client sampling date / time	14-Mar-2022 12:30	14-Mar-2022 13:00	14-Mar-2022 12:30	----	----
						CG2202897-001	CG2202897-002	CG2202897-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0070	0.0053	0.0058	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00159	0.00103	0.00152	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0294	0.0344	0.0283	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	<0.000100 DLDS	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.063	0.058	0.060	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000250 DLDS	0.0000324	<0.0000250 DLDS	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		231	228	232	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00100 DLDS	0.0140	<0.00100 DLDS	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.399	<0.050 DLDS	0.383	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	<0.000250 DLDS	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		43.1	44.0	41.3	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.196	<0.00050 DLDS	0.184	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0391	0.0766	0.0367	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.22	<0.250 DLDS	1.20	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.24	1.40	1.19	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		7.17	5.52	7.06	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		12.7	12.3	12.2	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.03	2.28	1.94	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		245	242	241	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	<0.000050 DLDS	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	<0.00050 DLDS	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	<0.00150 DLDS	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000217 RRV	0.000917	0.000206	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-MAR-2022	INF-14-MAR-2022	DUP-14-MAR-2022	----	----
					Client sampling date / time	14-Mar-2022 12:30	14-Mar-2022 13:00	14-Mar-2022 12:30	----	----
						CG2202897-001	**CG2202897-002**	**CG2202897-003**	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	<0.00250 DLDS	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	<0.00100 DLDS	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP423	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	<2.0	<2.0	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2202897**	Page	: 1 of 15
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Mar-2022 15:07
PO	: Not Submitted	Issue Date	: 23-Mar-2022 10:51
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
DUP-14-MAR-2022	E550	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-14-MAR-2022	E550	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF-14-MAR-2022	E550	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP-14-MAR-2022	E298	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-14-MAR-2022	E298	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF-14-MAR-2022	E298	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
DUP-14-MAR-2022	E235.Br-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-14-MAR-2022	E235.Br-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF-14-MAR-2022	E235.Br-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
DUP-14-MAR-2022	E235.Cl-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-14-MAR-2022	E235.Cl-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF-14-MAR-2022	E235.Cl-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
DUP-14-MAR-2022	E235.F	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-14-MAR-2022	E235.F	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF-14-MAR-2022	E235.F	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
DUP-14-MAR-2022	E235.NO3-L	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-14-MAR-2022	E235.NO3-L	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-14-MAR-2022	E235.NO3-L	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP-14-MAR-2022	E235.NO2-L	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-14-MAR-2022	E235.NO2-L	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-14-MAR-2022	E235.NO2-L	14-Mar-2022	----	----	----		15-Mar-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
DUP-14-MAR-2022	E235.SO4-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-14-MAR-2022	E235.SO4-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-14-MAR-2022	E235.SO4-L	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
DUP-14-MAR-2022	E372-U	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
INF-14-MAR-2022	E372-U	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SRF-14-MAR-2022	E372-U	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUP-14-MAR-2022	E509	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
INF-14-MAR-2022	E509	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF-14-MAR-2022	E509	14-Mar-2022	15-Mar-2022	----	----		15-Mar-2022	28 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
DUP-14-MAR-2022	E421	14-Mar-2022	21-Mar-2022	----	----		21-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-14-MAR-2022	E421	14-Mar-2022	21-Mar-2022	----	----		21-Mar-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-14-MAR-2022	E421	14-Mar-2022	21-Mar-2022	----	----		21-Mar-2022	180 days	7 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
DUP-14-MAR-2022	E397-H	14-Mar-2022	----	----	----		18-Mar-2022	7 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-14-MAR-2022	E397-H	14-Mar-2022	----	----	----		18-Mar-2022	7 days	4 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
SRF-14-MAR-2022	E397-H	14-Mar-2022	----	----	----		18-Mar-2022	7 days	4 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
DUP-14-MAR-2022	E423BSe	14-Mar-2022	20-Mar-2022	----	----		21-Mar-2022	180 days	7 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-14-MAR-2022	E423BSe	14-Mar-2022	20-Mar-2022	----	----		21-Mar-2022	180 days	7 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-14-MAR-2022	E423BSe	14-Mar-2022	20-Mar-2022	----	----		21-Mar-2022	180 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
DUP-14-MAR-2022	E355-L	14-Mar-2022	15-Mar-2022	----	----		20-Mar-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
INF-14-MAR-2022	E355-L	14-Mar-2022	15-Mar-2022	----	----		20-Mar-2022	28 days	6 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-14-MAR-2022	E355-L	14-Mar-2022	15-Mar-2022	----	----		20-Mar-2022	28 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP-14-MAR-2022	E290	14-Mar-2022	----	----	----		15-Mar-2022	14 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
INF-14-MAR-2022	E290	14-Mar-2022	----	----	----		15-Mar-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-14-MAR-2022	E290	14-Mar-2022	----	----	----		15-Mar-2022	14 days	1 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
DUP-14-MAR-2022	E162	14-Mar-2022	----	----	----		19-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
INF-14-MAR-2022	E162	14-Mar-2022	----	----	----		19-Mar-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-14-MAR-2022	E162	14-Mar-2022	----	----	----		19-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
DUP-14-MAR-2022	E160	14-Mar-2022	----	----	----		20-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-14-MAR-2022	E160	14-Mar-2022	----	----	----		20-Mar-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-14-MAR-2022	E160	14-Mar-2022	----	----	----		20-Mar-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
DUP-14-MAR-2022	E121	14-Mar-2022	----	----	----		16-Mar-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-14-MAR-2022	E121	14-Mar-2022	----	----	----		16-Mar-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-14-MAR-2022	E121	14-Mar-2022	----	----	----		16-Mar-2022	3 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
DUP-14-MAR-2022	E508	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-14-MAR-2022	E508	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-14-MAR-2022	E508	14-Mar-2022	----	----	----		15-Mar-2022	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
DUP-14-MAR-2022	E420	14-Mar-2022	----	----	----		21-Mar-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-14-MAR-2022	E420	14-Mar-2022	----	----	----		21-Mar-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-14-MAR-2022	E420	14-Mar-2022	----	----	----		21-Mar-2022	180 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	432619	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	432665	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	433262	1	7	14.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	432836	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	432837	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	437515	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	433205	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	438015	1	17	5.8	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	436765	1	4	25.0	5.0	✓
Fluoride in Water by IC	E235.F	432834	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	432838	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	432839	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	432840	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	433981	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	433204	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	433733	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	432866	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	432175	2	22	9.0	5.0	✓
TSS by Gravimetry	E160	433997	1	14	7.1	5.0	✓
Turbidity by Nephelometry	E121	434030	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	432619	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	432665	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	433262	1	7	14.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	432836	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	432837	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	437515	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	433205	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	438015	1	17	5.8	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	436765	1	4	25.0	5.0	✓
Fluoride in Water by IC	E235.F	432834	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	432838	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	432839	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	432840	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	433981	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	433204	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	433733	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	432866	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	432175	2	22	9.0	5.0	✓
TSS by Gravimetry	E160	433997	1	14	7.1	5.0	✓
Turbidity by Nephelometry	E121	434030	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	432619	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	432665	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	433262	1	7	14.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	432836	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	432837	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	437515	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	433205	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	438015	1	17	5.8	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	436765	1	4	25.0	5.0	✓
Fluoride in Water by IC	E235.F	432834	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	432838	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	432839	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	432840	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	433981	1	10	10.0	5.0	✓
Total Mercury in Water by CVAAS	E508	433204	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	433733	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	432866	1	14	7.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	432175	2	22	9.0	5.0	✓
TSS by Gravimetry	E160	433997	1	14	7.1	5.0	✓
Turbidity by Nephelometry	E121	434030	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	432665	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	432836	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	432837	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	437515	1	7	14.2	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	433205	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	438015	1	17	5.8	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	436765	1	4	25.0	5.0	✓
Fluoride in Water by IC	E235.F	432834	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	432838	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	432839	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	432840	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	433204	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	433733	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	432866	1	14	7.1	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	432175	2	22	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2202897**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Mar-2022 15:07
PO	: Not Submitted	Date Analysis Commenced	: 15-Mar-2022
C-O-C number	: ----	Issue Date	: 23-Mar-2022 10:51
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
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Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 432619)											
CG2202874-004	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	459	454	0.920%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	459	454	0.920%	20%	----
Physical Tests (QC Lot: 433981)											
CG2202881-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	262	244	7.30%	20%	----
Physical Tests (QC Lot: 433997)											
FC2200421-003	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	66.6	66.2	0.602%	20%	----
Physical Tests (QC Lot: 434030)											
CG2202897-001	SRF-14-MAR-2022	turbidity	----	E121	0.10	NTU	1.55	1.51	2.62%	15%	----
Anions and Nutrients (QC Lot: 432175)											
CG2202874-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 432176)											
CG2202897-002	INF-14-MAR-2022	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0041	0.0040	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 432665)											
CG2202889-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	2.08	2.05	1.53%	20%	----
Anions and Nutrients (QC Lot: 432834)											
CG2202889-001	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 432836)											
CG2202889-001	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 432837)											
CG2202889-001	Anonymous	chloride	16887-00-6	E235.Cl-L	2.00	mg/L	11.6	12.0	0.40	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 432838)											
CG2202889-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	244	250	2.56%	20%	----
Anions and Nutrients (QC Lot: 432839)											
CG2202889-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 432840)											
CG2202897-001	SRF-14-MAR-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	744	739	0.674%	20%	----
Organic / Inorganic Carbon (QC Lot: 432866)											
CG2202881-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Dissolved Sulfides (QC Lot: 436765)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Sulfides (QC Lot: 436765) - continued											
CG2202897-001	SRF-14-MAR-2022	sulfide, dissolved (as S)	18496-25-8	E397-H	0.010	mg/L	0.408	0.379	7.24%	20%	----
Total Metals (QC Lot: 433204)											
CG2202897-001	SRF-14-MAR-2022	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 433733)											
CG2202815-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	2.25	2.07	8.09%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00194	0.00184	5.54%	20%	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.0249	0.0225	9.85%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0439	0.0414	5.87%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	0.000120	0.000113	0.000007	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	0.000078	0.000085	0.000007	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000855	0.0000733	15.4%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	46.6	46.4	0.396%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00394	0.00363	0.00031	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00471	0.00448	4.90%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00812	0.00748	8.22%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	8.16	7.56	7.60%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00794	0.00771	2.96%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0038	0.0039	0.0001	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	18.7	17.5	6.90%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.328	0.310	5.61%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000391	0.000381	0.000010	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00701	0.00660	5.94%	20%	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.151	0.142	0.009	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	1.49	1.38	7.78%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000126	0.000132	0.000006	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	10.3	9.92	4.08%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.000050	0.000046	0.000003	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.21	1.16	4.64%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0731	0.0724	0.905%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	0.78	0.81	0.03	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000091	0.000088	0.000003	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00096	0.00094	0.00002	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.0706	0.0673	4.83%	20%	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000385	0.000382	0.771%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 433733) - continued											
CG2202815-001	Anonymous	vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00471	0.00448	0.00023	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0125	0.0114	0.0011	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00027	0.00027	0.000005	Diff <2x LOR	----
Dissolved Metals (QC Lot: 433205)											
CG2202897-001	SRF-14-MAR-2022	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 437515)											
CG2202897-001	SRF-14-MAR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00298	0.00282	5.55%	20%	----
Dissolved Metals (QC Lot: 438015)											
CG2202702-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0136	0.0127	6.92%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	351	344	1.96%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0989	0.0958	3.13%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	278	260	6.51%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.0107	0.00968	9.86%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.0445	0.0436	2.08%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	0.00432	0.00391	0.00042	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	7.65	7.12	7.21%	20%	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	2.15	2.09	0.064	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	17.5	16.4	6.30%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	0.242	0.237	2.18%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	517	502	3.05%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 438015) - continued											
CG2202702-001	Anonymous	tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.0154	0.0154	0.161%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 433262)											
CG2202906-004	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 432619)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 433981)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 433997)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 434030)						
turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 432175)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 432176)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 432665)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 432834)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 432836)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 432837)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 432838)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 432839)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 432840)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 432866)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 436765)						
sulfide, dissolved (as S)	18496-25-8	E397-H	0.01	mg/L	<0.010	----
Total Metals (QCLot: 433204)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 433204) - continued						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 433733)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 433205)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 437515)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 438015)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 438015) - continued						
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 433262)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 432619)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	103	85.0	115	----
Physical Tests (QCLot: 433981)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.4	85.0	115	----
Physical Tests (QCLot: 433997)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	93.9	85.0	115	----
Physical Tests (QCLot: 434030)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Anions and Nutrients (QCLot: 432175)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	106	80.0	120	----
Anions and Nutrients (QCLot: 432176)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 432665)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.8	85.0	115	----
Anions and Nutrients (QCLot: 432834)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 432836)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 432837)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 432838)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 432839)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 432840)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 432866)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	100	80.0	120	----
Dissolved Sulfides (QCLot: 436765)									
sulfide, dissolved (as S)	18496-25-8	E397-H	0.01	mg/L	0.08 mg/L	87.0	80.0	120	----
Total Metals (QCLot: 433204)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 433204) - continued									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	84.0	80.0	120	----
Total Metals (QCLot: 433733)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.0	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.7	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	93.1	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	89.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.3	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	94.6	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.4	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	114	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	94.3	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.3	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	95.9	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	91.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	88.7	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	95.9	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.0	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.3	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	92.1	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.0	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.9	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.1	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	117	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 437515) - continued									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	107	80.0	120	----
Dissolved Metals (QCLot: 438015)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.9	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.1	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	95.5	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	91.4	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.5	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	88.0	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.7	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.6	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.0	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.4	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.1	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	114	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.8	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.6	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.3	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	97.1	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	97.6	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	89.1	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	96.9	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.3	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.3	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.1	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.8	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	96.3	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.8	80.0	120	----
Aggregate Organics (QCLot: 433262)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Aggregate Organics (QCLot: 433262) - continued									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	87.0	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 432175)										
CG2202874-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0578 mg/L	0.0676 mg/L	85.5	70.0	130	----
Anions and Nutrients (QCLot: 432176)										
CG2202897-003	DUP-14-MAR-2022	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.0676 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 432665)										
CG2202889-003	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 432834)										
CG2202889-008	Anonymous	fluoride	16984-48-8	E235.F	1.13 mg/L	1 mg/L	113	75.0	125	----
Anions and Nutrients (QCLot: 432836)										
CG2202889-008	Anonymous	bromide	24959-67-9	E235.Br-L	0.552 mg/L	0.5 mg/L	110	75.0	125	----
Anions and Nutrients (QCLot: 432837)										
CG2202889-008	Anonymous	chloride	16887-00-6	E235.Cl-L	113 mg/L	100 mg/L	113	75.0	125	----
Anions and Nutrients (QCLot: 432838)										
CG2202889-008	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.84 mg/L	2.5 mg/L	114	75.0	125	----
Anions and Nutrients (QCLot: 432839)										
CG2202889-008	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.576 mg/L	0.5 mg/L	115	75.0	125	----
Anions and Nutrients (QCLot: 432840)										
CG2202897-002	INF-14-MAR-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 432866)										
CG2202881-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.47 mg/L	5 mg/L	109	70.0	130	----
Dissolved Sulfides (QCLot: 436765)										
CG2202897-002	INF-14-MAR-2022	sulfide, dissolved (as S)	18496-25-8	E397-H	1.00 mg/L	1 mg/L	100	75.0	125	----
Total Metals (QCLot: 433204)										
CG2202897-002	INF-14-MAR-2022	mercury, total	7439-97-6	E508	0.0000956 mg/L	0.0001 mg/L	95.6	70.0	130	----
Total Metals (QCLot: 433733)										
CG2202815-002	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.222 mg/L	0.2 mg/L	111	70.0	130	----
		arsenic, total	7440-38-2	E420	0.230 mg/L	0.2 mg/L	115	70.0	130	----
		barium, total	7440-39-3	E420	0.252 mg/L	0.2 mg/L	126	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 433733) - continued										
CG2202815-002	Anonymous	beryllium, total	7440-41-7	E420	0.460 mg/L	0.4 mg/L	115	70.0	130	----
		bismuth, total	7440-69-9	E420	0.116 mg/L	0.1 mg/L	116	70.0	130	----
		boron, total	7440-42-8	E420	1.07 mg/L	1 mg/L	107	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0463 mg/L	0.04 mg/L	116	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.462 mg/L	0.4 mg/L	115	70.0	130	----
		cobalt, total	7440-48-4	E420	0.232 mg/L	0.2 mg/L	116	70.0	130	----
		copper, total	7440-50-8	E420	0.228 mg/L	0.2 mg/L	114	70.0	130	----
		iron, total	7439-89-6	E420	25.4 mg/L	20 mg/L	127	70.0	130	----
		lead, total	7439-92-1	E420	0.233 mg/L	0.2 mg/L	116	70.0	130	----
		lithium, total	7439-93-2	E420	1.11 mg/L	1 mg/L	111	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.232 mg/L	0.2 mg/L	116	70.0	130	----
		nickel, total	7440-02-0	E420	0.461 mg/L	0.4 mg/L	115	70.0	130	----
		phosphorus, total	7723-14-0	E420	110 mg/L	100 mg/L	110	70.0	130	----
		potassium, total	7440-09-7	E420	45.6 mg/L	40 mg/L	114	70.0	130	----
		selenium, total	7782-49-2	E420	0.438 mg/L	0.4 mg/L	109	70.0	130	----
		silicon, total	7440-21-3	E420	116 mg/L	100 mg/L	116	70.0	130	----
		silver, total	7440-22-4	E420	0.0448 mg/L	0.04 mg/L	112	70.0	130	----
		sodium, total	7440-23-5	E420	22.3 mg/L	20 mg/L	112	70.0	130	----
		strontium, total	7440-24-6	E420	0.255 mg/L	0.2 mg/L	127	70.0	130	----
		sulfur, total	7704-34-9	E420	222 mg/L	200 mg/L	111	70.0	130	----
		thallium, total	7440-28-0	E420	0.0434 mg/L	0.04 mg/L	108	70.0	130	----
		tin, total	7440-31-5	E420	0.217 mg/L	0.2 mg/L	108	70.0	130	----
		titanium, total	7440-32-6	E420	0.454 mg/L	0.4 mg/L	113	70.0	130	----
		uranium, total	7440-61-1	E420	0.0454 mg/L	0.04 mg/L	113	70.0	130	----
		vanadium, total	7440-62-2	E420	1.18 mg/L	1 mg/L	118	70.0	130	----
		zinc, total	7440-66-6	E420	4.75 mg/L	4 mg/L	119	70.0	130	----
		zirconium, total	7440-67-7	E420	0.461 mg/L	0.4 mg/L	115	70.0	130	----
Dissolved Metals (QCLot: 433205)										
CG2202897-002	INF-14-MAR-2022	mercury, dissolved	7439-97-6	E509	0.0000791 mg/L	0.0001 mg/L	79.1	70.0	130	----
Dissolved Metals (QCLot: 437515)										
CG2202897-002	INF-14-MAR-2022	selenium, dissolved	7782-49-2	E423BSe	ND mg/L	0.04 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 438015)										
CG2202702-008	Anonymous	aluminum, dissolved	7429-90-5	E421	1.84 mg/L	2 mg/L	92.2	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 438015) - continued										
CG2202702-008	Anonymous	antimony, dissolved	7440-36-0	E421	0.187 mg/L	0.2 mg/L	93.7	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.179 mg/L	0.2 mg/L	89.5	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.187 mg/L	0.2 mg/L	93.5	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.356 mg/L	0.4 mg/L	89.0	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.910 mg/L	1 mg/L	91.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0380 mg/L	0.04 mg/L	95.1	70.0	130	----
		calcium, dissolved	7440-70-2	E421	37.8 mg/L	40 mg/L	94.5	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.381 mg/L	0.4 mg/L	95.3	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.189 mg/L	0.2 mg/L	94.5	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.186 mg/L	0.2 mg/L	92.9	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.0 mg/L	20 mg/L	95.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.198 mg/L	0.2 mg/L	99.0	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.914 mg/L	1 mg/L	91.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	9.17 mg/L	10 mg/L	91.7	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.188 mg/L	0.2 mg/L	94.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.377 mg/L	0.4 mg/L	94.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	89.6 mg/L	100 mg/L	89.6	70.0	130	----
		potassium, dissolved	7440-09-7	E421	37.0 mg/L	40 mg/L	92.6	70.0	130	----
		silicon, dissolved	7440-21-3	E421	91.9 mg/L	100 mg/L	91.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0381 mg/L	0.04 mg/L	95.4	70.0	130	----
		sodium, dissolved	7440-23-5	E421	19.3 mg/L	20 mg/L	96.6	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	192 mg/L	200 mg/L	96.0	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.176 mg/L	0.2 mg/L	88.2	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.364 mg/L	0.4 mg/L	91.1	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.946 mg/L	1 mg/L	94.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.77 mg/L	4 mg/L	94.2	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.371 mg/L	0.4 mg/L	92.7	70.0	130	----

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Environmental Division

Chain of Custody / Analytical Request Form

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Page 1 of 1

Report to:		Report Format / Distribution				Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:				○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					

Invoice To:	Same as Report ? ◉ Yes ○ No	Client / Project Information:
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427
Contact:		PO / AFE:
Address:		Legal Site Description:
Phone:	Fax:	Quote #: CG2021MPMC1000001
Lab Work Order # (lab use only)		ALS Contact: Can Dang / Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS & BOD	Dissolved Se (E423BSe)	Total Organic Carbon	Number of Containers
										P	P/F				P/F	P	
	SRF-14-Mar-2022	14-Mar-22	12:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-14-Mar-2022	14-Mar-22	1:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	DUP -14-Mar-2022	14-Mar-22	12:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2202897

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

INF Hg-Dissolved Bottle broke, used amber glass for dissolved-Hg. Please add preservative in lab.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
		[illegible]	3/14	30 [illegible]	2			

ALS Laboratory Group
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Environmental Division

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COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Akalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS & BOD	Dissolved Se (E423BSe)	Total Organic Carbon	Number of Containers
										F	P/F				P/F	P	
	SRF-14-Mar-2022	14-Mar-22	12:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-14-Mar-2022	14-Mar-22	1:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	DUP -14-Mar-2022	14-Mar-22	12:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2202897

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

INF Hg-Dissolved Bottle broke, used amber glass for dissolved-Hg. please add preservative in lab.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			3/14	3:30 pm	2.5			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2203192**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 21-Mar-2022 12:10
PO	: Not Submitted	Date Analysis Commenced	: 21-Mar-2022
C-O-C number	: ----	Issue Date	: 28-Mar-2022 15:21
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SRF-21-MAR-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	21-Mar-2022 10:00	----	----	----	----
						CG2203192-001	--------	--------	--------	--------
						Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.94	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000851	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00149	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2203192**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 21-Mar-2022 12:10
PO	: Not Submitted	Issue Date	: 28-Mar-2022 15:21
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-21-MAR-2022	E423BSe	21-Mar-2022	23-Mar-2022	----	----		24-Mar-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-21-MAR-2022	E355-L	21-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-21-MAR-2022	E420	21-Mar-2022	----	----	----		25-Mar-2022	180 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	440116	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	441118	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	439727	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	440116	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	441118	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	439727	1	4	25.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	440116	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	441118	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	439727	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	440116	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	441118	1	17	5.8	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	439727	1	4	25.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2203192**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 21-Mar-2022 12:10
PO	: Not Submitted	Date Analysis Commenced	: 21-Mar-2022
C-O-C number	: ----	Issue Date	: 28-Mar-2022 15:21
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 439727)											
CG2203192-001	SRF-21-MAR-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.94	5.14	4.07%	20%	----
Total Metals (QC Lot: 441118)											
CG2203239-001	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 440116)											
CG2203192-001	SRF-21-MAR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000851	0.000863	1.33%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 439727)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 441118)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 440116)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 439727)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	103	80.0	120	----
Total Metals (QCLot: 441118)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.7	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	106	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 439727)										
CG2203192-001	SRF-21-MAR-2022	carbon, total organic [TOC]	----	E355-L	5.97 mg/L	5 mg/L	119	70.0	130	----
Total Metals (QCLot: 441118)										
CG2203239-002	Anonymous	selenium, total	7782-49-2	E420	0.474 mg/L	0.4 mg/L	118	70.0	130	----
Dissolved Metals (QCLot: 440116)										
VA22A5701-015	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0813 mg/L	0.08 mg/L	102	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
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Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Copper	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					F	
	SRF-21-Mar-2022	21-Mar-22	10:00	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2203192

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			3/21	1210	16			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2203504**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Mar-2022 12:30
PO	: Not Submitted	Date Analysis Commenced	: 28-Mar-2022
C-O-C number	: ----	Issue Date	: 04-Apr-2022 15:15
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					Client sample ID	**SRF-28-MAR-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	28-Mar-2022 11:15	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2203504-001**	**--------**	**--------**	**--------**	**--------**	
					Result	----	----	----	----	
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.41	----	----	----	----	
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000688	----	----	----	----	
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L	0.00214	----	----	----	----	
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00223	----	----	----	----	
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----	
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2203504**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Mar-2022 12:30
PO	: Not Submitted	Issue Date	: 04-Apr-2022 15:15
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-28-MAR-2022	E421	28-Mar-2022	03-Apr-2022	----	----		03-Apr-2022	180 days	6 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-28-MAR-2022	E423BSe	28-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-28-MAR-2022	E355-L	28-Mar-2022	29-Mar-2022	----	----		31-Mar-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-28-MAR-2022	E420	28-Mar-2022	----	----	----		02-Apr-2022	180 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	447756	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	449049	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447013	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	445297	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	447756	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	449049	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447013	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	445297	1	8	12.5	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	447756	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	449049	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447013	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	445297	1	8	12.5	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	447756	1	7	14.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	449049	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	447013	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	445297	1	8	12.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2203504**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 28-Mar-2022 12:30
PO	: Not Submitted	Date Analysis Commenced	: 28-Mar-2022
C-O-C number	: ----	Issue Date	: 04-Apr-2022 15:16
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 445297)											
CG2203536-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.34	1.41	0.07	Diff <2x LOR	----
Total Metals (QC Lot: 447013)											
CG2203479-001	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 447756)											
CG2203504-001	SRF-28-MAR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000688	0.000679	1.41%	20%	----
Dissolved Metals (QC Lot: 449049)											
CG2203502-001	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 445297)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 447013)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 447756)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 449049)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 445297)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	87.9	80.0	120	----
Total Metals (QCLot: 447013)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	90.5	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 449049)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	92.6	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 445297)										
CG2203536-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.02 mg/L	5 mg/L	100	70.0	130	----
Total Metals (QCLot: 447013)										
CG2203479-002	Anonymous	selenium, total	7782-49-2	E420	0.383 mg/L	0.4 mg/L	95.9	70.0	130	----
Dissolved Metals (QCLot: 447756)										
VA22A6186-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0794 mg/L	0.08 mg/L	99.3	70.0	130	----
Dissolved Metals (QCLot: 449049)										
CG2203507-014	Anonymous	copper, dissolved	7440-50-8	E421	0.222 mg/L	0.2 mg/L	111	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se and Cu	Dissolved Se (E423BSe)	Dissolved Copper	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F	P/F				P	
	SRF-28-Mar-2022	28-Mar-22	11:15	Water						X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2203504

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
		Amber M	Mar. 28	12:30p	9°C			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2203792**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Apr-2022 11:12
PO	: Not Submitted	Date Analysis Commenced	: 04-Apr-2022
C-O-C number	: ----	Issue Date	: 11-Apr-2022 11:31
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**SRF-4-APR-2022**	**----**	**----**	**----**	**----**
					Client sampling date / time	04-Apr-2022 09:20	----	----	----	----
						CG2203792-001	--------	--------	--------	--------
						Result	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.33	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000938	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00207	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2203792**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Apr-2022 11:12
PO	: Not Submitted	Issue Date	: 11-Apr-2022 11:31
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-4-APR-2022	E423BSe	04-Apr-2022	06-Apr-2022	----	----		06-Apr-2022	180 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SRF-4-APR-2022	E355-L	04-Apr-2022	04-Apr-2022	----	----		04-Apr-2022	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SRF-4-APR-2022	E420	04-Apr-2022	----	----	----		07-Apr-2022	180 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	451687	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	451969	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	449672	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	451687	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	451969	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	449672	1	1	100.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	451687	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	451969	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	449672	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	451687	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	451969	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	449672	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2203792**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Apr-2022 11:12
PO	: Not Submitted	Date Analysis Commenced	: 04-Apr-2022
C-O-C number	: ----	Issue Date	: 11-Apr-2022 11:31
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Organic / Inorganic Carbon (QC Lot: 449672)											
CG2203792-001	SRF-4-APR-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.33	4.96	7.21%	20%	----
Total Metals (QC Lot: 451969)											
CG2203781-001	Anonymous	selenium, total	7782-49-2	E420	0.000250	mg/L	0.00214	0.00178	0.000357	Diff <2x LOR	----
Dissolved Metals (QC Lot: 451687)											
CG2203792-001	SRF-4-APR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000100	mg/L	0.000938	0.000902	0.000036	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 449672)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 451969)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 451687)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 449672)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	101	80.0	120	----
Total Metals (QCLot: 451969)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.6	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	107	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 449672)										
CG2203792-001	SRF-4-APR-2022	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 451969)										
CG2203781-001	Anonymous	selenium, total	7782-49-2	E420	0.468 mg/L	0.4 mg/L	117	70.0	130	----
Dissolved Metals (QCLot: 451687)										
VA22A6760-009	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0422 mg/L	0.04 mg/L	106	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Copper	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-4-Apr-2022	04-Apr-22	10:20	Water						X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2203792

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			4/4/22	17:21	4.6			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2204086**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 11-Apr-2022 13:40
PO	: Not Submitted	Date Analysis Commenced	: 11-Apr-2022
C-O-C number	: ----	Issue Date	: 28-Apr-2022 14:21
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DTSE	*Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-11-APR-2022	INF-11-APR-2022	NEW-INF-11-APR-2022	----	----
					Client sampling date / time	11-Apr-2022 10:15	11-Apr-2022 11:45	11-Apr-2022 12:15	----	----
						CG2204086-001	CG2204086-002	CG2204086-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		178	89.7	78.1	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	6.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		178	89.7	84.1	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		860	780	829	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		885	897	868	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1130	1170	1080	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	3.4	<3.0	----	----
turbidity	----	E121	0.10	NTU		3.14	0.16	0.16	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.456	0.0569	<0.0050	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	<0.250 DLDS	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.90	2.84	2.87	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.225	0.209	0.204	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0250 DLDS	6.71	6.67	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		2.36	0.0050	0.0054	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		754	776	779	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.19	4.99	4.89	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L		1.12	<0.0015	<0.0015	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397	0.0016	mg/L		1.19	<0.0016	<0.0016	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00113	0.0909	0.0919	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0076	0.0072	0.0066	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00049	0.00050	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00266	0.00123	0.00109	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0352	0.0396	0.0420	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-11-APR-2022	INF-11-APR-2022	NEW-INF-11-APR-2022	----	----
					Client sampling date / time	11-Apr-2022 10:15	11-Apr-2022 11:45	11-Apr-2022 12:15	----	----
						CG2204086-001	CG2204086-002	CG2204086-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000020	<0.000020	<0.000020	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.067	0.066	0.067	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000848	0.0000589	0.0000459	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		272	278	264	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00045	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.0268	0.0154	0.0138	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.314	<0.010	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000251	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0032	0.0037	0.0035	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		49.9	49.2	50.7	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.210	0.00050	0.00051	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0187	0.0841	0.0851	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		3.04	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.47	1.64	1.67	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00148 DTSE, RRV	0.106	0.108	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		8.63	6.23	6.40	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		15.5	14.4	14.7	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		2.13 RRV	2.40 RRV	2.42 RRV	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		218	223	228	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00039	<0.00030	<0.00030	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000140	0.00104	0.00105	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00252 RRV	0.00072	0.00074	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0057	0.0042	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-11-APR-2022	INF-11-APR-2022	NEW-INF-11-APR-2022	----	----
					Client sampling date / time	11-Apr-2022 10:15	11-Apr-2022 11:45	11-Apr-2022 12:15	----	----
						CG2204086-001	CG2204086-002	CG2204086-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0048	0.0061	0.0036	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00044	0.00049	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00208	0.00108	0.00113	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0326	0.0383	0.0382	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.063	0.047	0.065	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	0.0000493	0.0000514	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		270	238	254	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00034	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	0.0135	0.0129	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.245	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0032	0.0032	0.0035	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		45.0	45.2	47.2	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.181	0.00012	0.00024	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0108	0.0741	0.0824	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		2.56	<0.050	<0.050	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.32	1.51	1.59	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		8.19	5.63	5.93	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		14.1	13.2	14.0	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.08 RRV	2.18 RRV	2.38 RRV	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		213	203	215	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000141	0.000926	0.00103	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-11-APR-2022	INF-11-APR-2022	NEW-INF-11-APR-2022	----	----
					Client sampling date / time	11-Apr-2022 10:15	11-Apr-2022 11:45	11-Apr-2022 12:15	----	----
						CG2204086-001	CG2204086-002	CG2204086-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00203	<0.00050	0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0025	0.0050	0.0038	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP423	-	-		Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	<2.0	<2.0	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2204086**	Page	: 1 of 15
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 11-Apr-2022 13:40
PO	: Not Submitted	Issue Date	: 28-Apr-2022 14:21
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-11-APR-2022	E550	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
NEW-INF-11-APR-2022	E550	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF-11-APR-2022	E550	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-11-APR-2022	E298	11-Apr-2022	11-Apr-2022	----	----		11-Apr-2022	28 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
NEW-INF-11-APR-2022	E298	11-Apr-2022	11-Apr-2022	----	----		11-Apr-2022	28 days	0 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF-11-APR-2022	E298	11-Apr-2022	11-Apr-2022	----	----		11-Apr-2022	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.Br-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE NEW-INF-11-APR-2022	E235.Br-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SRF-11-APR-2022	E235.Br-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE INF-11-APR-2022	E235.Cl-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE NEW-INF-11-APR-2022	E235.Cl-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE SRF-11-APR-2022	E235.Cl-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE INF-11-APR-2022	E235.F	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE NEW-INF-11-APR-2022	E235.F	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SRF-11-APR-2022	E235.F	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE INF-11-APR-2022	E235.NO3-L	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
NEW-INF-11-APR-2022	E235.NO3-L	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-11-APR-2022	E235.NO3-L	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.NO2-L	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
NEW-INF-11-APR-2022	E235.NO2-L	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-11-APR-2022	E235.NO2-L	11-Apr-2022	----	----	----		12-Apr-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.SO4-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
NEW-INF-11-APR-2022	E235.SO4-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-11-APR-2022	E235.SO4-L	11-Apr-2022	----	----	----		12-Apr-2022	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
INF-11-APR-2022	E372-U	11-Apr-2022	18-Apr-2022	----	----		18-Apr-2022	28 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
NEW-INF-11-APR-2022	E372-U	11-Apr-2022	18-Apr-2022	----	----		18-Apr-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SRF-11-APR-2022	E372-U	11-Apr-2022	18-Apr-2022	----	----		18-Apr-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved)										
INF-11-APR-2022	E509	11-Apr-2022	13-Apr-2022	----	----		13-Apr-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
NEW-INF-11-APR-2022	E509	11-Apr-2022	13-Apr-2022	----	----		13-Apr-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF-11-APR-2022	E509	11-Apr-2022	13-Apr-2022	----	----		13-Apr-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-11-APR-2022	E421	11-Apr-2022	13-Apr-2022	----	----		13-Apr-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
NEW-INF-11-APR-2022	E421	11-Apr-2022	13-Apr-2022	----	----		13-Apr-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-11-APR-2022	E421	11-Apr-2022	13-Apr-2022	----	----		13-Apr-2022	180 days	2 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-11-APR-2022	E397	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide) NEW-INF-11-APR-2022	E397	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide) SRF-11-APR-2022	E397	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) INF-11-APR-2022	E423BSe	11-Apr-2022	28-Apr-2022	----	----		28-Apr-2022	180 days	17 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) NEW-INF-11-APR-2022	E423BSe	11-Apr-2022	28-Apr-2022	----	----		28-Apr-2022	180 days	17 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-11-APR-2022	E423BSe	11-Apr-2022	28-Apr-2022	----	----		28-Apr-2022	180 days	17 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) INF-11-APR-2022	E355-L	11-Apr-2022	11-Apr-2022	----	----		11-Apr-2022	28 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) NEW-INF-11-APR-2022	E355-L	11-Apr-2022	11-Apr-2022	----	----		11-Apr-2022	28 days	0 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SRF-11-APR-2022	E355-L	11-Apr-2022	11-Apr-2022	----	----		11-Apr-2022	28 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE INF-11-APR-2022	E290	11-Apr-2022	----	----	----		13-Apr-2022	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
NEW-INF-11-APR-2022	E290	11-Apr-2022	----	----	----		13-Apr-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-11-APR-2022	E290	11-Apr-2022	----	----	----		13-Apr-2022	14 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
INF-11-APR-2022	E162	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
NEW-INF-11-APR-2022	E162	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-11-APR-2022	E162	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-11-APR-2022	E160	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
NEW-INF-11-APR-2022	E160	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-11-APR-2022	E160	11-Apr-2022	----	----	----		13-Apr-2022	7 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-11-APR-2022	E121	11-Apr-2022	----	----	----		11-Apr-2022	3 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
NEW-INF-11-APR-2022	E121	11-Apr-2022	----	----	----		11-Apr-2022	3 days	0 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-11-APR-2022	E121	11-Apr-2022	----	----	----		11-Apr-2022	3 days	0 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved)										
INF-11-APR-2022	E508	11-Apr-2022	----	----	----		13-Apr-2022	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
NEW-INF-11-APR-2022	E508	11-Apr-2022	----	----	----		13-Apr-2022	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-11-APR-2022	E508	11-Apr-2022	----	----	----		13-Apr-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-11-APR-2022	E420	11-Apr-2022	----	----	----		13-Apr-2022	180 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
NEW-INF-11-APR-2022	E420	11-Apr-2022	----	----	----		13-Apr-2022	180 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-11-APR-2022	E420	11-Apr-2022	----	----	----		13-Apr-2022	180 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	457575	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	455747	2	37	5.4	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	456807	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	456210	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	456209	1	12	8.3	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470405	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	457736	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	456164	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	458109	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	456206	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	456208	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	456207	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	456212	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	456657	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	457735	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	457221	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	455703	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	455819	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	457616	1	11	9.0	5.0	✓
Turbidity by Nephelometry	E121	455832	1	6	16.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	457575	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	455747	2	37	5.4	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	456807	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	456210	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	456209	1	12	8.3	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470405	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	457736	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	456164	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	458109	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	456206	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	456208	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	456207	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	456212	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	456657	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	457735	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	457221	1	16	6.2	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	455703	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	455819	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	457616	1	11	9.0	5.0	✓
Turbidity by Nephelometry	E121	455832	1	6	16.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	457575	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	455747	2	37	5.4	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	456807	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	456210	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	456209	1	12	8.3	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470405	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	457736	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	456164	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	458109	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	456206	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	456208	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	456207	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	456212	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	456657	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	457735	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	457221	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	455703	1	3	33.3	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	455819	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	457616	1	11	9.0	5.0	✓
Turbidity by Nephelometry	E121	455832	1	6	16.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	455747	2	37	5.4	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	456210	1	12	8.3	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	456209	1	12	8.3	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470405	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	457736	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	456164	1	18	5.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397	458109	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	456206	1	12	8.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	456208	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	456207	1	13	7.6	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	456212	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	457735	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	457221	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	455703	1	3	33.3	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	455819	1	7	14.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397 Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2204086**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 11-Apr-2022 13:40
PO	: Not Submitted	Date Analysis Commenced	: 11-Apr-2022
C-O-C number	: ----	Issue Date	: 28-Apr-2022 14:21
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 455832)											
CG2204076-006	Anonymous	turbidity	----	E121	0.10	NTU	0.55	0.56	0.006	Diff <2x LOR	----
Physical Tests (QC Lot: 456657)											
CG2204082-006	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	3540	3550	0.254%	20%	----
Physical Tests (QC Lot: 457575)											
CG2203808-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	329	343	4.28%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	329	343	4.28%	20%	----
Physical Tests (QC Lot: 457616)											
FJ2200889-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	8.0	7.4	0.6	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 455747)											
CG2204064-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.186	0.186	0.215%	20%	----
Anions and Nutrients (QC Lot: 455748)											
CG2204086-003	NEW-INF-11-APR-2022	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 455819)											
CG2204080-010	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0034	0.0037	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 456206)											
CG2204082-001	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	0.437	0.444	0.007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 456207)											
CG2204082-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	4.85	4.79	1.28%	20%	----
Anions and Nutrients (QC Lot: 456208)											
CG2204082-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	95.4	95.9	0.459%	20%	----
Anions and Nutrients (QC Lot: 456209)											
CG2204082-001	Anonymous	chloride	16887-00-6	E235.Cl-L	2.00	mg/L	47.4	47.4	0.130%	20%	----
Anions and Nutrients (QC Lot: 456210)											
CG2204082-001	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 456212)											
CG2204086-001	SRF-11-APR-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	754	731	3.05%	20%	----
Organic / Inorganic Carbon (QC Lot: 455703)											
CG2204086-001	SRF-11-APR-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.19	5.07	2.25%	20%	----
Dissolved Sulfides (QC Lot: 458109)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Sulfides (QC Lot: 458109) - continued											
CG2204081-003	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	<0.0015	0	Diff <2x LOR	----
Total Metals (QC Lot: 457221)											
CG2204086-001	SRF-11-APR-2022	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0076	0.0088	0.0013	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00266	0.00277	3.82%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0352	0.0354	0.538%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.067	0.069	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000848	0.0000696	19.6%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	272	279	2.65%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00045	0.00044	0.00001	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.0268	0.0264	1.59%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.314	0.319	1.33%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000251	0.000262	0.000010	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0032	0.0035	0.0003	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	49.9	50.3	0.808%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.210	0.212	0.864%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0187	0.0190	1.75%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	3.04	3.03	0.477%	20%	----
		potassium, total	7440-09-7	E420	0.100	mg/L	1.47	1.48	0.731%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	8.63	8.68	0.594%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	15.5	15.4	1.19%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	2.13	2.21	3.69%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	218	216	0.974%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00039	0.00037	0.00002	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000140	0.000146	4.89%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00252	0.00248	0.00004	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 457735)											
CG2204085-007	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 456164)											
CG2204062-016	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 457736)											
CG2204086-001	SRF-11-APR-2022	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 470405)											
CG2204086-001	SRF-11-APR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00113	0.00107	4.86%	20%	----
Aggregate Organics (QC Lot: 456807)											
CG2204082-010	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 455832)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 456657)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 457575)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 457616)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 455747)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 455748)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 455819)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 456206)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 456207)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 456208)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 456209)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 456210)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 456212)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 455703)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 458109)						
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 457221)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 457221) - continued						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 457735)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.000000005	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 456164)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 457736)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.000000005	----
Dissolved Metals (QCLot: 470405)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 470405) - continued						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Aggregate Organics (QCLot: 456807)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 455832)									
turbidity	----	E121	0.1	NTU	200 NTU	105	85.0	115	----
Physical Tests (QCLot: 456657)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	97.9	85.0	115	----
Physical Tests (QCLot: 457575)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	112	85.0	115	----
Physical Tests (QCLot: 457616)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	98.9	85.0	115	----
Anions and Nutrients (QCLot: 455747)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 455748)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 455819)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 456206)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 456207)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 456208)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 456209)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 456210)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	95.2	85.0	115	----
Anions and Nutrients (QCLot: 456212)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	105	90.0	110	----
Organic / Inorganic Carbon (QCLot: 455703)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	102	80.0	120	----
Dissolved Sulfides (QCLot: 458109)									
sulfide, dissolved (as S)	18496-25-8	E397	0.0015	mg/L	0.08 mg/L	99.4	80.0	120	----
Total Metals (QCLot: 457221)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 457221) - continued									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	105	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	114	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	105	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.6	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	115	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	107	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.8	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	106	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	108	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Total Metals (QCLot: 457735)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	112	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 456164)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	110	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	106	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	96.3	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.9	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	108	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.7	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	106	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	105	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.3	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	98.6	80.0	120	----
Aggregate Organics (QCLot: 456807)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	106	85.0	115	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 455747)										
CG2204064-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 455748)										
CG2204088-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 455819)										
CG2204085-003	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0551 mg/L	0.0676 mg/L	81.5	70.0	130	----
Anions and Nutrients (QCLot: 456206)										
CG2204082-003	Anonymous	fluoride	16984-48-8	E235.F	0.920 mg/L	1 mg/L	92.0	75.0	125	----
Anions and Nutrients (QCLot: 456207)										
CG2204082-003	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	ND mg/L	0.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 456208)										
CG2204082-003	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 456209)										
CG2204082-003	Anonymous	chloride	16887-00-6	E235.Cl-L	101 mg/L	100 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 456210)										
CG2204082-003	Anonymous	bromide	24959-67-9	E235.Br-L	0.455 mg/L	0.5 mg/L	91.0	75.0	125	----
Anions and Nutrients (QCLot: 456212)										
CG2204086-002	INF-11-APR-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 455703)										
CG2204086-001	SRF-11-APR-2022	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Dissolved Sulfides (QCLot: 458109)										
CG2204081-004	Anonymous	sulfide, dissolved (as S)	18496-25-8	E397	0.930 mg/L	1 mg/L	93.0	75.0	125	----
Total Metals (QCLot: 457221)										
CG2204086-002	INF-11-APR-2022	aluminum, total	7429-90-5	E420	2.08 mg/L	2 mg/L	104	70.0	130	----
		antimony, total	7440-36-0	E420	0.211 mg/L	0.2 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.209 mg/L	0.2 mg/L	104	70.0	130	----
		barium, total	7440-39-3	E420	0.228 mg/L	0.2 mg/L	114	70.0	130	----
		beryllium, total	7440-41-7	E420	0.401 mg/L	0.4 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.108 mg/L	0.1 mg/L	108	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 457221) - continued										
CG2204086-002	INF-11-APR-2022	boron, total	7440-42-8	E420	1.03 mg/L	1 mg/L	103	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0426 mg/L	0.04 mg/L	107	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.428 mg/L	0.4 mg/L	107	70.0	130	----
		cobalt, total	7440-48-4	E420	0.209 mg/L	0.2 mg/L	105	70.0	130	----
		copper, total	7440-50-8	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		iron, total	7439-89-6	E420	20.6 mg/L	20 mg/L	103	70.0	130	----
		lead, total	7439-92-1	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		lithium, total	7439-93-2	E420	1.04 mg/L	1 mg/L	104	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.213 mg/L	0.2 mg/L	107	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.216 mg/L	0.2 mg/L	108	70.0	130	----
		nickel, total	7440-02-0	E420	0.417 mg/L	0.4 mg/L	104	70.0	130	----
		phosphorus, total	7723-14-0	E420	108 mg/L	100 mg/L	108	70.0	130	----
		potassium, total	7440-09-7	E420	41.7 mg/L	40 mg/L	104	70.0	130	----
		selenium, total	7782-49-2	E420	0.370 mg/L	0.4 mg/L	92.4	70.0	130	----
		silicon, total	7440-21-3	E420	97.8 mg/L	100 mg/L	97.8	70.0	130	----
		silver, total	7440-22-4	E420	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
		sodium, total	7440-23-5	E420	21.1 mg/L	20 mg/L	106	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		tin, total	7440-31-5	E420	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		titanium, total	7440-32-6	E420	0.430 mg/L	0.4 mg/L	108	70.0	130	----
		uranium, total	7440-61-1	E420	0.0429 mg/L	0.04 mg/L	107	70.0	130	----
		vanadium, total	7440-62-2	E420	1.05 mg/L	1 mg/L	105	70.0	130	----
		zinc, total	7440-66-6	E420	4.08 mg/L	4 mg/L	102	70.0	130	----
		zirconium, total	7440-67-7	E420	0.424 mg/L	0.4 mg/L	106	70.0	130	----
Total Metals (QCLot: 457735)										
CG2204085-008	Anonymous	mercury, total	7439-97-6	E508	0.0000950 mg/L	0.0001 mg/L	95.0	70.0	130	----
Dissolved Metals (QCLot: 456164)										
CG2204062-016	Anonymous	aluminum, dissolved	7429-90-5	E421	1.95 mg/L	2 mg/L	97.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.190 mg/L	0.2 mg/L	94.8	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.398 mg/L	0.4 mg/L	99.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 456164) - continued										
CG2204062-016	Anonymous	bismuth, dissolved	7440-69-9	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		boron, dissolved	7440-42-8	E421	1.06 mg/L	1 mg/L	106	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		calcium, dissolved	7440-70-2	E421	37.9 mg/L	40 mg/L	94.8	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.195 mg/L	0.2 mg/L	97.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.3 mg/L	20 mg/L	96.6	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.970 mg/L	1 mg/L	97.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	9.42 mg/L	10 mg/L	94.2	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.196 mg/L	0.2 mg/L	98.1	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.392 mg/L	0.4 mg/L	98.1	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	93.2 mg/L	100 mg/L	93.2	70.0	130	----
		potassium, dissolved	7440-09-7	E421	37.4 mg/L	40 mg/L	93.6	70.0	130	----
		silicon, dissolved	7440-21-3	E421	91.7 mg/L	100 mg/L	91.7	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0395 mg/L	0.04 mg/L	98.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	20.3 mg/L	20 mg/L	102	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.190 mg/L	0.2 mg/L	95.0	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	192 mg/L	200 mg/L	95.8	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0380 mg/L	0.04 mg/L	95.0	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.194 mg/L	0.2 mg/L	97.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.418 mg/L	0.4 mg/L	104	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.965 mg/L	1 mg/L	96.5	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.90 mg/L	4 mg/L	97.5	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.387 mg/L	0.4 mg/L	96.8	70.0	130	----
Dissolved Metals (QCLot: 457736)										
CG2204086-002	INF-11-APR-2022	mercury, dissolved	7439-97-6	E509	0.000106 mg/L	0.0001 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 470405)										
CG2204086-002	INF-11-APR-2022	selenium, dissolved	7782-49-2	E423BSe	ND mg/L	0.04 mg/L	ND	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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Page 1 of 1

Environmental Division Calgary
Work Order Reference
CG2204086

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS & BOD	Dissolved Se (E423BSe)	Total Organic Carbon	Number of Containers
							F/P			P	P/F				P/F	P	
	SRF-11-Apr-2022	11-Apr-22	11:15	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-11-Apr-2022	11-Apr-22	12:45	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	New -INF -11-Apr-2022	11-Apr-22	1:15	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2204086

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

T-Hg & D-Hg for INF-11-Apr-2022 sample has been collected in amber glass bottles. The samples are not preserved nor filtered. Please preserve and filter in the lab accordingly.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			4/11	1440	22			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2204359**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 18-Apr-2022 13:10
PO	: Not Submitted	Date Analysis Commenced	: 18-Apr-2022
C-O-C number	: ----	Issue Date	: 25-Apr-2022 12:48
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)				Client sample ID	**SRF-18-APR-2022**	**----**	**----**	**----**	**----**
				Client sampling date / time	18-Apr-2022 11:00	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2204359-001**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
Anions and Nutrients									
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.102	----	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.17	----	----	----	----
Metals									
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00130	----	----	----	----
Total Metals									
selenium, total	7782-49-2	E420	0.000050	mg/L	0.00168	----	----	----	----
Dissolved Metals									
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2204359**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 18-Apr-2022 13:10
PO	: Not Submitted	Issue Date	: 25-Apr-2022 12:48
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-18-APR-2022	E235.NO3-L	18-Apr-2022	----	----	----		18-Apr-2022	3 days	0 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-18-APR-2022	E423BSe	18-Apr-2022	22-Apr-2022	----	----		23-Apr-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-18-APR-2022	E355-L	18-Apr-2022	18-Apr-2022	----	----		19-Apr-2022	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-18-APR-2022	E420	18-Apr-2022	----	----	----		19-Apr-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	465598	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	461253	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	461639	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	461056	1	6	16.6	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	465598	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	461253	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	461639	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	461056	1	6	16.6	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	465598	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	461253	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	461639	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	461056	1	6	16.6	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	465598	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	461253	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	461639	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	461056	1	6	16.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2204359**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 18-Apr-2022 13:10
PO	: Not Submitted	Date Analysis Commenced	: 18-Apr-2022
C-O-C number	: ----	Issue Date	: 25-Apr-2022 12:48
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 461253)											
CG2204345-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	17.1	16.6	2.95%	20%	----
Organic / Inorganic Carbon (QC Lot: 461056)											
CG2204356-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.34	1.26	0.08	Diff <2x LOR	----
Total Metals (QC Lot: 461639)											
CG2204369-001	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 465598)											
CG2204359-001	SRF-18-APR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00130	0.00122	5.88%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 461253)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 461056)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 461639)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 465598)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 461253)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.7	90.0	110	----
Organic / Inorganic Carbon (QCLot: 461056)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	107	80.0	120	----
Total Metals (QCLot: 461639)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.8	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	102	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 461253)										
CG2204356-005	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.35 mg/L	2.5 mg/L	94.0	75.0	125	----
Organic / Inorganic Carbon (QCLot: 461056)										
CG2204356-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.59 mg/L	5 mg/L	112	70.0	130	----
Total Metals (QCLot: 461639)										
CG2204369-002	Anonymous	selenium, total	7782-49-2	E420	0.412 mg/L	0.4 mg/L	103	70.0	130	----
Dissolved Metals (QCLot: 465598)										
VA22A7709-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0811 mg/L	0.08 mg/L	101	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se (P)	Dissolved Se (E423BSe) (F/P)	Dissolved Copper	Turbidity	TSS	BOD	Total Organic Carbon (P)	Number of Containers
	SRF-18-Apr-2022	18-Apr-22	11:00	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2204359

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
					18		Apr 10/04/10 2022	

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2204729**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 25-Apr-2022 14:08
PO	:	Date Analysis Commenced	: 26-Apr-2022
C-O-C number	: 17-814980	Issue Date	: 30-Apr-2022 12:47
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Kevin Baxter		Metals, Calgary, Alberta
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-25-APR-2022	----	----	----	----
					Client sampling date / time	25-Apr-2022	----	----	----	----
						CG2204729-001	--------	--------	--------	--------
						Result	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0422	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.53	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000892	----	----	----	----
Total Metals										
copper, total	7440-50-8	E420	0.00050	mg/L		0.0102	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00166	----	----	----	----
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00100 DLDS	----	----	----	----
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2204729**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 25-Apr-2022 14:08
PO	:	Issue Date	: 30-Apr-2022 12:47
C-O-C number	: 17-814980		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SRF-25-APR-2022	E235.NO3-L	25-Apr-2022	----	----	----		27-Apr-2022	3 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-25-APR-2022	E421	25-Apr-2022	29-Apr-2022	----	----		29-Apr-2022	180 days	4 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-25-APR-2022	E423BSe	25-Apr-2022	28-Apr-2022	----	----		28-Apr-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SRF-25-APR-2022	E355-L	25-Apr-2022	26-Apr-2022	----	----		27-Apr-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SRF-25-APR-2022	E420	25-Apr-2022	----	----	----		26-Apr-2022	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470055	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	472080	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	469409	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	468231	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	468141	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470055	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	472080	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	469409	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	468231	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	468141	1	13	7.6	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470055	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	472080	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	469409	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	468231	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	468141	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	470055	1	3	33.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	472080	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	469409	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	468231	1	3	33.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	468141	1	13	7.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2204729**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 25-Apr-2022 14:08
PO	:	Date Analysis Commenced	: 26-Apr-2022
C-O-C number	: 17-814980	Issue Date	: 30-Apr-2022 12:47
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Kevin Baxter		Metals, Calgary, Alberta
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 469409)											
CG2204764-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 468141)											
CG2204721-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.11	1.07	0.04	Diff <2x LOR	----
Total Metals (QC Lot: 468231)											
CG2204727-001	Anonymous	copper, total	7440-50-8	E420	0.00050	mg/L	0.00280	0.00268	0.00012	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000647	0.000559	14.5%	20%	----
Dissolved Metals (QC Lot: 470055)											
CG2204729-001	SRF-25-APR-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000892	0.000929	3.99%	20%	----
Dissolved Metals (QC Lot: 472080)											
CG2204719-001	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 469409)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 468141)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 468231)						
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 470055)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 472080)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 469409)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100	90.0	110	----
Organic / Inorganic Carbon (QCLot: 468141)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	119	80.0	120	----
Total Metals (QCLot: 468231)									
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.6	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 472080)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 469409)										
CG2204801-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.30 mg/L	2.5 mg/L	91.9	75.0	125	----
Organic / Inorganic Carbon (QCLot: 468141)										
CG2204721-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.57 mg/L	5 mg/L	111	70.0	130	----
Total Metals (QCLot: 468231)										
CG2204727-001	Anonymous	copper, total	7440-50-8	E420	0.195 mg/L	0.2 mg/L	97.7	70.0	130	----
		selenium, total	7782-49-2	E420	0.407 mg/L	0.4 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 470055)										
VA22A8786-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0447 mg/L	0.04 mg/L	112	70.0	130	----
Dissolved Metals (QCLot: 472080)										
CG2204719-002	Anonymous	copper, dissolved	7440-50-8	E421	0.172 mg/L	0.2 mg/L	86.2	70.0	130	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 - 814980

Page of

Report To	Contact and company name below will appear on the final report	Report Format / Distribution		Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)	
Company:	Mount Polley mining corp	Select Report Format:	[X] PDF [X] EXCEL | | EDD (DIGITAL)	Regular [R]	[X] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Kala Ivens	Quality Control (QC) Report with Report	[X] YES [ ] NO	PRIORITY (Business Days) 4 day [P4-20%]	[ ] EMERGENCY 1 Business day [E - 100%] [ ]
Phone:		[ ] Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] [ ]	Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] [ ]
Company address below will appear on the final report		Select Distribution:	[X] EMAIL | | MAIL [ ] FAX	2 day [P2-50%] [ ]	
Street:		Email 1 or Fax	mxw@golder.com	Date and Time Required for all E&P TATs:	dd-mmm-yy hh:mm
City/Province:		Email 2		For tests that can not be performed according to the service level selected, you will be contacted.	
Postal Code:		Email 3			

Invoice To		Invoice Distribution	
	Same as Report To [X] YES [ ] NO	Select Invoice Distribution:	[ ] EMAIL [ ] MAIL [ ] FAX
	Copy of Invoice with Report [ ] YES [ ] NO	Email 1 or Fax	
Company:		Email 2	
Contact:	ernie.guevarra@imperialmetals.com		

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	MPMC100 / CG2021MPMC100001	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):	ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P	F/P	F	P												SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
						Total Se & Cu	D-Se (CE42B Se)	D-Cu	TOC	Nitrate												
	SRF - LS - Apr - 2022	25-4-22		WW		X	X	X	X	X												

Environmental Division Calgary
Work Order Reference
CG2204729

Telephone : +1 403 407 1800

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? [ ] YES [ ] NO	
Are samples for human consumption/ use? | | YES | | NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	[ ]	SIF Observations	Yes [ ]	No	[ ]
Ice Packs	[ ] Ice Cubes [ ]	Custody seal intact	Yes [ ]	No	[ ]
Cooling Initiated	[ ]				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
				4/25	9:20			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2015 FRONT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2205167**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 02-May-2022 14:30
PO	: Not Submitted	Date Analysis Commenced	: 04-May-2022
C-O-C number	: ----	Issue Date	: 20-May-2022 08:41
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-2MAY-2022	----	----	----	----
					Client sampling date / time	02-May-2022 10:45	----	----	----	----
					CG2205167-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0521	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.38	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00563 DTC	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00414 DTC	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2205167**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 02-May-2022 14:30
PO	: Not Submitted	Issue Date	: 20-May-2022 08:41
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-2MAY-2022	E235.NO3-L	02-May-2022	----	----	----		04-May-2022	3 days	2 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-2MAY-2022	E423BSe	02-May-2022	10-May-2022	----	----		10-May-2022	180 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-2MAY-2022	E355-L	02-May-2022	04-May-2022	----	----		04-May-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-2MAY-2022	E420	02-May-2022	----	----	----		08-May-2022	180 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	480584	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	476905	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480715	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	477112	1	2	50.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	480584	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	476905	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480715	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	477112	1	2	50.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	480584	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	476905	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480715	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	477112	1	2	50.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	480584	1	19	5.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	476905	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	480715	1	7	14.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	477112	1	2	50.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2205167**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 02-May-2022 14:30
PO	: Not Submitted	Date Analysis Commenced	: 04-May-2022
C-O-C number	: ----	Issue Date	: 20-May-2022 08:41
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Sara Niroomand		Calgary Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 476905)											
CG2205164-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0235	0.0218	0.0017	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 477112)											
CG2205201-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 480715)											
CG2205068-009	Anonymous	selenium, total	7782-49-2	E420	0.000250	mg/L	2.61 µg/L	0.00260	0.267%	20%	----
Dissolved Metals (QC Lot: 480584)											
CG2205167-001	SRF-2MAY-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00563	0.00584	3.75%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 476905)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 477112)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 480715)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 480584)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 476905)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 477112)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	114	80.0	120	----
Total Metals (QCLot: 480715)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.2	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	104	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 476905)										
CG2205168-009	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.46 mg/L	2.5 mg/L	98.3	75.0	125	----
Organic / Inorganic Carbon (QCLot: 477112)										
CG2205201-001	Anonymous	carbon, total organic [TOC]	----	E355-L	5.53 mg/L	5 mg/L	110	70.0	130	----
Total Metals (QCLot: 480715)										
CG2205075-001	Anonymous	selenium, total	7782-49-2	E420	0.395 mg/L	0.4 mg/L	98.7	70.0	130	----
Dissolved Metals (QCLot: 480584)										
FJ2201111-001	Anonymous	selenium, dissolved	7782-49-2	E423BSe	ND mg/L	0.04 mg/L	ND	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Copper	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F					P	
	SRF-2-May-2022	02-May-22	10:45	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2205167

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			5/2	1430	1.4			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2205498**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 09-May-2022 14:44
PO	: Not Submitted	Date Analysis Commenced	: 10-May-2022
C-O-C number	: ----	Issue Date	: 30-May-2022 13:28
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-9-May-2022	----	----	----	----
					Client sampling date / time	09-May-2022 13:15	----	----	----	----
					CG2205498-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.307	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.73	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00145 RRV	----	----	----	----
Total Metals										
copper, total	7440-50-8	E420	0.00050	mg/L		0.00793	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00104 DTC, RRV	----	----	----	----
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00708	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2205498**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 09-May-2022 14:44
PO	: Not Submitted	Issue Date	: 30-May-2022 13:28
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-9-May-2022	E235.NO3-L	09-May-2022	----	----	----		10-May-2022	3 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-9-May-2022	E421	09-May-2022	20-May-2022	----	----		20-May-2022	180 days	11 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-9-May-2022	E423BSe	09-May-2022	12-May-2022	----	----		14-May-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-9-May-2022	E355-L	09-May-2022	20-May-2022	----	----		22-May-2022	28 days	13 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-9-May-2022	E420	09-May-2022	----	----	----		22-May-2022	180 days	13 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	485302	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	494900	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	482128	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	496333	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	494852	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	485302	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	494900	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	482128	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	496333	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	494852	1	3	33.3	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	485302	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	494900	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	482128	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	496333	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	494852	1	3	33.3	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	485302	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	494900	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	482128	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	496333	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	494852	1	3	33.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2205498**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 09-May-2022 14:44
PO	: Not Submitted	Date Analysis Commenced	: 10-May-2022
C-O-C number	: ----	Issue Date	: 30-May-2022 13:28
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Shirley Li		Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 482128)											
CG2205488-013	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.0442	0.0414	0.0028	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 494852)											
CG2205782-010	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Total Metals (QC Lot: 496333)											
CG2205498-001	SRF-9-May-2022	copper, total	7440-50-8	E420	0.00050	mg/L	0.00793	0.00813	2.42%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00104	0.00104	0.289%	20%	----
Dissolved Metals (QC Lot: 485302)											
CG2205498-001	SRF-9-May-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00145	0.00148	1.56%	20%	----
Dissolved Metals (QC Lot: 494900)											
CG2205498-001	SRF-9-May-2022	copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00708	0.00712	0.581%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 482128)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 494852)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 496333)						
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 485302)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 494900)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 482128)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 494852)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	85.8	80.0	120	----
Total Metals (QCLot: 496333)									
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.1	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.5	80.0	120	----
Dissolved Metals (QCLot: 485302)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 494900)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 482128)										
CG2205488-014	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.53 mg/L	2.5 mg/L	101	75.0	125	----
Organic / Inorganic Carbon (QCLot: 494852)										
CG2205782-010	Anonymous	carbon, total organic [TOC]	----	E355-L	5.01 mg/L	5 mg/L	100	70.0	130	----
Total Metals (QCLot: 496333)										
CG2205861-004	Anonymous	copper, total	7440-50-8	E420	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		selenium, total	7782-49-2	E420	0.422 mg/L	0.4 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 485302)										
VA22B0053-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
Dissolved Metals (QCLot: 494900)										
CG2205498-001	SRF-9-May-2022	copper, dissolved	7440-50-8	E421	0.203 mg/L	0.2 mg/L	102	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se and Cu	Dissolved Se (E423BSe)	Dissolved Copper	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
						P	P/F	P/F								P	
	SRF-9-May-2022	09-May-22	1:15 PM	Water		X				X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2205498

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			5/9	14:44	6			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2205843**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 17-May-2022 05:30
PO	:	Date Analysis Commenced	: 17-May-2022
C-O-C number	: ----	Issue Date	: 31-May-2022 15:56
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Naeun Kim	Analyst	Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Inorganics, Calgary, Alberta
Sunil Palak		Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
PHA	*pH adjusted before analysis.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF - 11- APR - 2022	INF-11-APR-2022	----	----	----
					Client sampling date / time	16-May-2022 14:40	16-May-2022 15:00	----	----	----
						CG2205843-001	CG2205843-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		229	77.9	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		229	77.9	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		786	782	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		750	775	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1090	894	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		6.7	3.7	----	----	----
turbidity	----	E121	0.10	NTU		5.43	0.21	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0772	0.0073	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.82	2.78	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.182	0.180	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0633	6.66	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	0.0088	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		3.01 DLHC	0.0070	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		645	770	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.72	4.75	----	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397-H	0.010	mg/L		1.71	<0.010	----	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397-H	0.011	mg/L		1.82	<0.011	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00110	0.0970 RRV	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0070	0.0060	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00049	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00386	0.00111	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0278	0.0332	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF - 11- APR - 2022	INF-11-APR-2022	----	----	----
					Client sampling date / time	16-May-2022 14:40	16-May-2022 15:00	----	----	----
						CG2205843-001	CG2205843-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000020	<0.000020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.064	0.080	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000398	0.0000597	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		225	236	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00116	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00391	0.0150	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.650	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000102	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0025	0.0034	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		45.6	45.2	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.350	0.00170	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		0.0000106 RRV	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00558	0.123	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		3.14	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.18	1.52	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00154 DTC	0.0906	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		9.90	5.89	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		13.7	12.9	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		1.90	2.36	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		231	214	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000074	0.000943	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00202	0.00084	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	0.0075	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF - 11- APR - 2022	INF-11-APR-2022	----	----	----
					Client sampling date / time	16-May-2022 14:40	16-May-2022 15:00	----	----	----
						CG2205843-001	CG2205843-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0064	<0.0050 DLDS	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00334	0.00111	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0282	0.0352	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.066	0.061	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000250 DLDS	0.0000506	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		239	235	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00089	<0.00050 DLDS	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00100 DLDS	0.0137	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.603	<0.050 DLDS	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		45.9	47.4	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.340	0.00083	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		0.0000056 RRV	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00595	0.0784	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		2.63	<0.250 DLDS	----	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.17	1.56	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		9.59	5.86	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		13.3	13.1	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.01	2.34	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		219	256	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000079	0.000941	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF - 11- APR - 2022	INF-11-APR-2022	----	----	----
					Client sampling date / time	16-May-2022 14:40	16-May-2022 15:00	----	----	----
						CG2205843-001	CG2205843-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP423	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		17.1	<2.0 PHA	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2205843**	Page	: 1 of 14
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 17-May-2022 05:30
PO	:	Issue Date	: 31-May-2022 15:56
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Dissolved Metals	Anonymous	Anonymous	manganese, dissolved	7439-96-5	E421	70.8 %	20%	Duplicate RPD does not meet the DQO for this test.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-11-APR-2022	E550	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF - 11- APR - 2022	E550	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-11-APR-2022	E298	16-May-2022	18-May-2022	----	----		18-May-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF - 11- APR - 2022	E298	16-May-2022	18-May-2022	----	----		18-May-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.Br-L	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF - 11- APR - 2022	E235.Br-L	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.Cl-L	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF - 11- APR - 2022	E235.Cl-L	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-11-APR-2022	E235.F	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF - 11- APR - 2022	E235.F	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.NO3-L	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF - 11- APR - 2022	E235.NO3-L	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.NO2-L	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF - 11- APR - 2022	E235.NO2-L	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-11-APR-2022	E235.SO4-L	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF - 11- APR - 2022	E235.SO4-L	16-May-2022	----	----	----		17-May-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
INF-11-APR-2022	E372-U	16-May-2022	21-May-2022	----	----		21-May-2022	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
SRF - 11- APR - 2022	E372-U	16-May-2022	21-May-2022	----	----		21-May-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
INF-11-APR-2022	E509	16-May-2022	24-May-2022	----	----		24-May-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF - 11- APR - 2022	E509	16-May-2022	24-May-2022	----	----		24-May-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-11-APR-2022	E421	16-May-2022	21-May-2022	----	----		24-May-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF - 11- APR - 2022	E421	16-May-2022	21-May-2022	----	----		24-May-2022	180 days	8 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-11-APR-2022	E397-H	16-May-2022	----	----	----		20-May-2022	7 days	4 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
SRF - 11- APR - 2022	E397-H	16-May-2022	----	----	----		20-May-2022	7 days	4 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-11-APR-2022	E423BSe	16-May-2022	19-May-2022	----	----		19-May-2022	180 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid) SRF - 11- APR - 2022	E423BSe	16-May-2022	19-May-2022	----	----		19-May-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) INF-11-APR-2022	E355-L	16-May-2022	22-May-2022	----	----		24-May-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) SRF - 11- APR - 2022	E355-L	16-May-2022	22-May-2022	----	----		24-May-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE INF-11-APR-2022	E290	16-May-2022	----	----	----		19-May-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SRF - 11- APR - 2022	E290	16-May-2022	----	----	----		19-May-2022	14 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE INF-11-APR-2022	E162	16-May-2022	----	----	----		20-May-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE SRF - 11- APR - 2022	E162	16-May-2022	----	----	----		20-May-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE INF-11-APR-2022	E160	16-May-2022	----	----	----		18-May-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SRF - 11- APR - 2022	E160	16-May-2022	----	----	----		18-May-2022	7 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-11-APR-2022	E121	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF - 11- APR - 2022	E121	16-May-2022	----	----	----		17-May-2022	3 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-11-APR-2022	E508	16-May-2022	----	----	----		24-May-2022	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF - 11- APR - 2022	E508	16-May-2022	----	----	----		24-May-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-11-APR-2022	E420	16-May-2022	----	----	----		24-May-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF - 11- APR - 2022	E420	16-May-2022	----	----	----		24-May-2022	180 days	8 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	493813	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	492173	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	490984	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	490499	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	490500	1	17	5.8	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	492782	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	497525	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	495737	1	14	7.1	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	495018	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	490497	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	490501	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	490502	1	17	5.8	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	490503	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	493730	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	497548	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	497358	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	496058	1	2	50.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	490608	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	491343	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	490273	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	493813	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	492173	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	490984	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	490499	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	490500	1	17	5.8	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	492782	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	497525	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	495737	1	14	7.1	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	495018	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	490497	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	490501	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	490502	1	17	5.8	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	490503	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	493730	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	497548	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	497358	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	496058	1	2	50.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	490608	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	491343	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	490273	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	493813	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	492173	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	490984	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	490499	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	490500	1	17	5.8	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	492782	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	497525	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	495737	1	14	7.1	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	495018	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	490497	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	490501	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	490502	1	17	5.8	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	490503	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	493730	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	497548	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	497358	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	496058	1	2	50.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	490608	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	491343	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	490273	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	492173	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	490499	1	17	5.8	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	490500	1	17	5.8	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	492782	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	497525	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	495737	1	14	7.1	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	495018	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	490497	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	490501	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	490502	1	17	5.8	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	490503	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	497548	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	497358	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	496058	1	2	50.0	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	490608	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2205843**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 17-May-2022 05:30
PO	:	Date Analysis Commenced	: 17-May-2022
C-O-C number	: ----	Issue Date	: 31-May-2022 15:56
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Naeun Kim	Analyst	Calgary Metals, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Calgary Inorganics, Calgary, Alberta
Ruby Pham	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Shirley Li		Calgary Inorganics, Calgary, Alberta
Sunil Palak		Calgary Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 490273)											
CG2205838-006	Anonymous	turbidity	----	E121	0.10	NTU	0.92	0.97	0.05	Diff <2x LOR	----
Physical Tests (QC Lot: 491343)											
CG2205688-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	15.9	13.3	2.6	Diff <2x LOR	----
Physical Tests (QC Lot: 493730)											
CG2205843-001	SRF - 11- APR - 2022	solids, total dissolved [TDS]	----	E162	20	mg/L	1090	962	12.5%	20%	----
Physical Tests (QC Lot: 493813)											
CG2205547-002	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	327	338	3.25%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	327	338	3.25%	20%	----
Anions and Nutrients (QC Lot: 490497)											
CG2205839-001	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 490499)											
CG2205839-001	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 490500)											
CG2205839-001	Anonymous	chloride	16887-00-6	E235.Cl-L	2.00	mg/L	54.4	54.3	0.301%	20%	----
Anions and Nutrients (QC Lot: 490501)											
CG2205839-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	69.7	69.4	0.333%	20%	----
Anions and Nutrients (QC Lot: 490502)											
CG2205839-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	13.8	13.7	0.535%	20%	----
Anions and Nutrients (QC Lot: 490503)											
CG2205843-001	SRF - 11- APR - 2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	645	644	0.188%	20%	----
Anions and Nutrients (QC Lot: 490608)											
CG2205843-001	SRF - 11- APR - 2022	phosphorus, total	7723-14-0	E372-U	0.100	mg/L	3.01	3.06	1.56%	20%	----
Anions and Nutrients (QC Lot: 492173)											
CG2205840-010	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	3.99	4.27	6.82%	20%	----
Organic / Inorganic Carbon (QC Lot: 496058)											
CG2205843-001	SRF - 11- APR - 2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.72	4.68	0.04	Diff <2x LOR	----
Dissolved Sulfides (QC Lot: 495018)											
CG2205843-001	SRF - 11- APR - 2022	sulfide, dissolved (as S)	18496-25-8	E397-H	0.010	mg/L	1.71	1.68	1.85%	20%	----
Total Metals (QC Lot: 497358)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 497358) - continued											
CG2205837-001	Anonymous	aluminum, total	7429-90-5	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00024	0.00023	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.0200	mg/L	0.0302	0.0299	0.00027	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	0.000030	0.000023	0.000007	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.100	mg/L	83.6	84.0	0.506%	20%	----
		chromium, total	7440-47-3	E420	0.00200	mg/L	<0.00200	0.00229	0.00029	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00018	0.00018	0.000006	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00100	mg/L	0.0471	0.0466	0.998%	20%	----
		iron, total	7439-89-6	E420	0.030	mg/L	0.114	0.137	0.023	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000500	mg/L	0.00166	0.00167	0.000014	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0048	0.0048	0.00002	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	7.37	7.26	1.45%	20%	----
		manganese, total	7439-96-5	E420	0.00200	mg/L	0.0334	0.0332	0.314%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000121	0.000117	0.000004	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00224	0.00226	0.00001	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	4.63	4.58	1.11%	20%	----
		selenium, total	7782-49-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	6.77	6.69	1.18%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	2.00	mg/L	2.04	2.02	0.024	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.383	0.384	0.0997%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	9.10	9.07	0.263%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000014	0.000013	0.000001	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00012	0.00011	0.000009	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000100	mg/L	0.00368	0.00369	0.394%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0500	mg/L	0.0819	0.0810	0.0008	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 497548)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 497548) - continued											
CG2205843-001	SRF - 11- APR - 2022	mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000106	0.0000103	0.0000003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 492782)											
CG2205843-001	SRF - 11- APR - 2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00110	0.00104	5.51%	20%	----
Dissolved Metals (QC Lot: 495737)											
CG2205823-005	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0055	0.0069	0.0014	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0193	0.0192	0.247%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	0.882	0.889	0.866%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	528	533	0.951%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0176	0.0179	0.0003	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	50.3	51.0	1.32%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.00740	0.0155	70.8%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00126	0.00128	0.000012	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	2.18	2.21	0.027	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	5.09	5.11	0.495%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	15.6	16.0	2.79%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	7.59	7.65	0.708%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	507	506	0.165%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.00124	0.00124	0.0483%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 495737) - continued											
CG2205823-005	Anonymous	zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 497525)											
CG2205843-001	SRF - 11- APR - 2022	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	0.0000056	0.0000100	0.0000044	Diff <2x LOR	----
Aggregate Organics (QC Lot: 490984)											
CG2205840-015	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	7.2	8.2	13.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 490273)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 491343)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 493730)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 493813)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 490497)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 490499)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 490500)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 490501)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 490502)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 490503)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 490608)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 492173)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 496058)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 495018)						
sulfide, dissolved (as S)	18496-25-8	E397-H	0.01	mg/L	<0.010	----
Total Metals (QCLot: 497358)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 497358) - continued						
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 497548)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 492782)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 495737)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 497525)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 490984)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 490984) - continued						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 490273)									
turbidity	----	E121	0.1	NTU	200 NTU	99.0	85.0	115	----
Physical Tests (QCLot: 491343)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	97.0	85.0	115	----
Physical Tests (QCLot: 493730)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.1	85.0	115	----
Physical Tests (QCLot: 493813)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 490497)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 490499)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	97.1	85.0	115	----
Anions and Nutrients (QCLot: 490500)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 490501)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 490502)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 490503)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 490608)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	105	80.0	120	----
Anions and Nutrients (QCLot: 492173)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.4	85.0	115	----
Organic / Inorganic Carbon (QCLot: 496058)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	89.1	80.0	120	----
Dissolved Sulfides (QCLot: 495018)									
sulfide, dissolved (as S)	18496-25-8	E397-H	0.01	mg/L	0.08 mg/L	101	80.0	120	----
Total Metals (QCLot: 497358)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 497358) - continued									
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	99.2	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	99.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	94.1	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.2	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.7	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	94.1	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.8	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.4	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.1	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	116	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.6	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.1	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	107	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.9	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	102	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	94.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.0	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Total Metals (QCLot: 497548)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	112	80.0	120	----
Dissolved Metals (QCLot: 495737)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 495737) - continued									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	107	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.3	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	98.3	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.9	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.7	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100.0	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.4	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.2	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	118	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.9	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	104	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.5	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	108	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	92.8	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	105	80.0	120	----
Aggregate Organics (QCLot: 490984)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	97.9	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 490497)										
CG2205851-001	Anonymous	fluoride	16984-48-8	E235.F	0.976 mg/L	1 mg/L	97.6	75.0	125	----
Anions and Nutrients (QCLot: 490499)										
CG2205851-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.501 mg/L	0.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 490500)										
CG2205851-001	Anonymous	chloride	16887-00-6	E235.Cl-L	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 490501)										
CG2205851-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.56 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 490502)										
CG2205851-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.528 mg/L	0.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 490503)										
CG2205843-002	INF-11-APR-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 490608)										
CG2205843-002	INF-11-APR-2022	phosphorus, total	7723-14-0	E372-U	0.0507 mg/L	0.0676 mg/L	74.9	70.0	130	----
Anions and Nutrients (QCLot: 492173)										
CG2205840-011	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 496058)										
CG2205843-002	INF-11-APR-2022	carbon, total organic [TOC]	----	E355-L	5.16 mg/L	5 mg/L	103	70.0	130	----
Dissolved Sulfides (QCLot: 495018)										
CG2205843-002	INF-11-APR-2022	sulfide, dissolved (as S)	18496-25-8	E397-H	1.01 mg/L	1 mg/L	101	75.0	125	----
Total Metals (QCLot: 497358)										
CG2205843-001	SRF - 11- APR - 2022	aluminum, total	7429-90-5	E420	1.98 mg/L	2 mg/L	99.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.199 mg/L	0.2 mg/L	99.6	70.0	130	----
		arsenic, total	7440-38-2	E420	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		barium, total	7440-39-3	E420	0.200 mg/L	0.2 mg/L	99.8	70.0	130	----
		beryllium, total	7440-41-7	E420	0.399 mg/L	0.4 mg/L	99.8	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0966 mg/L	0.1 mg/L	96.6	70.0	130	----
		boron, total	7440-42-8	E420	1.02 mg/L	1 mg/L	102	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 497358) - continued										
CG2205843-001	SRF - 11- APR - 2022	chromium, total	7440-47-3	E420	0.405 mg/L	0.4 mg/L	101	70.0	130	----
		cobalt, total	7440-48-4	E420	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.200 mg/L	0.2 mg/L	99.8	70.0	130	----
		iron, total	7439-89-6	E420	20.1 mg/L	20 mg/L	100	70.0	130	----
		lead, total	7439-92-1	E420	0.198 mg/L	0.2 mg/L	99.2	70.0	130	----
		lithium, total	7439-93-2	E420	1.03 mg/L	1 mg/L	103	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.195 mg/L	0.2 mg/L	97.7	70.0	130	----
		nickel, total	7440-02-0	E420	0.398 mg/L	0.4 mg/L	99.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	104 mg/L	100 mg/L	104	70.0	130	----
		potassium, total	7440-09-7	E420	41.1 mg/L	40 mg/L	103	70.0	130	----
		selenium, total	7782-49-2	E420	0.418 mg/L	0.4 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	89.2 mg/L	100 mg/L	89.2	70.0	130	----
		silver, total	7440-22-4	E420	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		sodium, total	7440-23-5	E420	20.1 mg/L	20 mg/L	100	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0385 mg/L	0.04 mg/L	96.2	70.0	130	----
		tin, total	7440-31-5	E420	0.194 mg/L	0.2 mg/L	97.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.397 mg/L	0.4 mg/L	99.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		vanadium, total	7440-62-2	E420	1.03 mg/L	1 mg/L	103	70.0	130	----
		zinc, total	7440-66-6	E420	3.92 mg/L	4 mg/L	98.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.393 mg/L	0.4 mg/L	98.3	70.0	130	----
Total Metals (QCLot: 497548)										
CG2205843-002	INF-11-APR-2022	mercury, total	7439-97-6	E508	0.000127 mg/L	0.0001 mg/L	127	70.0	130	----
Dissolved Metals (QCLot: 492782)										
CG2205843-002	INF-11-APR-2022	selenium, dissolved	7782-49-2	E423BSe	ND mg/L	0.04 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 495737)										
CG2205823-006	Anonymous	aluminum, dissolved	7429-90-5	E421	2.06 mg/L	2 mg/L	103	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.195 mg/L	0.2 mg/L	97.4	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.205 mg/L	0.2 mg/L	102	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.420 mg/L	0.4 mg/L	105	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0960 mg/L	0.1 mg/L	96.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 495737) - continued										
CG2205823-006	Anonymous	boron, dissolved	7440-42-8	E421	1.01 mg/L	1 mg/L	101	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.412 mg/L	0.4 mg/L	103	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		iron, dissolved	7439-89-6	E421	20.3 mg/L	20 mg/L	101	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.198 mg/L	0.2 mg/L	99.0	70.0	130	----
		lithium, dissolved	7439-93-2	E421	1.06 mg/L	1 mg/L	106	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.205 mg/L	0.2 mg/L	102	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.418 mg/L	0.4 mg/L	104	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	108 mg/L	100 mg/L	108	70.0	130	----
		potassium, dissolved	7440-09-7	E421	41.0 mg/L	40 mg/L	102	70.0	130	----
		silicon, dissolved	7440-21-3	E421	93.4 mg/L	100 mg/L	93.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		sodium, dissolved	7440-23-5	E421	20.8 mg/L	20 mg/L	104	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.201 mg/L	0.2 mg/L	101	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.398 mg/L	0.4 mg/L	99.5	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	1.04 mg/L	1 mg/L	104	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.89 mg/L	4 mg/L	97.4	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.408 mg/L	0.4 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 497525)										
CG2205843-002	INF-11-APR-2022	mercury, dissolved	7439-97-6	E509	0.000114 mg/L	0.0001 mg/L	114	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS & BOD	Dissolved Se (E423BSe)	Total Organic Carbon	Number of Containers
							F/P			P	P/F				P/F	P	
	SRF-11-Apr-2022	16-May-22	2:40	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-11-Apr-2022	16-May-22	3:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2205843

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

T-Hg & D-Hg for INF-11-Apr-2022 sample has been collected in amber glass bottles. The samples are not preserved nor filtered. Please preserve and filter in the lab accordingly.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			5/17	530	10			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2206235**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 24-May-2022 14:30
PO	:	Date Analysis Commenced	: 25-May-2022
C-O-C number	: ----	Issue Date	: 01-Jun-2022 16:48
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Shirley Li		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-24-May-2022	----	----	----	----
					Client sampling date / time	24-May-2022 10:23	----	----	----	----
					CG2206235-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0792	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.79	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000982	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000989	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2206235**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 24-May-2022 14:30
PO	:	Issue Date	: 01-Jun-2022 16:48
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-24-May-2022	E235.NO3-L	24-May-2022	----	----	----		25-May-2022	3 days	1 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-24-May-2022	E423BSe	24-May-2022	01-Jun-2022	----	----		01-Jun-2022	180 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-24-May-2022	E355-L	24-May-2022	30-May-2022	----	----		30-May-2022	28 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-24-May-2022	E420	24-May-2022	----	----	----		29-May-2022	180 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	507395	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	498632	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	502831	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	504362	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	507395	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	498632	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	502831	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	504362	1	14	7.1	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	507395	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	498632	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	502831	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	504362	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	507395	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	498632	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	502831	1	9	11.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	504362	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: **CG2206235**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 24-May-2022 14:30
PO	:	Date Analysis Commenced	: 25-May-2022
C-O-C number	: ----	Issue Date	: 01-Jun-2022 16:48
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Shirley Li		Calgary Inorganics, Calgary, Alberta
Shirley Li		Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 498632)											
CG2206202-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	15.9	16.2	2.22%	20%	----
Organic / Inorganic Carbon (QC Lot: 504362)											
CG2206235-001	SRF-24-May-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.79	4.69	0.10	Diff <2x LOR	----
Total Metals (QC Lot: 502831)											
CG2206108-002	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 507395)											
CG2206235-001	SRF-24-May-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000982	0.000972	1.02%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 498632)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 504362)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 502831)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 507395)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 498632)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	98.1	90.0	110	----
Organic / Inorganic Carbon (QCLot: 504362)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	99.7	80.0	120	----
Total Metals (QCLot: 502831)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	98.2	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	101	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 498632)										
CG2206203-015	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.41 mg/L	2.5 mg/L	96.3	75.0	125	----
Organic / Inorganic Carbon (QCLot: 504362)										
CG2206235-001	SRF-24-May-2022	carbon, total organic [TOC]	----	E355-L	4.56 mg/L	5 mg/L	91.2	70.0	130	----
Total Metals (QCLot: 502831)										
CG2206182-008	Anonymous	selenium, total	7782-49-2	E420	0.435 mg/L	0.4 mg/L	109	70.0	130	----
Dissolved Metals (QCLot: 507395)										
CG2206235-001	SRF-24-May-2022	selenium, dissolved	7782-49-2	E423BSe	0.495 mg/L	0.7 mg/L	70.7	70.0	130	----

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001	

Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Copper	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
						P	P/F									P	
	SRF-24-May-2022	24-May-22	10:23	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2206235

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ?
			5/24	1430	17			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2206578**	Page	: 1 of 3
Amendment	: **1**		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 30-May-2022 13:37
PO	: Not Submitted	Date Analysis Commenced	: 30-May-2022
C-O-C number	: ----	Issue Date	: 10-Jun-2022 15:29
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Sheida Aria	Lab Assistant	Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-30-May-2022	----	----	----	----
					Client sampling date / time	30-May-2022 10:20	----	----	----	----
					CG2206578-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		3.72	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		4.73	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		<0.000050 DLM	----	----	----	----
Total Metals										
copper, total	7440-50-8	E420	0.00050	mg/L		0.00319	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00116	----	----	----	----
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	----	----	----	----
dissolved metals filtration location	----	EP423	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2206578**	Page	: 1 of 6
Amendment	: 1		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 30-May-2022 13:37
PO	: Not Submitted	Issue Date	: 10-Jun-2022 15:29
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Matrix Spike (MS) Recoveries								
Dissolved Metals	CG2206578-001	SRF-30-May-2022	selenium, dissolved	7782-49-2	E423BSe	63.9 % K	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-30-May-2022	E235.NO3-L	30-May-2022	----	----	----		30-May-2022	3 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-30-May-2022	E421	30-May-2022	10-Jun-2022	----	----		10-Jun-2022	180 days	11 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-30-May-2022	E423BSe	30-May-2022	07-Jun-2022	----	----		09-Jun-2022	180 days	10 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-30-May-2022	E355-L	30-May-2022	06-Jun-2022	----	----		06-Jun-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-30-May-2022	E420	30-May-2022	----	----	----		04-Jun-2022	180 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	513445	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	518376	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	504750	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	510492	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	512831	1	3	33.3	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	513445	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	518376	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	504750	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	510492	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	512831	1	3	33.3	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	513445	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	518376	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	504750	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	510492	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	512831	1	3	33.3	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	513445	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	518376	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	504750	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	510492	1	16	6.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	512831	1	3	33.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2206578**	Page	: 1 of 4
Amendment	: **1**		
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 30-May-2022 13:37
PO	: Not Submitted	Date Analysis Commenced	: 30-May-2022
C-O-C number	: ----	Issue Date	: 10-Jun-2022 15:29
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Sheida Aria	Lab Assistant	Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 504750)											
CG2206572-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	228	211	7.97%	20%	----
Organic / Inorganic Carbon (QC Lot: 512831)											
CG2206562-008	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.26	1.26	0.002	Diff <2x LOR	----
Total Metals (QC Lot: 510492)											
CG2206660-001	Anonymous	copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.839 µg/L	0.000861	2.60%	20%	----
Dissolved Metals (QC Lot: 513445)											
CG2206578-001	SRF-30-May-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	<0.00100	0.000745	0.000255	Diff <2x LOR	----
Dissolved Metals (QC Lot: 518376)											
CG2206904-001	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00052	0.00050	0.00001	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 504750)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 512831)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 510492)						
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 513445)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 518376)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 504750)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 512831)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	98.3	80.0	120	----
Total Metals (QCLot: 510492)									
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.0	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	94.9	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	92.7	80.0	120	----
Dissolved Metals (QCLot: 518376)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.8	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 504750)										
CG2206572-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Organic / Inorganic Carbon (QCLot: 512831)										
CG2206562-008	Anonymous	carbon, total organic [TOC]	----	E355-L	4.59 mg/L	5 mg/L	91.9	70.0	130	----
Total Metals (QCLot: 510492)										
CG2206660-002	Anonymous	copper, total	7440-50-8	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		selenium, total	7782-49-2	E420	0.423 mg/L	0.4 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 513445)										
CG2206578-001	SRF-30-May-2022	selenium, dissolved	7782-49-2	E423BSe	0.447 mg/L	0.7 mg/L	63.9	70.0	130	K
Dissolved Metals (QCLot: 518376)										
CG2206904-002	Anonymous	copper, dissolved	7440-50-8	E421	0.196 mg/L	0.2 mg/L	98.3	70.0	130	----

Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			Analysis Request
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se and Cu	Dissolved Se (E423BSe)	Dissolved Copper	Turbidty	TSS	BOD	Total Organic Carbon	Number of Containers
						P	P/F	P/F								P	
	SRF-30-May-2022	30-May-22	10:20	Water		X				X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2206578

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
							06/30/2022 13:37	

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2207000**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 06-Jun-2022 13:40
PO	:	Date Analysis Commenced	: 06-Jun-2022
C-O-C number	: ----	Issue Date	: 15-Jun-2022 09:26
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-06-Jun-2022	----	----	----	----
					Client sampling date / time	06-Jun-2022 11:30	----	----	----	----
					CG2207000-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050 DLDS	----	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.82	----	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000658	----	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0069	----	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00012	----	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00163	----	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0240	----	----	----	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	----	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.064	----	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000110	----	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	253	----	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000244	----	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	----	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00040	----	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00158	----	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.252	----	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000068	----	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0030	----	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	47.0	----	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.234	----	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00390	----	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	----	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	2.07	----	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.18	----	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00340	----	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000635	----	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-06-Jun-2022	----	----	----	----
					Client sampling date / time	06-Jun-2022 11:30	----	----	----	----
					CG2207000-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Total Metals										
silicon, total	7440-21-3	E420	0.10	mg/L	8.41	----	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	14.0	----	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	2.06	----	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	239	----	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00025	----	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	----	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00035	----	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00040	----	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000035	----	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00179	----	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	----	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	----	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010 DLDS	----	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010 DLDS	----	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00149	----	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0282	----	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020 DLDS	----	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050 DLDS	----	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.070	----	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050 DLDS	----	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	237	----	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000227	----	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	----	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010 DLDS	----	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020 DLDS	----	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.245	----	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050 DLDS	----	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-06-Jun-2022	----	----	----	----
					Client sampling date / time	06-Jun-2022 11:30	----	----	----	----
					CG2207000-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Dissolved Metals										
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010 DLDS	----	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	47.4	----	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.239	----	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00235	----	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050 DLDS	----	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	2.30	----	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.20	----	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00314	----	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	8.96	----	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010 DLDS	----	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	13.9	----	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.96	----	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	251	----	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020 DLDS	----	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010 DLDS	----	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010 DLDS	----	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010 DLDS	----	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030 DLDS	----	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010 DLDS	----	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010 DLDS	----	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050 DLDS	----	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010 DLDS	----	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030 DLDS	----	----	----	----	----
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2207000**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 06-Jun-2022 13:40
PO	:	Issue Date	: 15-Jun-2022 09:26
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-06-Jun-2022	E235.NO3-L	06-Jun-2022	----	----	----		06-Jun-2022	3 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-06-Jun-2022	E421	06-Jun-2022	13-Jun-2022	----	----		13-Jun-2022	180 days	7 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-06-Jun-2022	E423BSe	06-Jun-2022	10-Jun-2022	----	----		10-Jun-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-06-Jun-2022	E355-L	06-Jun-2022	13-Jun-2022	----	----		14-Jun-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-06-Jun-2022	E420	06-Jun-2022	----	----	----		12-Jun-2022	180 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	518246	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	521774	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	512923	1	2	50.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	519805	1	14	7.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	522217	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	518246	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	521774	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	512923	1	2	50.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	519805	1	14	7.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	522217	1	9	11.1	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	518246	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	521774	1	1	100.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	512923	1	2	50.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	519805	1	14	7.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	522217	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	518246	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	521774	0	1	0.0	5.0	×
Nitrate in Water by IC (Low Level)	E235.NO3-L	512923	1	2	50.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	519805	1	14	7.1	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	522217	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2207000**	Page	: 1 of 13
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 06-Jun-2022 13:40
PO	:	Date Analysis Commenced	: 06-Jun-2022
C-O-C number	: ----	Issue Date	: 15-Jun-2022 09:27
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Ruby Pham	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 512923)											
CG2206946-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.105	0.100	4.96%	20%	----
Organic / Inorganic Carbon (QC Lot: 522217)											
CG2207070-005	Anonymous	carbon, total organic [TOC]	----	E355-L	10.0	mg/L	75.4	68.2	7.20	Diff <2x LOR	----
Total Metals (QC Lot: 519805)											
CG2207281-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.901	0.847	6.14%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00043	0.00054	0.00010	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0391	0.0396	1.36%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	0.081 µg/L	0.000060	0.000021	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0403 µg/L	0.0000468	0.0000065	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	27.0	27.6	2.01%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000180	0.000210	15.7%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00120	0.00113	0.00007	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.38 µg/L	0.00044	0.00006	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00098	0.00108	0.00009	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.808	0.877	8.16%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000550	0.000567	2.99%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0029	0.0032	0.0003	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	8.26	8.05	2.60%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0294	0.0287	2.46%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000540	0.000552	2.12%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00116	0.00131	0.00015	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.050	0.052	0.002	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.590	0.670	12.6%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00230	0.00213	7.84%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.275 µg/L	0.000343	0.000068	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.98	3.36	11.8%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.14	1.12	2.02%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 519805) - continued											
CG2207281-001	Anonymous	strontium, total	7440-24-6	E420	0.00020	mg/L	0.0786	0.0811	3.09%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	2.95	3.02	0.06	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000021	0.000027	0.000006	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	0.00016	0.00006	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.0190	0.0173	9.67%	20%	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000180	0.000179	0.445%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00173	0.00208	0.00036	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0031	0.0038	0.0007	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 518246)											
CG2207000-001	SRF-06-Jun-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000658	0.000738	11.5%	20%	----
Dissolved Metals (QC Lot: 521774)											
CG2207000-001	SRF-06-Jun-2022	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00149	0.00147	0.00002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0282	0.0264	6.80%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	0.070	0.071	0.002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	237	238	0.732%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.000227	0.000232	0.000005	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	0.245	0.237	0.008	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	47.4	45.3	4.48%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.239	0.228	4.71%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00235	0.00236	0.000005	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 521774) - continued											
CG2207000-001	SRF-06-Jun-2022	phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	2.30	2.29	0.011	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	1.20	1.16	0.046	Diff <2x LOR	----
		rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.00314	0.00277	0.00036	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	8.96	8.61	4.02%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	13.9	13.4	3.86%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	1.96	1.98	0.724%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	251	245	2.53%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 512923)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 522217)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 519805)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 519805) - continued						
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 518246)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 521774)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 521774) - continued						
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 512923)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	96.2	90.0	110	----
Organic / Inorganic Carbon (QCLot: 522217)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	108	80.0	120	----
Total Metals (QCLot: 519805)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	93.3	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	98.9	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	92.3	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	93.2	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	92.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	93.2	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	95.7	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	92.7	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.4	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	93.9	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	89.9	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	92.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	87.3	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	92.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	93.6	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	90.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	88.5	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	89.3	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	91.8	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	91.5	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	91.5	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	88.5	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.4	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	93.8	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	85.9	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	89.4	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	96.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 519805) - continued									
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	104	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	94.6	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	93.4	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	89.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	92.1	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	89.8	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.0	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.5	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	111	80.0	120	----
Dissolved Metals (QCLot: 521774)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	116	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	114	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	114	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	114	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	109	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	105	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	112	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	106	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	113	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	112	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	111	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	106	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	106	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	108	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	114	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	113	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	114	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	110	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	125	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	114	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	115	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	120	60.0	140	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 521774) - continued									
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.0	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	117	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	120	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	105	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	104	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	114	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	112	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	108	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	115	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	109	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	110	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 512923)										
CG2207000-001	SRF-06-Jun-2022	nitrate (as N)	14797-55-8	E235.NO3-L	2.41 mg/L	2.5 mg/L	96.3	75.0	125	----
Organic / Inorganic Carbon (QCLot: 522217)										
CG2207070-005	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 519805)										
CG2207281-002	Anonymous	aluminum, total	7429-90-5	E420	2.43 mg/L	2 mg/L	121	70.0	130	----
		antimony, total	7440-36-0	E420	0.218 mg/L	0.2 mg/L	109	70.0	130	----
		arsenic, total	7440-38-2	E420	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		barium, total	7440-39-3	E420	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		beryllium, total	7440-41-7	E420	0.441 mg/L	0.4 mg/L	110	70.0	130	----
		bismuth, total	7440-69-9	E420	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		boron, total	7440-42-8	E420	1.21 mg/L	1 mg/L	121	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0429 mg/L	0.04 mg/L	107	70.0	130	----
		calcium, total	7440-70-2	E420	50.4 mg/L	40 mg/L	126	70.0	130	----
		cesium, total	7440-46-2	E420	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		chromium, total	7440-47-3	E420	0.444 mg/L	0.4 mg/L	111	70.0	130	----
		cobalt, total	7440-48-4	E420	0.224 mg/L	0.2 mg/L	112	70.0	130	----
		copper, total	7440-50-8	E420	0.225 mg/L	0.2 mg/L	113	70.0	130	----
		iron, total	7439-89-6	E420	22.7 mg/L	20 mg/L	113	70.0	130	----
		lead, total	7439-92-1	E420	0.224 mg/L	0.2 mg/L	112	70.0	130	----
		lithium, total	7439-93-2	E420	1.16 mg/L	1 mg/L	116	70.0	130	----
		magnesium, total	7439-95-4	E420	12.1 mg/L	10 mg/L	121	70.0	130	----
		manganese, total	7439-96-5	E420	0.234 mg/L	0.2 mg/L	117	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.232 mg/L	0.2 mg/L	116	70.0	130	----
		nickel, total	7440-02-0	E420	0.451 mg/L	0.4 mg/L	113	70.0	130	----
		phosphorus, total	7723-14-0	E420	100 mg/L	100 mg/L	100	70.0	130	----
		potassium, total	7440-09-7	E420	45.1 mg/L	40 mg/L	113	70.0	130	----
		rubidium, total	7440-17-7	E420	0.237 mg/L	0.2 mg/L	118	70.0	130	----
		selenium, total	7782-49-2	E420	0.440 mg/L	0.4 mg/L	110	70.0	130	----
		silicon, total	7440-21-3	E420	111 mg/L	100 mg/L	111	70.0	130	----
		silver, total	7440-22-4	E420	0.0440 mg/L	0.04 mg/L	110	70.0	130	----
		sodium, total	7440-23-5	E420	22.6 mg/L	20 mg/L	113	70.0	130	----
		strontium, total	7440-24-6	E420	0.244 mg/L	0.2 mg/L	122	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 519805) - continued										
CG2207281-002	Anonymous	sulfur, total	7704-34-9	E420	217 mg/L	200 mg/L	108	70.0	130	----
		tellurium, total	13494-80-9	E420	0.444 mg/L	0.4 mg/L	111	70.0	130	----
		thallium, total	7440-28-0	E420	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		thorium, total	7440-29-1	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		tin, total	7440-31-5	E420	0.222 mg/L	0.2 mg/L	111	70.0	130	----
		titanium, total	7440-32-6	E420	0.477 mg/L	0.4 mg/L	119	70.0	130	----
		tungsten, total	7440-33-7	E420	0.225 mg/L	0.2 mg/L	112	70.0	130	----
		uranium, total	7440-61-1	E420	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		vanadium, total	7440-62-2	E420	1.11 mg/L	1 mg/L	111	70.0	130	----
		zinc, total	7440-66-6	E420	4.35 mg/L	4 mg/L	109	70.0	130	----
		zirconium, total	7440-67-7	E420	0.460 mg/L	0.4 mg/L	115	70.0	130	----
Dissolved Metals (QCLot: 518246)										
CG2207022-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0845 mg/L	0.08 mg/L	106	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report to:		**Report Format / Distribution**	**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other	◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metals	Dissolved Se (E423BSe)	Dissolved Metals	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F	P/F				P	
	SRF-06-Jun-2022	06-Jun-22	11:30	Water		X				X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2207000

1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
		[signature]	6/6/22	1340	19			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2207463**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Jun-2022 16:07
PO	: Not Submitted	Date Analysis Commenced	: 14-Jun-2022
C-O-C number	: ----	Issue Date	: 24-Jun-2022 16:11
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-14-Jun-2022	----	----	----	----
					Client sampling date / time	14-Jun-2022 12:00	----	----	----	----
					CG2207463-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050 DLDS	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.91	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000682	----	----	----	----
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000584	----	----	----	----
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2207463**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Jun-2022 16:07
PO	: Not Submitted	Issue Date	: 24-Jun-2022 16:11
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-14-Jun-2022	E235.NO3-L	14-Jun-2022	----	----	----		15-Jun-2022	3 days	1 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-14-Jun-2022	E423BSe	14-Jun-2022	16-Jun-2022	----	----		16-Jun-2022	180 days	2 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-14-Jun-2022	E355-L	14-Jun-2022	21-Jun-2022	----	----		23-Jun-2022	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-14-Jun-2022	E420	14-Jun-2022	----	----	----		21-Jun-2022	180 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	525754	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	524335	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	532691	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	532681	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	525754	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	524335	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	532691	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	532681	1	17	5.8	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	525754	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	524335	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	532691	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	532681	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	525754	1	4	25.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	524335	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	532691	1	10	10.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	532681	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2207463**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 14-Jun-2022 16:07
PO	: Not Submitted	Date Analysis Commenced	: 14-Jun-2022
C-O-C number	: ----	Issue Date	: 24-Jun-2022 16:11
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 524335)											
CG2207438-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.980	0.987	0.651%	20%	----
Organic / Inorganic Carbon (QC Lot: 532681)											
CG2207457-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.99	0.96	0.03	Diff <2x LOR	----
Total Metals (QC Lot: 532691)											
CG2207584-001	Anonymous	selenium, total	7782-49-2	E420	0.000100	mg/L	426 µg/L	0.421	1.14%	20%	----
Dissolved Metals (QC Lot: 525754)											
CG2207430-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.0150	0.0158	5.46%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 524335)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 532681)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 532691)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 525754)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 524335)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 532681)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	89.7	80.0	120	----
Total Metals (QCLot: 532691)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.3	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	94.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 524335)										
CG2207438-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.70 mg/L	2.5 mg/L	108	75.0	125	----
Organic / Inorganic Carbon (QCLot: 532681)										
CG2207457-001	Anonymous	carbon, total organic [TOC]	----	E355-L	4.98 mg/L	5 mg/L	99.6	70.0	130	----
Total Metals (QCLot: 532691)										
CG2207584-004	Anonymous	selenium, total	7782-49-2	E420	0.389 mg/L	0.4 mg/L	97.3	70.0	130	----
Dissolved Metals (QCLot: 525754)										
CG2207430-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.422 mg/L	0.4 mg/L	105	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**				**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard	☑ Other			◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com			○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:				○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:					**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427			
Contact:		PO / AFE:				
Address:		Legal Site Description:				
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001			
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Metals	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
									P	P/F						P	
	SRF-14-Jun-2022	14-Jun-22	12:00	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2207463

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF 18.00 Front

CERTIFICATE OF ANALYSIS

Work Order	: **CG2207805**	Page	: 1 of 7
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 20-Jun-2022 16:44
PO	: Not Submitted	Date Analysis Commenced	: 21-Jun-2022
C-O-C number	: ----	Issue Date	: 29-Jun-2022 18:14
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
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Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
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Shirley Li		Metals, Calgary, Alberta
Sofiya Ivanova	Lab Assistant	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-20-JUN-2022	INF-20-JUN-2022	DUP-20-JUN-2022	----	----
					Client sampling date / time	20-Jun-2022 13:30	20-Jun-2022 14:00	20-Jun-2022 14:30	----	----
						CG2207805-001	CG2207805-002	CG2207805-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		151	72.2	82.6	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		151	72.2	82.6	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		842	844	835	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		796	787	784	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1110	1120	1140	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	<3.0	3.1	----	----
turbidity	----	E121	0.10	NTU		1.62	0.21	0.22	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.237	0.0050	<0.0050	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050 DLDS	<0.050 DLDS	<0.050 DLDS	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		2.75	2.57	3.19	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.161	0.154	0.180	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.268	6.31	6.50	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010 DLDS	<0.0010 DLDS	<0.0010 DLDS	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.68 DLHC	0.0040	0.0054	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		669	711	720	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.38	5.90	5.54	----	----
Dissolved Sulfides										
sulfide, dissolved (as S)	18496-25-8	E397-H	0.010	mg/L		2.32	<0.010	----	----	----
sulfide, dissolved (as H2S)	7783-06-4	E397-H	0.011	mg/L		2.47	<0.011	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.000941	0.0893	0.0907	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0076	0.0052	0.0048	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00046	0.00045	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00102	0.00119	0.00115	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0276	0.0343	0.0340	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-20-JUN-2022	INF-20-JUN-2022	DUP-20-JUN-2022	----	----
					Client sampling date / time	20-Jun-2022 13:30	20-Jun-2022 14:00	20-Jun-2022 14:30	----	----
						CG2207805-001	CG2207805-002	CG2207805-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000020	<0.000020	<0.000020	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.065	0.064	0.064	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000401	0.0000534	0.0000545	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		242	237	237	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00020	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00140	0.0132	0.0130	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.171	<0.010	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000119	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0029	0.0033	0.0033	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		46.7	47.4	46.8	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.175	0.00062	0.00057	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00286	0.0800	0.0809	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		1.88	<0.050	<0.050	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.24	1.53	1.51	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000706	0.101	0.0983	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		7.60	6.12	6.04	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		13.9	13.4	13.3	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		2.09	2.40	2.38	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		193	204	203	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000029	0.000916	0.000911	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00178	0.00077	0.00076	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0035	0.0043	0.0054	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-20-JUN-2022	INF-20-JUN-2022	DUP-20-JUN-2022	----	----
					Client sampling date / time	20-Jun-2022 13:30	20-Jun-2022 14:00	20-Jun-2022 14:30	----	----
						CG2207805-001	CG2207805-002	CG2207805-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0049	0.0027	0.0034	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00046	0.00047	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00087	0.00115	0.00112	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0293	0.0360	0.0357	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.063	0.062	0.061	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000050	0.0000462	0.0000464	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		254	253	250	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00014	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00038	0.0128	0.0134	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.167	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0030	0.0034	0.0034	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		50.4	51.5	51.2	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.186	0.00021	0.00060	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00190	0.0876	0.0873	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.99	<0.050	<0.050	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.32	1.61	1.61	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		9.21	6.54	6.50	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		14.1	13.8	13.7	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.17	2.46	2.42	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		226	219	217	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000030	0.000965	0.000951	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: SRF-20-JUN-2022	INF-20-JUN-2022	DUP-20-JUN-2022	----	----
					Client sampling date / time: 20-Jun-2022 13:30	20-Jun-2022 14:00	20-Jun-2022 14:30	----	----
					CG2207805-001	CG2207805-002	CG2207805-003	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00163	0.00058	0.00058	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0037	0.0048	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	----
Aggregate Organics									
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	<2.0	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2207805**	Page	: 1 of 15
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 20-Jun-2022 16:44
PO	: Not Submitted	Issue Date	: 29-Jun-2022 18:14
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
DUP-20-JUN-2022	E550	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-20-JUN-2022	E550	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF-20-JUN-2022	E550	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
DUP-20-JUN-2022	E298	20-Jun-2022	22-Jun-2022	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-20-JUN-2022	E298	20-Jun-2022	22-Jun-2022	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF-20-JUN-2022	E298	20-Jun-2022	22-Jun-2022	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
DUP-20-JUN-2022	E235.Br-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-20-JUN-2022	E235.Br-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF-20-JUN-2022	E235.Br-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
DUP-20-JUN-2022	E235.Cl-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-20-JUN-2022	E235.Cl-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF-20-JUN-2022	E235.Cl-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
DUP-20-JUN-2022	E235.F	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-20-JUN-2022	E235.F	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF-20-JUN-2022	E235.F	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
DUP-20-JUN-2022	E235.NO3-L	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-20-JUN-2022	E235.NO3-L	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-20-JUN-2022	E235.NO3-L	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
DUP-20-JUN-2022	E235.NO2-L	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-20-JUN-2022	E235.NO2-L	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-20-JUN-2022	E235.NO2-L	20-Jun-2022	----	----	----		22-Jun-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
DUP-20-JUN-2022	E235.SO4-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-20-JUN-2022	E235.SO4-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-20-JUN-2022	E235.SO4-L	20-Jun-2022	----	----	----		22-Jun-2022	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
DUP-20-JUN-2022	E372-U	20-Jun-2022	22-Jun-2022	----	----		23-Jun-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
INF-20-JUN-2022	E372-U	20-Jun-2022	22-Jun-2022	----	----		23-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
SRF-20-JUN-2022	E372-U	20-Jun-2022	22-Jun-2022	----	----		23-Jun-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
DUP-20-JUN-2022	E509	20-Jun-2022	26-Jun-2022	----	----		26-Jun-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
INF-20-JUN-2022	E509	20-Jun-2022	26-Jun-2022	----	----		26-Jun-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
SRF-20-JUN-2022	E509	20-Jun-2022	26-Jun-2022	----	----		26-Jun-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
DUP-20-JUN-2022	E421	20-Jun-2022	26-Jun-2022	----	----		26-Jun-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-20-JUN-2022	E421	20-Jun-2022	26-Jun-2022	----	----		26-Jun-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-20-JUN-2022	E421	20-Jun-2022	26-Jun-2022	----	----		26-Jun-2022	180 days	6 days	✓
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
INF-20-JUN-2022	E397-H	20-Jun-2022	----	----	----		27-Jun-2022	7 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Sulfides : Dissolved Sulfide by Colourimetry (Automated Flow)										
HDPE dissolved (zinc acetate+sodium hydroxide)										
SRF-20-JUN-2022	E397-H	20-Jun-2022	----	----	----		27-Jun-2022	7 days	7 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
DUP-20-JUN-2022	E423BSe	20-Jun-2022	23-Jun-2022	----	----		27-Jun-2022	180 days	7 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
INF-20-JUN-2022	E423BSe	20-Jun-2022	23-Jun-2022	----	----		27-Jun-2022	180 days	7 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-20-JUN-2022	E423BSe	20-Jun-2022	23-Jun-2022	----	----		27-Jun-2022	180 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
DUP-20-JUN-2022	E355-L	20-Jun-2022	27-Jun-2022	----	----		27-Jun-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
INF-20-JUN-2022	E355-L	20-Jun-2022	27-Jun-2022	----	----		27-Jun-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-20-JUN-2022	E355-L	20-Jun-2022	27-Jun-2022	----	----		27-Jun-2022	28 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP-20-JUN-2022	E290	20-Jun-2022	----	----	----		24-Jun-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
INF-20-JUN-2022	E290	20-Jun-2022	----	----	----		24-Jun-2022	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-20-JUN-2022	E290	20-Jun-2022	----	----	----		24-Jun-2022	14 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
DUP-20-JUN-2022	E162	20-Jun-2022	----	----	----		25-Jun-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
INF-20-JUN-2022	E162	20-Jun-2022	----	----	----		25-Jun-2022	7 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-20-JUN-2022	E162	20-Jun-2022	----	----	----		25-Jun-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
DUP-20-JUN-2022	E160	20-Jun-2022	----	----	----		24-Jun-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-20-JUN-2022	E160	20-Jun-2022	----	----	----		24-Jun-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-20-JUN-2022	E160	20-Jun-2022	----	----	----		24-Jun-2022	7 days	4 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
DUP-20-JUN-2022	E121	20-Jun-2022	----	----	----		21-Jun-2022	3 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-20-JUN-2022	E121	20-Jun-2022	----	----	----		21-Jun-2022	3 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-20-JUN-2022	E121	20-Jun-2022	----	----	----		21-Jun-2022	3 days	1 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
DUP-20-JUN-2022	E508	20-Jun-2022	----	----	----		26-Jun-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-20-JUN-2022	E508	20-Jun-2022	----	----	----		26-Jun-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-20-JUN-2022	E508	20-Jun-2022	----	----	----		26-Jun-2022	28 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
DUP-20-JUN-2022	E420	20-Jun-2022	----	----	----		27-Jun-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-20-JUN-2022	E420	20-Jun-2022	----	----	----		27-Jun-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-20-JUN-2022	E420	20-Jun-2022	----	----	----		27-Jun-2022	180 days	8 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	537712	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	534397	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	534353	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534641	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	534637	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	536301	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	539400	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	539054	1	8	12.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	540272	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	534636	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534638	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534639	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	534640	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	535920	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	539395	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	539714	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	540349	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	533943	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	535028	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	532206	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	537712	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	534397	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	534353	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534641	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	534637	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	536301	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	539400	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	539054	1	8	12.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	540272	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	534636	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534638	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534639	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	534640	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	535920	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	539395	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	539714	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	540349	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	533943	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	535028	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	532206	1	13	7.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	537712	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	534397	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	534353	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534641	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	534637	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	536301	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	539400	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	539054	1	8	12.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	540272	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	534636	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534638	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534639	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	534640	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	535920	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	539395	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	539714	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	540349	1	15	6.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	533943	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	535028	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	532206	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	534397	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	534641	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	534637	1	20	5.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	536301	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	539400	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	539054	1	8	12.5	5.0	✓
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H	540272	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	534636	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	534638	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	534639	1	20	5.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	534640	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	539395	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	539714	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	540349	1	15	6.6	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	533943	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Sulfide by Colourimetry (Automated Flow)	E397-H Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Dissolved Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. This analysis must be conducted on a sample that has had suspended solids removed by flocculation and settling in the field, prior to sample preservation. ALS provides field sampling kits to conduct the flocculation process. Filtration is not valid for dissolved sulfide due to its reactivity and volatility. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the dissolved sulfide concentration in the sample. The H_2S calculation converts dissolved Sulphide as (S2-) and reports it as Sulphide, dissolved as (H2S)
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2207805**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 20-Jun-2022 16:44
PO	: Not Submitted	Date Analysis Commenced	: 21-Jun-2022
C-O-C number	: ----	Issue Date	: 29-Jun-2022 18:15
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
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Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Metals, Calgary, Alberta
Shirley Li		Calgary Inorganics, Calgary, Alberta
Shirley Li		Calgary Metals, Calgary, Alberta
Sofiya Ivanova	Lab Assistant	Calgary Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 532206)											
CG2207793-017	Anonymous	turbidity	----	E121	0.10	NTU	0.13	<0.10	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 535028)											
CG2207770-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	16.5	17.1	0.6	Diff <2x LOR	----
Physical Tests (QC Lot: 535920)											
CG2207793-007	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	3010	3000	0.300%	20%	----
Physical Tests (QC Lot: 537712)											
CG2207790-010	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	785	868	10.0%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	785	868	10.0%	20%	----
Anions and Nutrients (QC Lot: 533943)											
CG2207793-005	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0040	mg/L	0.176	0.173	1.53%	20%	----
Anions and Nutrients (QC Lot: 534397)											
CG2207795-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	4.01	4.03	0.296%	20%	----
Anions and Nutrients (QC Lot: 534636)											
CG2207805-001	SRF-20-JUN-2022	fluoride	16984-48-8	E235.F	0.100	mg/L	0.161	0.162	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534637)											
CG2207805-001	SRF-20-JUN-2022	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	2.75	2.81	0.06	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534638)											
CG2207805-001	SRF-20-JUN-2022	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.268	0.281	4.92%	20%	----
Anions and Nutrients (QC Lot: 534639)											
CG2207805-001	SRF-20-JUN-2022	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 534640)											
CG2207805-001	SRF-20-JUN-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	669	677	1.13%	20%	----
Anions and Nutrients (QC Lot: 534641)											
CG2207805-001	SRF-20-JUN-2022	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 540349)											
CG2208044-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	7.52	7.69	2.31%	20%	----
Dissolved Sulfides (QC Lot: 540272)											
CG2207805-001	SRF-20-JUN-2022	sulfide, dissolved (as S)	18496-25-8	E397-H	0.010	mg/L	2.32	2.28	2.07%	20%	----
Total Metals (QC Lot: 539395)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 539395) - continued											
CG2207783-001	Anonymous	mercury, total	7439-97-6	E508	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
Total Metals (QC Lot: 539714)											
CG2207744-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.795	0.719	10.1%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00011	<0.00010	0.00001	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00122	0.00114	6.82%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.144	0.133	8.30%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	0.000073	0.000065	0.000008	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.030	0.030	0.0001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000255	0.0000204	0.0000051	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	106	106	0.00291%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00118	0.00106	0.00011	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00051	0.00050	0.000009	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00103	0.00095	0.00008	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	1.15	1.05	9.26%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00124	0.00121	2.27%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0042	0.0041	0.00010	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	29.9	29.4	1.69%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0562	0.0550	2.18%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00121	0.00113	6.56%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00190	0.00175	0.00015	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.090	0.085	0.006	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	0.764	0.721	0.043	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000140	0.000163	0.000023	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.81	3.67	3.72%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.48	1.46	1.03%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.891	0.887	0.422%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	57.0	56.8	0.233%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000033	0.000032	0.000001	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00848	0.00792	6.91%	20%	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000769	0.000766	0.435%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00247	0.00223	0.00025	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0055	0.0056	0.00003	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 539714) - continued											
CG2207744-001	Anonymous	zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 536301)											
CG2207805-001	SRF-20-JUN-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000941	0.000952	1.13%	20%	----
Dissolved Metals (QC Lot: 539054)											
CG2207721-004	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000054	0.000052	0.000002	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 539054) - continued											
CG2207721-004	Anonymous	zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 539400)											
CG2207805-001	SRF-20-JUN-2022	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 534353)											
CG2207820-005	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 532206)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 535028)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 535920)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 537712)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 533943)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 534397)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 534636)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 534637)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 534638)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 534639)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 534640)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 534641)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 540349)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Dissolved Sulfides (QCLot: 540272)						
sulfide, dissolved (as S)	18496-25-8	E397-H	0.01	mg/L	<0.010	----
Total Metals (QCLot: 539395)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 539714)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 539714) - continued						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 536301)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 539054)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 539400)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 534353)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 534353) - continued						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 532206)									
turbidity	----	E121	0.1	NTU	200 NTU	105	85.0	115	----
Physical Tests (QCLot: 535028)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	93.8	85.0	115	----
Physical Tests (QCLot: 535920)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	91.7	85.0	115	----
Physical Tests (QCLot: 537712)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.5	85.0	115	----
Anions and Nutrients (QCLot: 533943)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	106	80.0	120	----
Anions and Nutrients (QCLot: 534397)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	95.3	85.0	115	----
Anions and Nutrients (QCLot: 534636)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 534637)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 534638)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 534639)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 534640)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 534641)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	98.7	85.0	115	----
Organic / Inorganic Carbon (QCLot: 540349)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	101	80.0	120	----
Dissolved Sulfides (QCLot: 540272)									
sulfide, dissolved (as S)	18496-25-8	E397-H	0.01	mg/L	0.08 mg/L	95.8	80.0	120	----
Total Metals (QCLot: 539395)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	84.3	80.0	120	----
Total Metals (QCLot: 539714)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 539714) - continued									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.5	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	97.3	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.7	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	96.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	96.6	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.7	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.3	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.7	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.8	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.8	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	104	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	98.6	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.5	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	97.8	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	105	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	99.2	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.0	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	97.7	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.4	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	94.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.5	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	98.1	80.0	120	----
Dissolved Metals (QCLot: 536301)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 539054)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.8	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	96.6	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	89.1	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	82.7	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.8	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.8	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	113	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.6	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	99.6	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	97.8	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	111	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.0	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.4	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.2	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.7	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	97.2	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	87.8	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	112	80.0	120	----
Aggregate Organics (QCLot: 534353)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	94.4	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 533943)										
CG2207793-006	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.0676 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 534397)										
CG2207796-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 534636)										
CG2207805-002	INF-20-JUN-2022	fluoride	16984-48-8	E235.F	0.945 mg/L	1 mg/L	94.5	75.0	125	----
Anions and Nutrients (QCLot: 534637)										
CG2207805-002	INF-20-JUN-2022	chloride	16887-00-6	E235.Cl-L	93.0 mg/L	100 mg/L	93.0	75.0	125	----
Anions and Nutrients (QCLot: 534638)										
CG2207805-002	INF-20-JUN-2022	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 534639)										
CG2207805-002	INF-20-JUN-2022	nitrite (as N)	14797-65-0	E235.NO2-L	0.469 mg/L	0.5 mg/L	93.8	75.0	125	----
Anions and Nutrients (QCLot: 534640)										
CG2207805-002	INF-20-JUN-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 534641)										
CG2207805-002	INF-20-JUN-2022	bromide	24959-67-9	E235.Br-L	0.491 mg/L	0.5 mg/L	98.2	75.0	125	----
Organic / Inorganic Carbon (QCLot: 540349)										
CG2208044-001	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Dissolved Sulfides (QCLot: 540272)										
CG2207805-002	INF-20-JUN-2022	sulfide, dissolved (as S)	18496-25-8	E397-H	0.902 mg/L	1 mg/L	90.2	75.0	125	----
Total Metals (QCLot: 539395)										
CG2207805-001	SRF-20-JUN-2022	mercury, total	7439-97-6	E508	0.0000863 mg/L	0.0001 mg/L	86.3	70.0	130	----
Total Metals (QCLot: 539714)										
CG2207744-002	Anonymous	aluminum, total	7429-90-5	E420	2.02 mg/L	2 mg/L	101	70.0	130	----
		antimony, total	7440-36-0	E420	0.195 mg/L	0.2 mg/L	97.4	70.0	130	----
		arsenic, total	7440-38-2	E420	0.200 mg/L	0.2 mg/L	99.8	70.0	130	----
		barium, total	7440-39-3	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		beryllium, total	7440-41-7	E420	0.403 mg/L	0.4 mg/L	101	70.0	130	----
		bismuth, total	7440-69-9	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		boron, total	7440-42-8	E420	1.02 mg/L	1 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 539714) - continued										
CG2207744-002	Anonymous	cadmium, total	7440-43-9	E420	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.419 mg/L	0.4 mg/L	105	70.0	130	----
		cobalt, total	7440-48-4	E420	0.205 mg/L	0.2 mg/L	102	70.0	130	----
		copper, total	7440-50-8	E420	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		iron, total	7439-89-6	E420	20.5 mg/L	20 mg/L	103	70.0	130	----
		lead, total	7439-92-1	E420	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		lithium, total	7439-93-2	E420	1.04 mg/L	1 mg/L	104	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	0.410 mg/L	0.4 mg/L	102	70.0	130	----
		phosphorus, total	7723-14-0	E420	108 mg/L	100 mg/L	108	70.0	130	----
		potassium, total	7440-09-7	E420	40.1 mg/L	40 mg/L	100	70.0	130	----
		selenium, total	7782-49-2	E420	0.404 mg/L	0.4 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	86.4 mg/L	100 mg/L	86.4	70.0	130	----
		silver, total	7440-22-4	E420	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		sodium, total	7440-23-5	E420	20.4 mg/L	20 mg/L	102	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	198 mg/L	200 mg/L	99.1	70.0	130	----
		thallium, total	7440-28-0	E420	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		tin, total	7440-31-5	E420	0.197 mg/L	0.2 mg/L	98.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.397 mg/L	0.4 mg/L	99.2	70.0	130	----
		uranium, total	7440-61-1	E420	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
		vanadium, total	7440-62-2	E420	1.01 mg/L	1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	4.09 mg/L	4 mg/L	102	70.0	130	----
		zirconium, total	7440-67-7	E420	0.398 mg/L	0.4 mg/L	99.5	70.0	130	----
Dissolved Metals (QCLot: 536301)										
CG2207805-002	INF-20-JUN-2022	selenium, dissolved	7782-49-2	E423BSe	ND mg/L	0.04 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 539054)										
CG2207721-004	Anonymous	aluminum, dissolved	7429-90-5	E421	1.91 mg/L	2 mg/L	95.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.186 mg/L	0.2 mg/L	93.0	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.179 mg/L	0.2 mg/L	89.6	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.383 mg/L	0.4 mg/L	95.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0967 mg/L	0.1 mg/L	96.7	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 539054) - continued										
CG2207721-004	Anonymous	boron, dissolved	7440-42-8	E421	0.935 mg/L	1 mg/L	93.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0377 mg/L	0.04 mg/L	94.4	70.0	130	----
		calcium, dissolved	7440-70-2	E421	38.8 mg/L	40 mg/L	97.1	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.382 mg/L	0.4 mg/L	95.5	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.188 mg/L	0.2 mg/L	93.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.1 mg/L	20 mg/L	95.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.198 mg/L	0.2 mg/L	99.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	1.01 mg/L	1 mg/L	101	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	9.56 mg/L	10 mg/L	95.6	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.201 mg/L	0.2 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.374 mg/L	0.4 mg/L	93.4	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	92.0 mg/L	100 mg/L	92.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	38.6 mg/L	40 mg/L	96.5	70.0	130	----
		silicon, dissolved	7440-21-3	E421	90.5 mg/L	100 mg/L	90.5	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		sodium, dissolved	7440-23-5	E421	19.0 mg/L	20 mg/L	95.0	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.198 mg/L	0.2 mg/L	98.9	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	191 mg/L	200 mg/L	95.6	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0354 mg/L	0.04 mg/L	88.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.187 mg/L	0.2 mg/L	93.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.371 mg/L	0.4 mg/L	92.8	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0372 mg/L	0.04 mg/L	93.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.945 mg/L	1 mg/L	94.5	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.42 mg/L	4 mg/L	85.5	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.395 mg/L	0.4 mg/L	98.8	70.0	130	----
Dissolved Metals (QCLot: 539400)										
CG2207805-002	INF-20-JUN-2022	mercury, dissolved	7439-97-6	E509	0.0000890 mg/L	0.0001 mg/L	89.0	70.0	130	----

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ANALYTICAL CHEMISTRY & TESTING SERVICES

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Company:	MOUNT POLLEY MINING CORP	☑ Standard ☑ Other	● Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:		**Analysis Request**
Invoice To:	Same as Report ? ● Yes ○ No	**Client / Project Information:**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427	
Contact:		PO / AFE:	
Address:		Legal Site Description:	
Phone:	Fax:	Quote #: CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS & BOD	Dissolved Se (E423BSe)	Total Organic Carbon	Number of Containers
					✓	✓	F/P		✓	P	P/F	✓	✓		P/F	P	
	SRF-20-JUN-2022	20-Jun-22	1:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-20-JUN-2022	20-Jun-22	2:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	DUP -20-JUN-2022	20-Jun-22	2:30	Water	X	X	[illegible]	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2207805

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			6/20	4:44p	22			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2208228**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 27-Jun-2022 13:15
PO	: Not Submitted	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: ----	Issue Date	: 09-Jul-2022 15:21
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-27-Jun-2022	----	----	----	----
					Client sampling date / time	27-Jun-2022 10:13	----	----	----	----
					CG2208228-001	--------	--------	--------	--------	
					Result	----	----	----	----	
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0591	----	----	----	----	
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.37	----	----	----	----	
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000790	----	----	----	----	
Total Metals										
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000645	----	----	----	----	
Dissolved Metals										
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2208228**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 27-Jun-2022 13:15
PO	: Not Submitted	Issue Date	: 09-Jul-2022 15:21
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-27-Jun-2022	E235.NO3-L	27-Jun-2022	----	----	----		29-Jun-2022	3 days	2 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-27-Jun-2022	E423BSe	27-Jun-2022	02-Jul-2022	----	----		04-Jul-2022	180 days	7 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-27-Jun-2022	E355-L	27-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-27-Jun-2022	E420	27-Jun-2022	----	----	----		04-Jul-2022	180 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	546311	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	543271	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	548018	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	550307	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	546311	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	543271	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	548018	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	550307	1	20	5.0	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	546311	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	543271	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	548018	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	550307	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	546311	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	543271	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	548018	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	550307	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2208228**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 27-Jun-2022 13:15
PO	: Not Submitted	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: ----	Issue Date	: 09-Jul-2022 15:21
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ruby Pham	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 543271)											
CG2208326-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.287	0.301	4.66%	20%	----
Organic / Inorganic Carbon (QC Lot: 550307)											
CG2208228-001	SRF-27-Jun-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.37	5.64	5.00%	20%	----
Total Metals (QC Lot: 548018)											
CG2208181-001	Anonymous	selenium, total	7782-49-2	E420	0.000050	mg/L	55.5 µg/L	0.0553	0.379%	20%	----
Dissolved Metals (QC Lot: 546311)											
CG2208228-001	SRF-27-Jun-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000790	0.000773	2.24%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 543271)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 550307)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 548018)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 546311)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 543271)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.7	90.0	110	----
Organic / Inorganic Carbon (QCLot: 550307)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	111	80.0	120	----
Total Metals (QCLot: 548018)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.9	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	107	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 543271)										
CG2208326-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.29 mg/L	2.5 mg/L	91.7	75.0	125	----
Organic / Inorganic Carbon (QCLot: 550307)										
CG2208228-001	SRF-27-Jun-2022	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 548018)										
CG2208181-001	Anonymous	selenium, total	7782-49-2	E420	0.488 mg/L	0.4 mg/L	122	70.0	130	----
Dissolved Metals (QCLot: 546311)										
FJ2201746-001	Anonymous	selenium, dissolved	7782-49-2	E423BSe	ND mg/L	0.04 mg/L	ND	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Metals	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
						P	D/F			P						P	
	SRF-27-Jun-2022	27-Jun-22	10:13	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2208228

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			6/27	13:15	14			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2208648**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Jul-2022 14:45
PO	:	Date Analysis Commenced	: 05-Jul-2022
C-O-C number	: ----	Issue Date	: 12-Jul-2022 13:52
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Kevin Baxter		Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Summie Lo	Lab Assistant	Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-04-Jul-2022	----	----	----	----
					Client sampling date / time	04-Jul-2022 10:15	----	----	----	----
					CG2208648-001	--------	--------	--------	--------	--------
					Result	----	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		0.170	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		5.38	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00102	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0075	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00239	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0279	----	----	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.055	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000277	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		237	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L		0.000238	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00027	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00423	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.282	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000092	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0033	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		44.1	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.127	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0109	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		2.03	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.26	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00289	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00138	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		7.29	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SRF-04-Jul-2022	----	----	----	----
					Client sampling date / time	04-Jul-2022 10:15	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	CG2208648-001	--------	--------	--------	--------	
					Result	----	----	----	----	
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----	
sodium, total	7440-23-5	E420	0.050	mg/L	13.0	----	----	----	----	
strontium, total	7440-24-6	E420	0.00020	mg/L	2.08	----	----	----	----	
sulfur, total	7704-34-9	E420	0.50	mg/L	259	----	----	----	----	
tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00035	----	----	----	----	
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----	
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	----	----	----	----	
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----	
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	----	----	----	----	
tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00018	----	----	----	----	
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000149	----	----	----	----	
vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00224	----	----	----	----	
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	----	----	----	----	
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	----	----	----	----	
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0034	----	----	----	----	
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	----	----	----	----	
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00245	----	----	----	----	
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0301	----	----	----	----	
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	----	----	----	----	
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----	
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.056	----	----	----	----	
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	----	----	----	----	
calcium, dissolved	7440-70-2	E421	0.050	mg/L	266	----	----	----	----	
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000271	----	----	----	----	
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	----	----	----	----	
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00020	----	----	----	----	
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	----	----	----	----	
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.284	----	----	----	----	
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	----	----	----	----	
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0032	----	----	----	----	
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	48.1	----	----	----	----	

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SRF-04-Jul-2022	----	----	----	----
					Client sampling date / time	04-Jul-2022 10:15	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		CG2208648-001	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.141	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00549	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		2.45	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.31	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00317	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		7.93	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		13.6	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.20	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		263	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		0.00019	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000144	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00232	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		<0.00030	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2208648**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Jul-2022 14:45
PO	:	Issue Date	: 12-Jul-2022 13:52
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Dissolved Metals	QC-553879-001	----	selenium, dissolved	7782-49-2	E423BSe	0.000062 [B] mg/L	0.00005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC										
HDPE										
SRF-04-Jul-2022	E235.NO3	04-Jul-2022	----	----	----		06-Jul-2022	3 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-04-Jul-2022	E421	04-Jul-2022	08-Jul-2022	----	----		08-Jul-2022	180 days	4 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-04-Jul-2022	E423BSe	04-Jul-2022	08-Jul-2022	----	----		08-Jul-2022	180 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-04-Jul-2022	E355-L	04-Jul-2022	10-Jul-2022	----	----		10-Jul-2022	28 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-04-Jul-2022	E420	04-Jul-2022	----	----	----		08-Jul-2022	180 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	553879	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	554698	1	19	5.2	5.0	✓
Nitrate in Water by IC	E235.NO3	551636	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	554041	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	556472	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	553879	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	554698	1	19	5.2	5.0	✓
Nitrate in Water by IC	E235.NO3	551636	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	554041	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	556472	1	17	5.8	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	553879	1	1	100.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	554698	1	19	5.2	5.0	✓
Nitrate in Water by IC	E235.NO3	551636	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	554041	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	556472	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	553879	0	1	0.0	5.0	×
Dissolved Metals in Water by CRC ICPMS	E421	554698	1	19	5.2	5.0	✓
Nitrate in Water by IC	E235.NO3	551636	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	554041	1	15	6.6	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	556472	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC	E235.NO3 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2208648**	Page	: 1 of 14
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 04-Jul-2022 14:45
PO	:	Date Analysis Commenced	: 05-Jul-2022
C-O-C number	: ----	Issue Date	: 12-Jul-2022 13:52
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Kevin Baxter		Calgary Metals, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sara Niroomand		Calgary Inorganics, Calgary, Alberta
Sara Niroomand		Calgary Metals, Calgary, Alberta
Shirley Li		Calgary Metals, Calgary, Alberta
Summie Lo	Lab Assistant	Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 551636)											
CG2208629-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	0.023	0.022	0.002	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 556472)											
CG2208648-001	SRF-04-Jul-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.38	5.45	1.19%	20%	----
Total Metals (QC Lot: 554041)											
CG2208608-002	Anonymous	aluminum, total	7429-90-5	E420	0.0150	mg/L	0.459	0.449	2.16%	20%	----
		antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00050	mg/L	0.00058	0.00054	0.00005	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00050	mg/L	0.117	0.114	2.81%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000250	mg/L	0.00249	0.00242	0.000068	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.050	mg/L	0.084	0.082	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000250	mg/L	0.000300	0.000290	3.39%	20%	----
		calcium, total	7440-70-2	E420	0.250	mg/L	50.4	49.3	2.19%	20%	----
		cesium, total	7440-46-2	E420	0.000050	mg/L	0.000100	0.000100	0.0000001	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00156	0.00152	0.00004	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00050	mg/L	0.00060	0.00060	0.000005	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00250	mg/L	0.0798	0.0770	3.49%	20%	----
		iron, total	7439-89-6	E420	0.050	mg/L	2.10	2.05	2.66%	20%	----
		lead, total	7439-92-1	E420	0.000250	mg/L	0.00616	0.00610	0.850%	20%	----
		lithium, total	7439-93-2	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0250	mg/L	14.2	13.8	2.96%	20%	----
		manganese, total	7439-96-5	E420	0.00050	mg/L	0.0516	0.0512	0.885%	20%	----
		molybdenum, total	7439-98-7	E420	0.000250	mg/L	0.00131	0.00124	0.000073	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00250	mg/L	0.00393	0.00391	0.00002	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.250	mg/L	5.24	5.28	0.769%	20%	----
		potassium, total	7440-09-7	E420	0.250	mg/L	9.47	9.19	3.08%	20%	----
		rubidium, total	7440-17-7	E420	0.00100	mg/L	0.00686	0.00638	0.00048	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000250	mg/L	0.000685	0.000619	0.000066	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.50	mg/L	2.49	2.36	0.13	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000050	mg/L	0.000135	0.000135	0.0000002	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.250	mg/L	27.5	26.7	2.94%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 554041) - continued											
CG2208608-002	Anonymous	strontium, total	7440-24-6	E420	0.00100	mg/L	0.210	0.204	3.00%	20%	----
		sulfur, total	7704-34-9	E420	2.50	mg/L	29.9	28.6	4.29%	20%	----
		tellurium, total	13494-80-9	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00050	mg/L	0.00078	0.00076	0.00001	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00150	mg/L	0.00469	0.00714	0.00245	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000050	mg/L	0.000163	0.000168	0.000005	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0150	mg/L	0.187	0.180	3.70%	20%	----
		zirconium, total	7440-67-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 553879)											
CG2208648-001	SRF-04-Jul-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.00102	0.00106	3.83%	20%	----
Dissolved Metals (QC Lot: 554698)											
CG2208527-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0036	0.0037	0.00006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00053	0.00052	0.000008	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00084	0.00087	0.00003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.181	0.187	2.99%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.256	0.268	4.90%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000142	0.0000128	0.0000013	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	74.6	75.4	1.05%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00014	0.00016	0.00002	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00523	0.00536	2.56%	20%	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	0.100	0.101	0.0008	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0126	0.0127	0.850%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	34.1	34.6	1.23%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00137	0.00142	3.66%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00216	0.00228	0.00012	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 554698) - continued											
CG2208527-001	Anonymous	phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.051	0.057	0.006	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.46	5.58	2.20%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00176	0.00180	0.00003	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.82	5.85	0.498%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	31.1	32.1	3.11%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.493	0.497	0.658%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	10.7	10.5	2.60%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	0.00028	0.00028	0.000002	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00037	<0.00030	0.00007	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00386	0.00394	1.92%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0032	0.0032	0.000005	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00053	0.00055	0.00002	Diff <2x LOR	----