



# Mount Polley Mining Corporation

an Imperial Metals company

October 30, 2014

## Results of Analyses of Mine Processing Reagents

In response to questions raised about the possibility of release of process chemicals used in Mount Polley's mine milling process, a set of seven samples of tailings deposited along Hazeltine Creek and a sample of soil underlying the tailings were submitted for laboratory analysis to identify if mine process reagents were present, and if so, at what concentrations they might be present. These reagents are used to separate and concentrate copper and gold ore minerals from the crushed gangue minerals being mined as ore at the site.

Laboratory analysis of the tailings samples has included:

- Measurement of methyl isobutyl carbinol (MIBC) and total glycols to provide an indication of the presence of flotation agents. Methyl isobutyl ketone (MIBK) was also analyzed given that this compound may occasionally be associated with MIBC as a degradation product;
- Measurement of xanthates (a binding agent) and carbon disulphide which is a possible degradation byproduct of xanthate; and
- Measurement of light and heavy extractable petroleum hydrocarbons (LEPH and HEPH) and polycyclic aromatic hydrocarbons (PAH) which are associated with diesel and kerosene fuels. Although diesel and kerosene were not known process agents at the mine, they are sometimes used in process circuits to enhance flotation at many mine sites.

In all eight samples submitted, none of the substances identified above were present in the tailings samples. These results were not unexpected given that these potential contaminants would be expected to have been consumed during process applications, ending up in the mineral concentrate which is shipped to the smelter, and/or are biodegradable to varying degrees. However, the testing described here was to provide data so that we could appropriately respond to questions that members of First Nations and the local community have asked us about the process reagents

The BC Ministry of Environment also carried out testing of tailings material for MIBC and similar to our findings, [their laboratory analysis](#) did not find MIBC residues.

Lime (calcium oxide) is also used at the Mount Polley mine and does end up in the tailings. This is the same lime that is used on residential lawns to control soil pH. However, it is not present in appreciable amounts either in the tailings water that was held in the storage facility pre-breach or in the tailings themselves. The pH of the tailings water was approximately 8.5 pH units, which is within the water quality guidelines for freshwater aquatic life. The pH of the samples referred to above was moderately elevated over the adjacent soils but not harmful.

*Attachment: Mount Polley ALS laboratory report dated October 30, 2014*



MOUNT POLLEY MINING CORP.  
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Date Received: 16-SEP-14  
Report Date: 30-OCT-14 16:55 (MT)  
Version: FINAL REV. 2

Client Phone: 250-790-2215

## Certificate of Analysis

**Lab Work Order #:** L1518225  
**Project P.O. #:** NOT SUBMITTED  
**Job Reference:** 621717  
**C of C Numbers:** 10-045380, 10-045393, 10-045395, 10-045399, 10-045402, 10-045403, 10-045409  
**Legal Site Desc:** Mt Polley Mining Corp 2014

**Comments:** Addendum.

30-OCT-2014 Revision 2: This revision includes only specific hydrocarbons analyses.

Can Dang  
Senior Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1518225-41	L1518225-43	L1518225-57	L1518225-59	L1518225-60
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	11-SEP-14	11-SEP-14	13-SEP-14	13-SEP-14	13-SEP-14
		Sampled Time	13:10	11:40	12:50	09:50	09:50
		Client ID	ST01-03-140911	ST01-05-01-140911	ST16-03-140913	ST18-03-01-140913	ST18-03-02-140913
Grouping	Analyte						
<b>SOIL</b>							
<b>Volatile Organic Compounds</b>	Acetone (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0	
	Carbon Disulfide (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	n-Heptane (nC7) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	2-Hexanone (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Methyl ethyl ketone (MEK) (mg/kg)	<20	<20	<20	<20	<20	
	Methyl isobutyl ketone (MIBK) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Methyl isobutyl carbinol (MIBC) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	n-Octane (nC8) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	n-Pentane (mg/kg)	<2.5	<2.5	<2.5	<2.5	<2.5	
	1,2,3-Trimethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Surrogate: 4-Bromofluorobenzene (SS) (%)	93.6	96.5	91.3	94.9	89.4	
	Surrogate: 1,4-Difluorobenzene (SS) (%)	96.5	98.5	94.5	99.0	96.8	
<b>Hydrocarbons</b>	EPH10-19 (mg/kg)	<200	<200	<200	<200	<200	
	EPH19-32 (mg/kg)	<200	<200	<200	<200	<200	
	LEPH (mg/kg)	<200	<200	<200	<200	<200	
	HEPH (mg/kg)	<200	<200	<200	<200	<200	
<b>Polycyclic Aromatic Hydrocarbons</b>	Acenaphthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Acenaphthylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Anthracene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Benz(a)anthracene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Benzo(a)pyrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Benzo(b)fluoranthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Benzo(g,h,i)perylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Benzo(k)fluoranthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Chrysene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Dibenz(a,h)anthracene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Fluoranthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Fluorene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	2-Methylnaphthalene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Naphthalene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Phenanthrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Pyrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Surrogate: Acenaphthene d10 (%)	92.9	95.3	96.5	104.3	97.0	
	Surrogate: Chrysene d12 (%)	111.3	115.0	117.5	121.1	114.3	
	Surrogate: Naphthalene d8 (%)	92.2	95.1	95.7	104.8	97.9	

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1518225-63 Soil 13-SEP-14 16:30 ST15-02-02-140913	L1518225-64 Soil 13-SEP-14 17:00 ST15-03-140913			
Grouping	Analyte				
<b>SOIL</b>					
<b>Volatile Organic Compounds</b>	Acetone (mg/kg)	<4.0	<4.0		
	Carbon Disulfide (mg/kg)	<0.050	<0.050		
	n-Heptane (nC7) (mg/kg)	<0.050	<0.050		
	2-Hexanone (mg/kg)	<0.050	<0.050		
	Methyl ethyl ketone (MEK) (mg/kg)	<20	<20		
	Methyl isobutyl ketone (MIBK) (mg/kg)	<0.050	<0.050		
	Methyl isobutyl carbinol (MIBC) (mg/kg)	<0.050	<0.050		
	n-Octane (nC8) (mg/kg)	<0.050	<0.050		
	n-Pentane (mg/kg)	<2.5	<2.5		
	1,2,3-Trimethylbenzene (mg/kg)	<0.050	<0.050		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	95.9	93.6		
	Surrogate: 1,4-Difluorobenzene (SS) (%)	103.9	102.3		
<b>Hydrocarbons</b>	EPH10-19 (mg/kg)	<200	<200		
	EPH19-32 (mg/kg)	<200	<200		
	LEPH (mg/kg)	<200	<200		
	HEPH (mg/kg)	<200	<200		
<b>Polycyclic Aromatic Hydrocarbons</b>	Acenaphthene (mg/kg)	<0.050	<0.050		
	Acenaphthylene (mg/kg)	<0.050	<0.050		
	Anthracene (mg/kg)	<0.050	<0.050		
	Benz(a)anthracene (mg/kg)	<0.050	<0.050		
	Benzo(a)pyrene (mg/kg)	<0.050	<0.050		
	Benzo(b)fluoranthene (mg/kg)	<0.050	<0.050		
	Benzo(g,h,i)perylene (mg/kg)	<0.050	<0.050		
	Benzo(k)fluoranthene (mg/kg)	<0.050	<0.050		
	Chrysene (mg/kg)	<0.050	<0.050		
	Dibenz(a,h)anthracene (mg/kg)	<0.050	<0.050		
	Fluoranthene (mg/kg)	<0.050	<0.050		
	Fluorene (mg/kg)	<0.050	<0.050		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.050	<0.050		
	2-Methylnaphthalene (mg/kg)	<0.050	<0.050		
	Naphthalene (mg/kg)	<0.050	<0.050		
	Phenanthrene (mg/kg)	<0.050	<0.050		
	Pyrene (mg/kg)	<0.050	<0.050		
	Surrogate: Acenaphthene d10 (%)	100.5	99.1		
	Surrogate: Chrysene d12 (%)	110.1	117.0		
	Surrogate: Naphthalene d8 (%)	100.5	97.4		

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	<b>Sample ID</b>	<b>Description</b>	<b>Sampled Date</b>	<b>Sampled Time</b>	<b>Client ID</b>
	L1518225-41	Soil	11-SEP-14	13:10	ST01-03-140911
	L1518225-43	Soil	11-SEP-14	11:40	ST01-05-01-140911
	L1518225-57	Soil	13-SEP-14	12:50	ST16-03-140913
	L1518225-59	Soil	13-SEP-14	09:50	ST18-03-01-140913
	L1518225-60	Soil	13-SEP-14	09:50	ST18-03-02-140913
Grouping	Analyte				
<b>SOIL</b>					
<b>Polycyclic Aromatic Hydrocarbons</b>	Surrogate: Phenanthrene d10 (%)				
	92.3	99.1	95.7	102.5	95.8

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1518225-63	Description	Soil	L1518225-64						
Sampled Date	13-SEP-14	Sampled Time	16:30	Client ID	ST15-02-02-140913	Sampled Date	13-SEP-14	Sampled Time	17:00	Client ID	ST15-03-140913
Grouping	Analyte										
<b>SOIL</b>											
<b>Polycyclic Aromatic Hydrocarbons</b>	Surrogate: Phenanthrene d10 (%)	96.7	99.6								

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## Reference Information

### Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L1518225-57	ST16-03-140913	VOCH	Volatile organic compound analysis was conducted on a sample that contained headspace.
L1518225-60	ST18-03-02-140913	VOCH	Volatile organic compound analysis was conducted on a sample that contained headspace.
L1518225-64	ST15-03-140913	VOCH	Volatile organic compound analysis was conducted on a sample that contained headspace.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<b>ALK-PASTE-VA</b>	Soil	Alkalinity in Soil (Paste) by Colour	Carter-CSSS / EPA 310.2 (modified)
A soil extract produced by the saturated paste extraction procedure is analyzed for alkalinity by methyl orange colourimetry.			
<b>C-INORG-SK</b>	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456
When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.			
Reference: Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5			
<b>C-TOT-LECO-SK</b>	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
<b>CAT-XTR-SK</b>	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7
Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.			
<b>CEC-SK</b>	Soil	Cation Exchange Capacity (NH4OAc Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)
Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.			
<b>CL-PASTE-COLOR-VA</b>	Soil	Chloride in Soil (Paste) by Colourimetry	Carter-CSSS / APHA 4500-Cl E (modified)
A soil extract produced by the saturated paste extraction procedure is analyzed for chloride by ferricyanide colourimetry.			
<b>EC-PASTE-VA</b>	Soil	Conductivity in Soil (Paste) by Meter	Carter-CSSS / APHA 2510B
A soil extract produced by the saturated paste extraction procedure is analyzed by conductivity meter.			
<b>EPH-TUMB-FID-VA</b>	Soil	EPH in Solids by Tumbler and GCFID	BC MOE EPH GCFID
Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).			
<b>ETL-ESP-SK</b>	Soil	Exchangeable Sodium Percentage - Calc	Calculation
<b>GLY-EXT-FID-VA</b>	Soil	Glycols in Soil by Wrist Shaker GCFID	SW-846, METHOD 8015B, EPA
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8015B, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of a subsample of the sediment/soil with deionized water, followed by treatment of the extract with a strong base (NaOH) and benzoyl chloride to form the corresponding benzoate esters. The benzoate esters are then extracted with iso-octane and the extract is analyzed by capillary column gas chromatography with flame ionization detection (FID).			
<b>HG-200.2-CVAF-VA</b>	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7
This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.			
<b>IC-CACO3-CALC-SK</b>	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
<b>LEPH/HEPH-CALC-VA</b>	Soil	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)

## Reference Information

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**ME-MS41-AX** Soil Aqua Regia ICPMS Aqua Regia ICPMS

A prepared sample (0.50 g) is digested with aqua regia in a graphite heating block. After cooling, the resulting solution is diluted to with deionized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry. Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples are then analysed by ICP-MS for the remaining suite of elements. The analytical results are corrected for inter-element spectral interferences.

**MET-200.2-CCMS-VA** Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**MET-PASTE-ICP-VA** Soil Metals in Soil (Paste) by ICPOES Carter-CSSS / EPA 6010B (modified)

A soil extract produced by the saturated paste extraction procedure is analyzed for Sodium, Calcium, and Magnesium by ICPOES as per "Soil Sampling and Methods of Analysis" by M. Carter.

**MOISTURE-VA** Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

**N-TOT-LECO-SK** Soil Total Nitrogen by combustion method SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

**NO3-AVAIL-SK** Soil Available Nitrate-N Method = Alberta Ag (1988)

Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.

Reference:  
 Recommended Methods of Soil Analysis for Canadian Prairie Agricultural Soils. Alberta Agriculture (1988) p. 19 and 28

**NO3-PASTE-IC-VA** Soil Nitrate (N) in Soil (Paste) by IC Carter-CSSS / EPA 300.1 (modified)

A soil extract produced by the saturated paste extraction procedure is analyzed for nitrate (as N) by Ion Chromatography with conductivity or UV detection.

**PAH-TMB-H/A-MS-VA** Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

**PH-1:2-VA** Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

**PO4/K-AVAIL-SK** Soil Plant Available Phosphorus and Potassium Comm. Soil Sci. Plant Anal, 25 (5&6)

Plant available phosphorus and potassium are extracted from the soil using Modified Kelowna solution. Phosphorus in the soil extract is determined colorimetrically at 880 nm, while potassium is determined by flame emission at 770 nm.



## Reference Information

<b>PSA-PIPET-DETAIL-SK</b>	Soil	Particle size - Sieve and Pipette	SSIR-51 METHOD 3.2.1
Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.			
Reference:			
Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.			
<b>S-TOT-LECO-SK</b>	Soil	Total Sulphur by combustion method	ISO 15178:2000
The sample is ignited in a combustion analyzer where sulfur in the reduced SO <sub>2</sub> gas is determined using a thermal conductivity detector.			
<b>SAR-PASTE-CALC-VA</b>	Soil	Sodium Adsorption Ratio (Sat. Paste)	Calculation
A soil extract produced by the saturated paste extraction procedure is analyzed for Sodium, Calcium, and Magnesium by ICPOES. Sodium Adsorption Ratio (SAR) is calculated as per "Soil Sampling and Methods of Analysis" by M. Carter.			
<b>SAT-PCNT-VA</b>	Soil	Saturation Percentage	Carter-CSSS
Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.			
<b>SO4-AVAIL-SK</b>	Soil	Available Sulfate-S	REC METH SOIL ANAL - AB. AG(1988)
Plant available sulfur in the soil is extracted with a weak calcium chloride solution. Total S in the extract is then determined by ICP-OES.			
<b>SO4-PASTE-IC-VA</b>	Soil	Sulfate in Soil (Paste) by IC	Carter-CSSS / EPA 300.1 (modified)
A soil extract produced by the saturated paste extraction procedure is analyzed for sulfate by Ion Chromatography with conductivity detection.			
<b>TGR2-CALC-VA</b>	Soil	Theoretical Gypsum Requirement	J. Ashworth et al (1999)
Theoretical Gypsum Requirement is an estimate of the gypsum amendment required to remediate brine-contaminated or sodic soils, and is provided in units of tonnes per hectare (t/ha) for a treatment depth of 15cm. TGR(brine), intended for brine-contaminated soils, is calculated using Method A from "A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils", by J. Ashworth (Cdn J. of Soil Science, 1999), available at <a href="http://www.alsglobal.com">www.alsglobal.com</a> . TGR(sodic), intended for naturally sodic soils, uses the Oster and Frenkel method (Method B) from the same paper. Reported TGR values are capped at 50 t/ha, considered the maximum practical gypsum amendment. To convert TGR from t/ha to tons/acre, multiply by 0.446. To determine a TGR value for an alternate treatment depth, multiply by [desired treatment depth (cm) / 15 cm].			
<b>VOC-M2-HSMS-VA</b>	Soil	Misc VOCs in soil by Headspace GCMS	EPA8260B, 5021, BC MELP
The soil methanol extract is added to water and reagents, then 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.			
<b>VOC7/VOC-SURR-MS-VA</b>	Soil	VOC7 and/or VOC Surrogates for Soils	EPA METHODS 8260B & 524.2

\*\* 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

### Chain of Custody Numbers:

10-045380	10-045393	10-045395	10-045399	10-045402
10-045403	10-045409			

## 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.*



# Quality Control Report

Workorder: L1518225

Report Date: 30-OCT-14

Page 1 of 5

Client: MOUNT POLLEY MINING CORP.  
 PO Box 12  
 Likely BC V0L 1N0  
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>EPH-TUMB-FID-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2953834</b>							
<b>WG1955441-3</b>	<b>IRM</b>	<b>ALS PHC2 RM</b>						
EPH10-19			95.3		%		70-130	21-SEP-14
EPH19-32			101.2		%		70-130	21-SEP-14
<b>WG1955441-1</b>	<b>MB</b>							
EPH10-19			<200		mg/kg		200	21-SEP-14
EPH19-32			<200		mg/kg		200	21-SEP-14
<b>PAH-TMB-H/A-MS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2954691</b>							
<b>WG1955441-4</b>	<b>IRM</b>	<b>ALS PAH1 RM</b>						
Acenaphthene			99.9		%		60-130	22-SEP-14
Acenaphthylene			103.4		%		60-130	22-SEP-14
Anthracene			107.9		%		60-130	22-SEP-14
Benz(a)anthracene			104.4		%		60-130	22-SEP-14
Benzo(a)pyrene			100.2		%		60-130	22-SEP-14
Benzo(b)fluoranthene			108.9		%		60-130	22-SEP-14
Benzo(g,h,i)perylene			123.3		%		60-130	22-SEP-14
Benzo(k)fluoranthene			106.4		%		60-130	22-SEP-14
Chrysene			121.3		%		60-130	22-SEP-14
Dibenz(a,h)anthracene			120.4		%		60-130	22-SEP-14
Fluoranthene			109.1		%		60-130	22-SEP-14
Fluorene			105.1		%		60-130	22-SEP-14
Indeno(1,2,3-c,d)pyrene			117.2		%		60-130	22-SEP-14
2-Methylnaphthalene			99.9		%		60-130	22-SEP-14
Naphthalene			105.6		%		50-130	22-SEP-14
Phenanthrene			108.9		%		60-130	22-SEP-14
Pyrene			107.1		%		60-130	22-SEP-14
<b>WG1955441-1</b>	<b>MB</b>							
Acenaphthene			<0.0050		mg/kg		0.005	22-SEP-14
Acenaphthylene			<0.0050		mg/kg		0.005	22-SEP-14
Anthracene			<0.0040		mg/kg		0.004	22-SEP-14
Benz(a)anthracene			<0.010		mg/kg		0.01	22-SEP-14
Benzo(a)pyrene			<0.010		mg/kg		0.01	22-SEP-14
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	22-SEP-14
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	22-SEP-14
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	22-SEP-14
Chrysene			<0.010		mg/kg		0.01	22-SEP-14



## Quality Control Report

Workorder: L1518225

Report Date: 30-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PAH-TMB-H/A-MS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2954691</b>							
<b>WG1955441-1</b>	<b>MB</b>							
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	22-SEP-14
Fluoranthene			<0.010		mg/kg		0.01	22-SEP-14
Fluorene			<0.010		mg/kg		0.01	22-SEP-14
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	22-SEP-14
2-Methylnaphthalene			<0.010		mg/kg		0.01	22-SEP-14
Naphthalene			<0.010		mg/kg		0.01	22-SEP-14
Phenanthrene			<0.010		mg/kg		0.01	22-SEP-14
Pyrene			<0.010		mg/kg		0.01	22-SEP-14
Surrogate: Naphthalene d8			94.7		%		50-130	22-SEP-14
Surrogate: Acenaphthene d10			93.6		%		60-130	22-SEP-14
Surrogate: Phenanthrene d10			90.3		%		60-130	22-SEP-14
Surrogate: Chrysene d12			101.4		%		60-130	22-SEP-14
<b>VOC-M2-HSMS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2952710</b>							
<b>WG1954561-3</b>	<b>DUP</b>	<b>L1518225-59</b>						
Acetone		<4.0	<4.0	RPD-NA	mg/kg	N/A	50	20-SEP-14
Carbon Disulfide		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
2-Hexanone		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
Methyl ethyl ketone (MEK)		<20	<20	RPD-NA	mg/kg	N/A	50	20-SEP-14
Methyl isobutyl ketone (MIBK)		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
Methyl isobutyl carbinol (MIBC)		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
n-Heptane (nC7)		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
n-Octane (nC8)		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
n-Pentane		<2.5	<2.5	RPD-NA	mg/kg	N/A	50	20-SEP-14
1,2,3-Trimethylbenzene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	20-SEP-14
<b>WG1952756-2</b>		<b>LCS</b>						
Acetone			95.0		%		70-130	18-SEP-14
Carbon Disulfide			101.7		%		70-130	18-SEP-14
2-Hexanone			114.8		%		70-130	18-SEP-14
Methyl isobutyl ketone (MIBK)			118.5		%		70-130	18-SEP-14
Methyl isobutyl carbinol (MIBC)			93.1		%		70-130	18-SEP-14
n-Heptane (nC7)			101.8		%		70-130	18-SEP-14
n-Octane (nC8)			105.8		%		70-130	18-SEP-14
n-Pentane			97.3		%		70-130	18-SEP-14



## Quality Control Report

Workorder: L1518225

Report Date: 30-OCT-14

Page 3 of 5

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>VOC-M2-HSMS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2952710</b>							
<b>WG1952756-2</b>	<b>LCS</b>							
1,2,3-Trimethylbenzene			107.9		%		70-130	18-SEP-14
<b>WG1953608-2</b>	<b>LCS</b>							
Acetone			85.4		%		70-130	20-SEP-14
Carbon Disulfide			101.3		%		70-130	20-SEP-14
2-Hexanone			101.2		%		70-130	20-SEP-14
Methyl isobutyl ketone (MIBK)			106.7		%		70-130	20-SEP-14
Methyl isobutyl carbinol (MIBC)			94.8		%		70-130	20-SEP-14
n-Heptane (nC7)			101.4		%		70-130	20-SEP-14
n-Octane (nC8)			102.0		%		70-130	20-SEP-14
n-Pentane			93.5		%		70-130	20-SEP-14
1,2,3-Trimethylbenzene			102.1		%		70-130	20-SEP-14
<b>WG1954561-2</b>	<b>LCS</b>							
Acetone			83.8		%		70-130	20-SEP-14
Carbon Disulfide			90.3		%		70-130	20-SEP-14
2-Hexanone			99.3		%		70-130	20-SEP-14
Methyl isobutyl ketone (MIBK)			103.2		%		70-130	20-SEP-14
Methyl isobutyl carbinol (MIBC)			102.5		%		70-130	20-SEP-14
n-Heptane (nC7)			93.5		%		70-130	20-SEP-14
n-Octane (nC8)			94.6		%		70-130	20-SEP-14
n-Pentane			105.1		%		70-130	20-SEP-14
1,2,3-Trimethylbenzene			94.7		%		70-130	20-SEP-14
<b>WG1952756-1</b>	<b>MB</b>							
Acetone			<4.0		mg/kg		4	18-SEP-14
Carbon Disulfide			<0.050		mg/kg		0.05	18-SEP-14
2-Hexanone			<0.050		mg/kg		0.05	18-SEP-14
Methyl ethyl ketone (MEK)			<20		mg/kg		20	18-SEP-14
Methyl isobutyl ketone (MIBK)			<0.050		mg/kg		0.05	18-SEP-14
Methyl isobutyl carbinol (MIBC)			<0.050		mg/kg		0.05	18-SEP-14
n-Heptane (nC7)			<0.050		mg/kg		0.05	18-SEP-14
n-Octane (nC8)			<0.050		mg/kg		0.05	18-SEP-14
n-Pentane			<2.5		mg/kg		2.5	18-SEP-14
1,2,3-Trimethylbenzene			<0.050		mg/kg		0.05	18-SEP-14
<b>WG1953608-1</b>	<b>MB</b>							
Acetone			<4.0		mg/kg		4	20-SEP-14
Carbon Disulfide			<0.050		mg/kg		0.05	20-SEP-14



## Quality Control Report

Workorder: L1518225

Report Date: 30-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>VOC-M2-HSMS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2952710</b>							
<b>WG1953608-1</b>	<b>MB</b>							
2-Hexanone			<0.050		mg/kg		0.05	20-SEP-14
Methyl ethyl ketone (MEK)			<20		mg/kg		20	20-SEP-14
Methyl isobutyl ketone (MIBK)			<0.050		mg/kg		0.05	20-SEP-14
Methyl isobutyl carbinol (MIBC)			<0.050		mg/kg		0.05	20-SEP-14
n-Heptane (nC7)			<0.050		mg/kg		0.05	20-SEP-14
n-Octane (nC8)			<0.050		mg/kg		0.05	20-SEP-14
n-Pentane			<2.5		mg/kg		2.5	20-SEP-14
1,2,3-Trimethylbenzene			<0.050		mg/kg		0.05	20-SEP-14
<b>WG1954561-1</b>	<b>MB</b>							
Acetone			<4.0		mg/kg		4	20-SEP-14
Carbon Disulfide			<0.050		mg/kg		0.05	20-SEP-14
2-Hexanone			<0.050		mg/kg		0.05	20-SEP-14
Methyl ethyl ketone (MEK)			<20		mg/kg		20	20-SEP-14
Methyl isobutyl ketone (MIBK)			<0.050		mg/kg		0.05	20-SEP-14
Methyl isobutyl carbinol (MIBC)			<0.050		mg/kg		0.05	20-SEP-14
n-Heptane (nC7)			<0.050		mg/kg		0.05	20-SEP-14
n-Octane (nC8)			<0.050		mg/kg		0.05	20-SEP-14
n-Pentane			<2.5		mg/kg		2.5	20-SEP-14
1,2,3-Trimethylbenzene			<0.050		mg/kg		0.05	20-SEP-14

# Quality Control Report

Workorder: L1518225

Report Date: 30-OCT-14

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## Legend:

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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
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

---

## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

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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 REPORT

Sample ID	L1518225-41	L1518225-43	L1518225-57	L1518225-59
Client ID	ST01-03-140911	ST01-05-01-140911	ST16-03-140913	ST18-03-01-140913
Matrix	Soil	Soil	Soil	Soil
Units	mg/kg	mg/kg	mg/kg	mg/kg
Analyte				
Xanthate as ethyl Xanthate	< 5 mg/kg	< 5 mg/kg	< 5 mg/kg	< 5 mg/kg
Matrix spike	80%	76%	84%	79%

### Notes:

Analysis of ethyl Xanthate in soil was conducted using procedures adapted from " *Flow injection analysis of ethyl xanthate by in-line dialysis and UV spectrophotometric detection. Talanta, Volume 72, Issue 3, 15 May 2007, Pages 1017–1022.*"

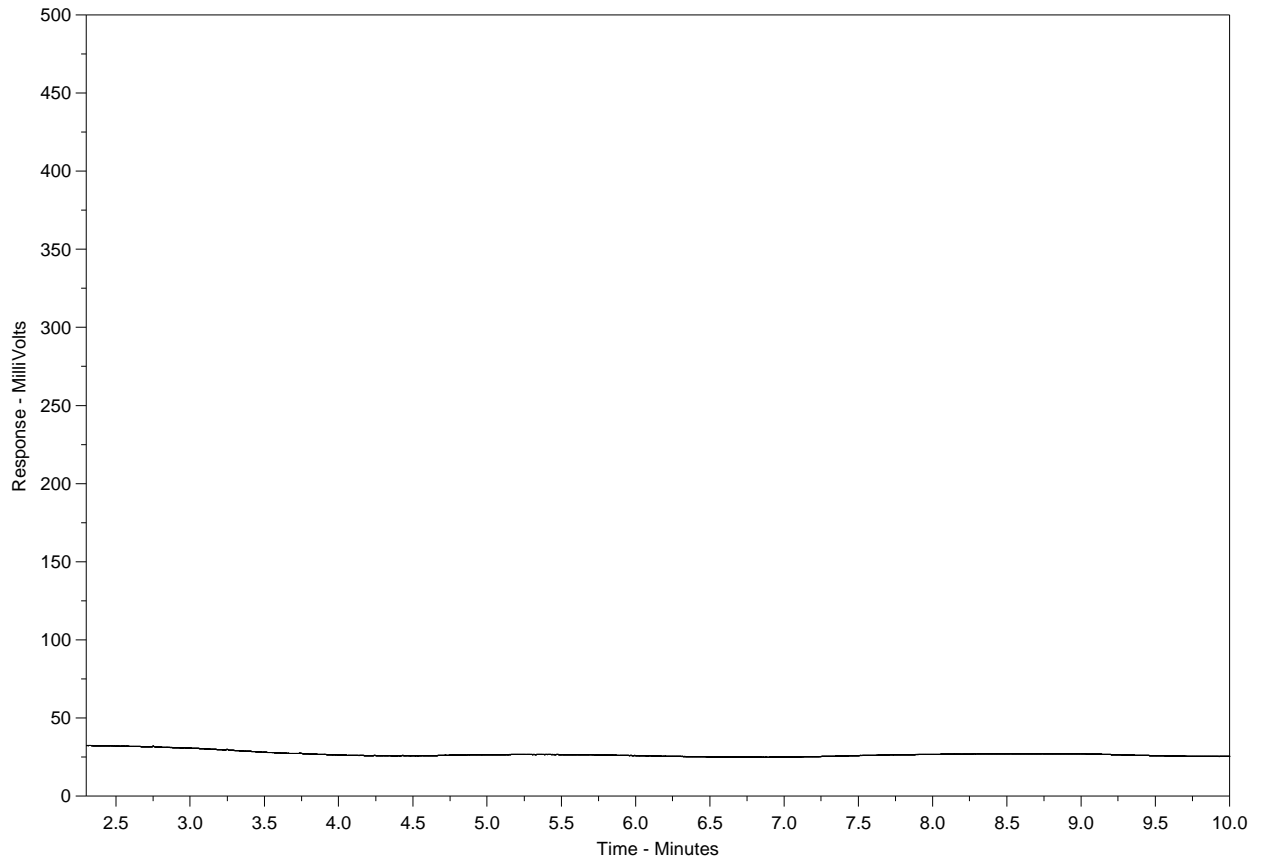


L1518225-60	L1518225-63	L1518225-64
ST18-03-02-140913	ST15-02-02-140913	ST15-03-1409013
Soil	Soil	Soil
mg/kg	mg/kg	mg/kg
< 5 mg/kg	< 5 mg/kg	< 5 mg/kg
85%	83%	87%

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-41  
Client Sample ID: ST01-03-140911



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Diesel / Jet Fuels →	← Motor Oils / Lube Oils / Grease →

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

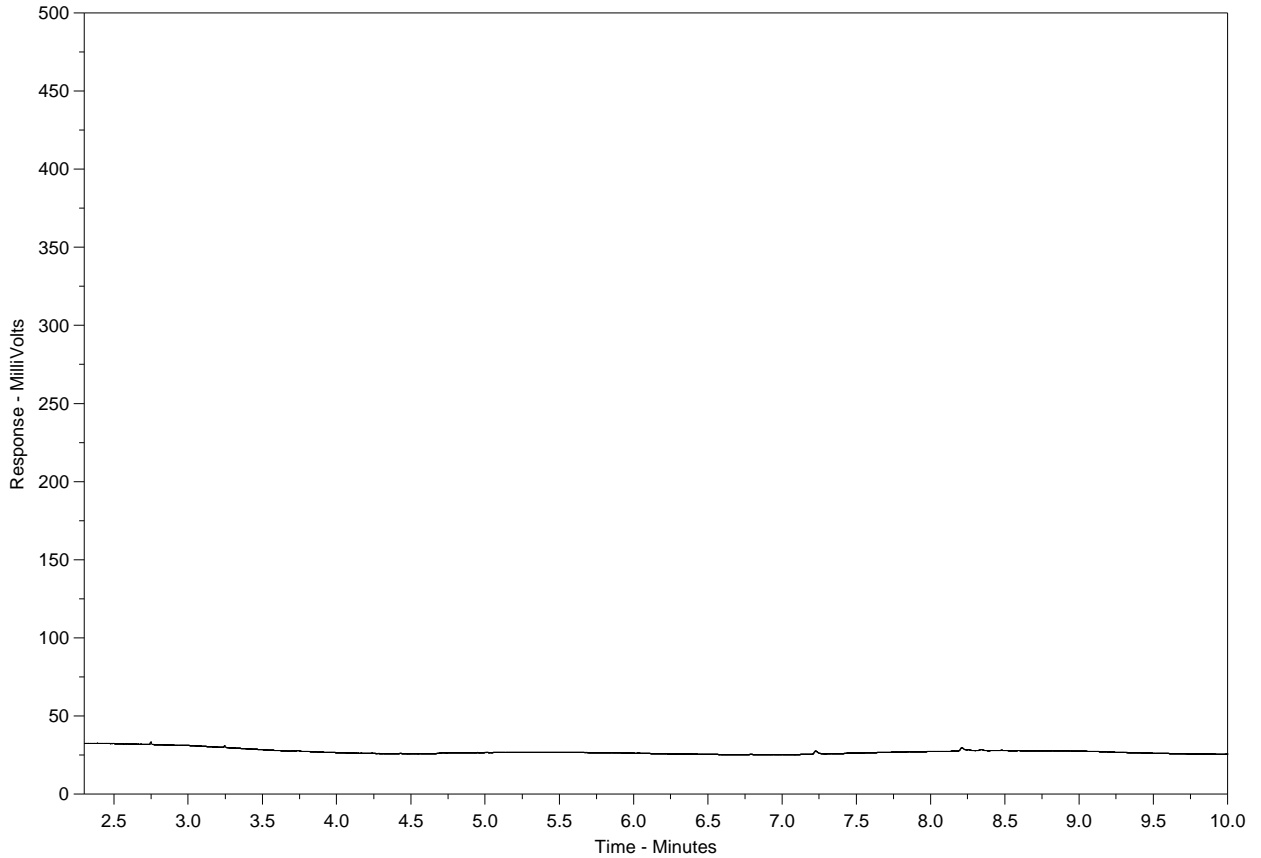
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-43  
 Client Sample ID: ST01-05-1-140911



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

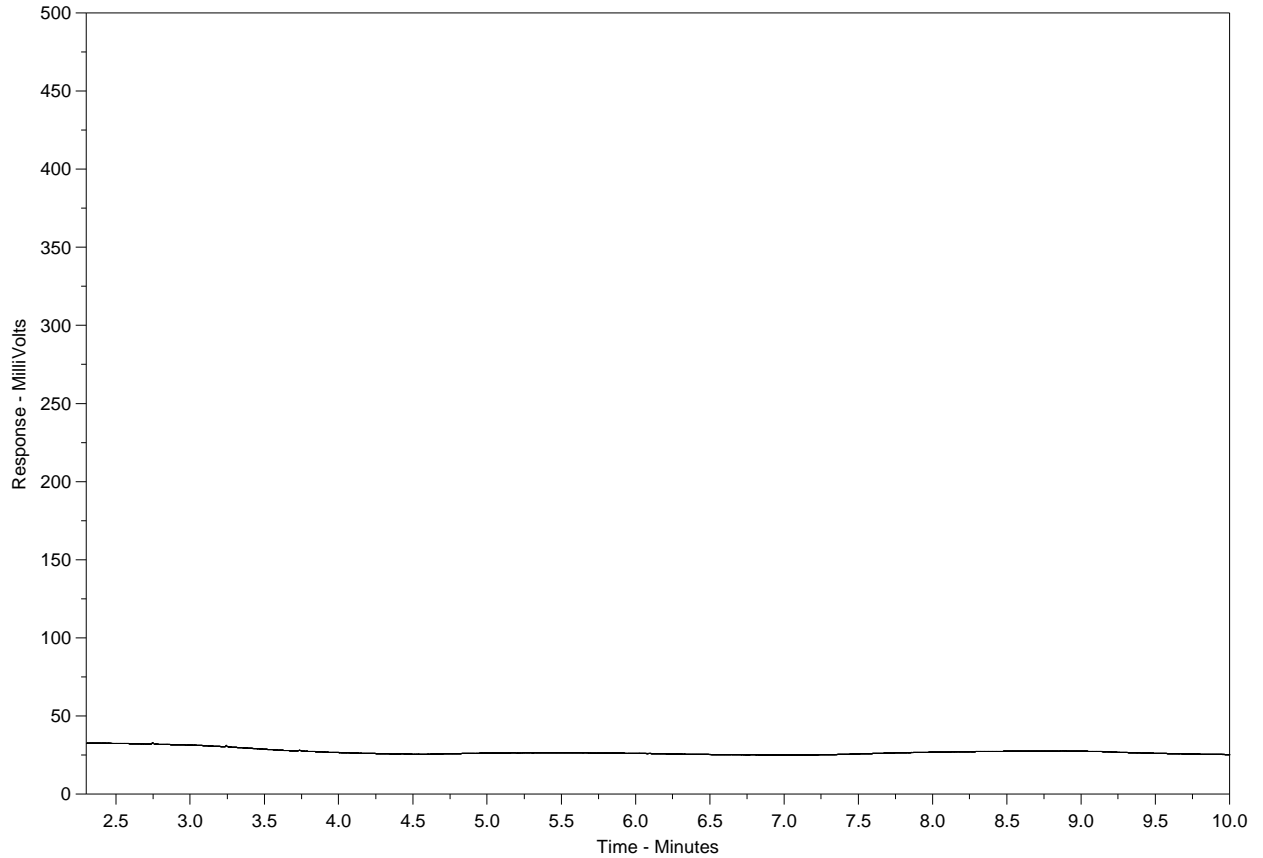
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-57  
Client Sample ID: ST16-03-140913



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Diesel / Jet Fuels →	← Motor Oils / Lube Oils / Grease →

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

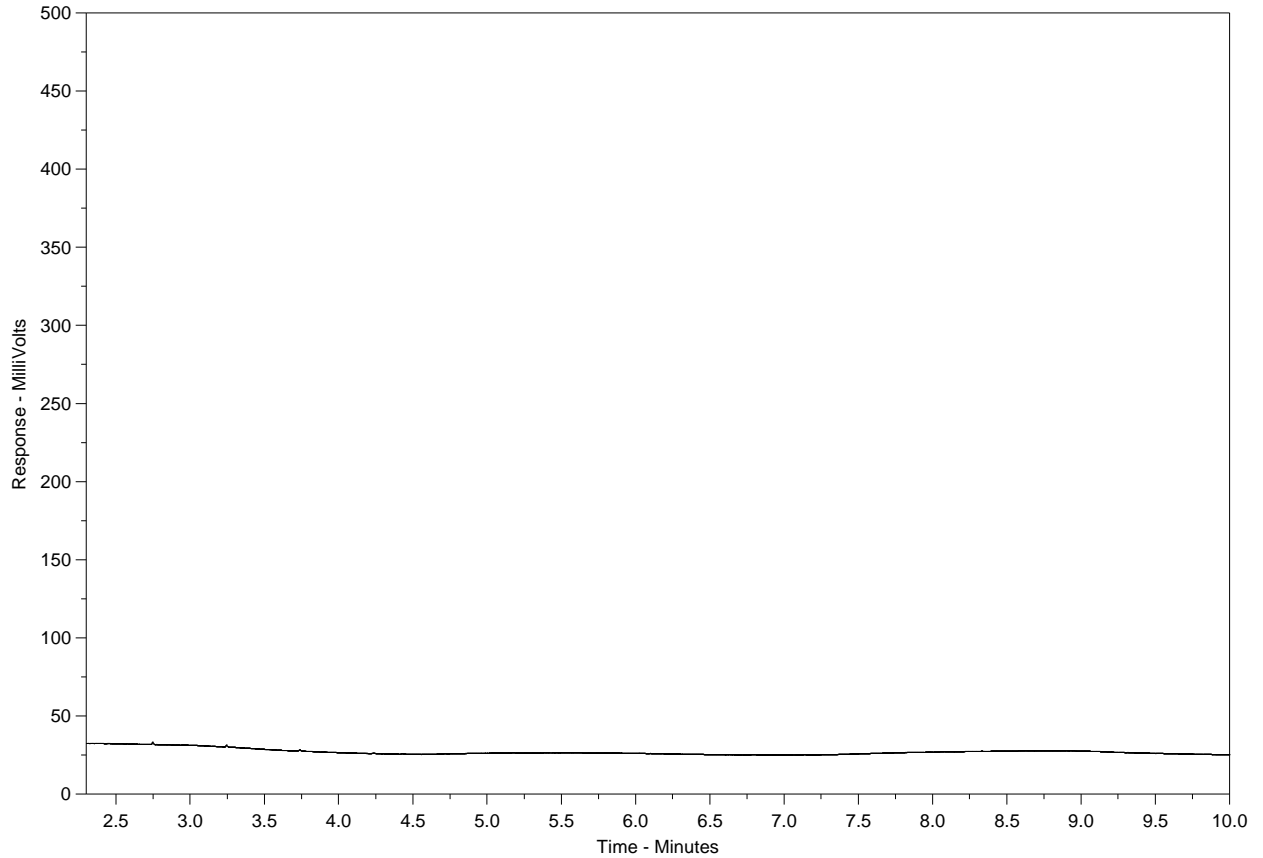
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-59  
Client Sample ID: ST18-03-1-140913



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Diesel / Jet Fuels →	← Motor Oils / Lube Oils / Grease →

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

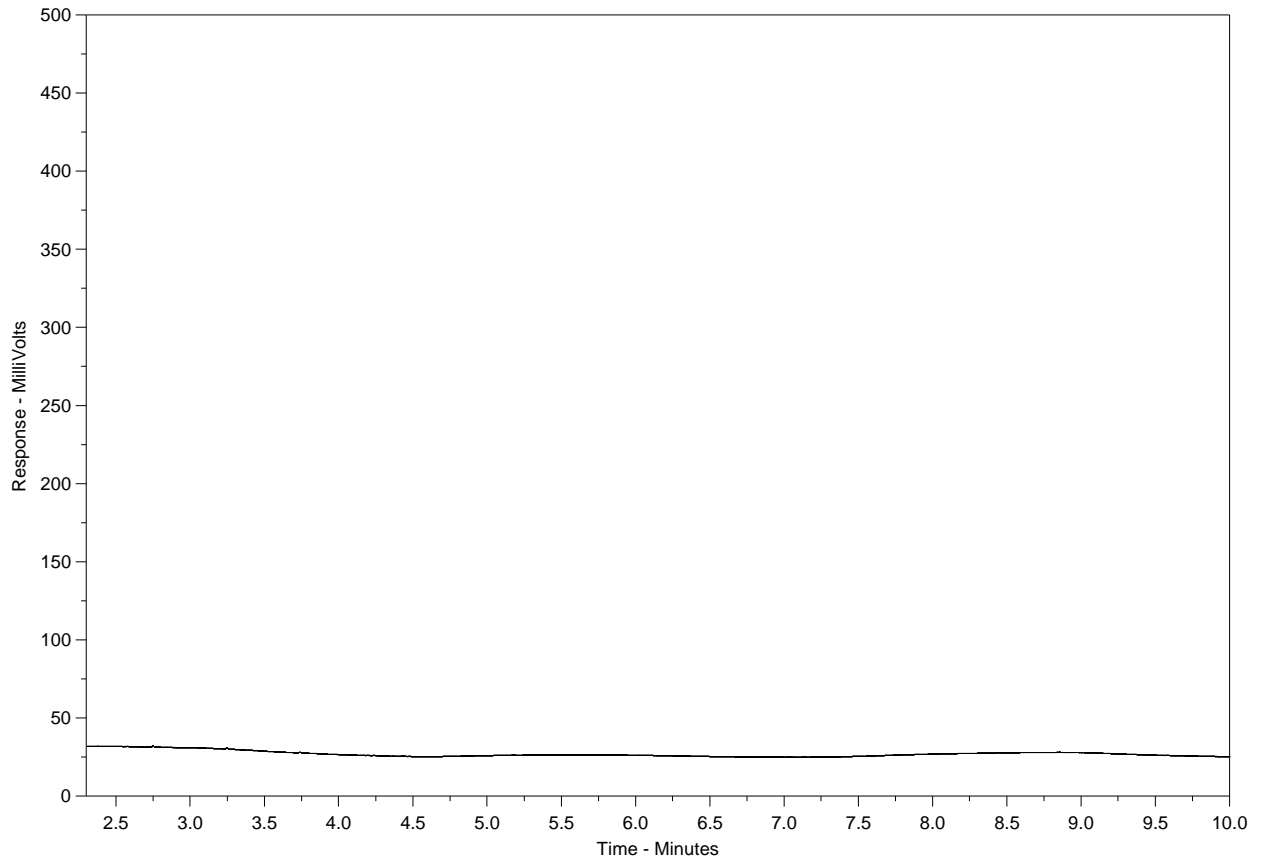
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-60  
Client Sample ID: ST18-03-2-140913



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

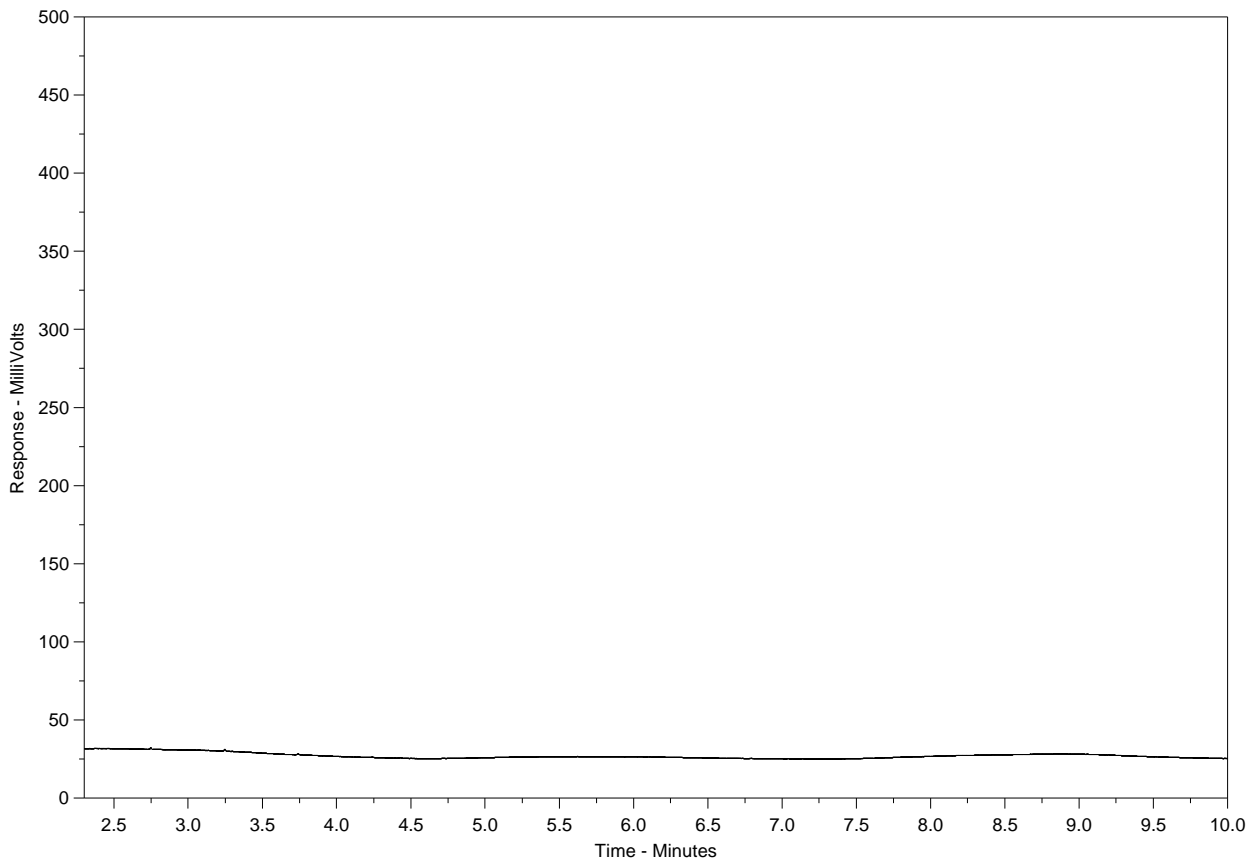
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-63  
Client Sample ID: ST15-02-2-140913



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →		
← Diesel / Jet Fuels →		
← Motor Oils / Lube Oils / Grease →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

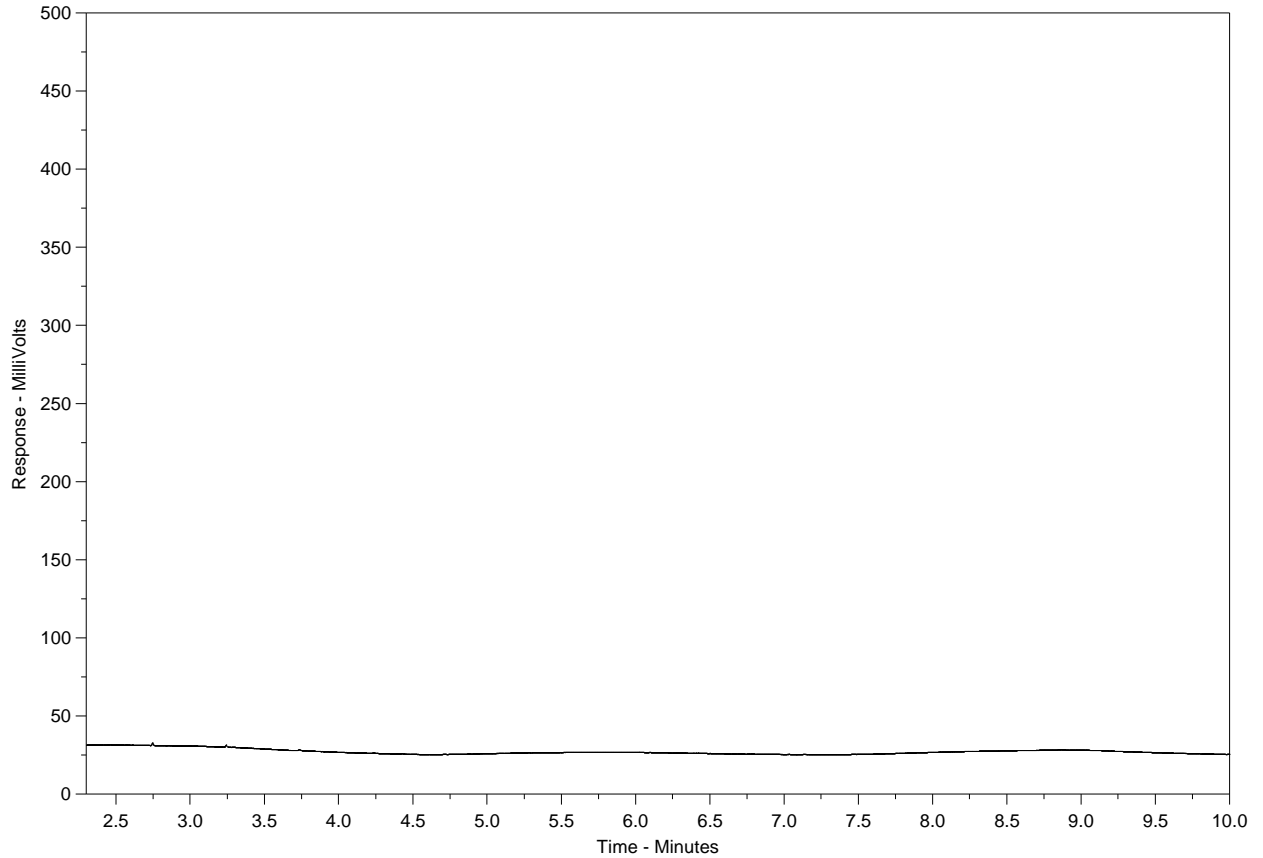
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1518225-64  
Client Sample ID: ST15-03-140913



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Diesel / Jet Fuels →	← Motor Oils / Lube Oils / Grease →

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.





MOUNT POLLEY MINING CORP.  
ATTN: Colleen Hughes  
PO Box 12  
Likely BC V0L 1N0

Date Received: 24-SEP-14  
Report Date: 30-OCT-14 16:02 (MT)  
Version: FINAL REV. 3

Client Phone: 250-790-2215

## Certificate of Analysis

**Lab Work Order #:** L1522556  
**Project P.O. #:** NOT SUBMITTED  
**Job Reference:** 621717  
**C of C Numbers:** P0017  
**Legal Site Desc:**

**Comments:** 30-OCT-2014 Revision 3: This revision includes only specific analyses.  
The data for Xanthates analysis is appended.

Can Dang  
Senior Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1522556-4 Soil/Sediment 22-SEP-14 13:30 ST01-09-01- 140922	L1522556-6 Soil/Sediment 22-SEP-14 13:30 ST01-09-03- 140922			
Grouping	Analyte				
<b>SOIL</b>					
<b>Volatile Organic Compounds</b>	Acetone (mg/kg)	<4.0	<4.0		
	Carbon Disulfide (mg/kg)	<0.050	<0.050		
	n-Heptane (nC7) (mg/kg)	<0.050	<0.050		
	2-Hexanone (mg/kg)	<0.050	<0.050		
	Methyl ethyl ketone (MEK) (mg/kg)	<20	<20		
	Methyl isobutyl ketone (MIBK) (mg/kg)	<0.050	<0.050		
	Methyl isobutyl carbinol (MIBC) (mg/kg)	<0.050	<0.050		
	n-Octane (nC8) (mg/kg)	<0.050	<0.050		
	n-Pentane (mg/kg)	<2.5	<2.5		
	1,2,3-Trimethylbenzene (mg/kg)	<0.050	<0.050		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	87.3	87.9		
	Surrogate: 1,4-Difluorobenzene (SS) (%)	85.2	87.1		
<b>Hydrocarbons</b>	EPH10-19 (mg/kg)	<200	<200		
	EPH19-32 (mg/kg)	<200	<200		
	LEPH (mg/kg)	<200	<200		
	HEPH (mg/kg)	<200	<200		
<b>Polycyclic Aromatic Hydrocarbons</b>	Acenaphthene (mg/kg)	<0.050	<0.050		
	Acenaphthylene (mg/kg)	<0.050	<0.050		
	Anthracene (mg/kg)	<0.050	<0.050		
	Benz(a)anthracene (mg/kg)	<0.050	<0.050		
	Benzo(a)pyrene (mg/kg)	<0.050	<0.050		
	Benzo(b)fluoranthene (mg/kg)	<0.050	<0.050		
	Benzo(g,h,i)perylene (mg/kg)	<0.050	<0.050		
	Benzo(k)fluoranthene (mg/kg)	<0.050	<0.050		
	Chrysene (mg/kg)	<0.050	<0.050		
	Dibenz(a,h)anthracene (mg/kg)	<0.050	<0.050		
	Fluoranthene (mg/kg)	<0.050	<0.050		
	Fluorene (mg/kg)	<0.050	<0.050		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.050	<0.050		
	2-Methylnaphthalene (mg/kg)	<0.050	<0.050		
	Naphthalene (mg/kg)	<0.050	<0.050		
	Phenanthrene (mg/kg)	<0.050	<0.050		
	Pyrene (mg/kg)	<0.050	<0.050		
	Surrogate: Acenaphthene d10 (%)	86.5	82.7		
	Surrogate: Chrysene d12 (%)	83.9	95.8		
	Surrogate: Naphthalene d8 (%)	81.7	79.3		

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	Description	Sampled Date	Sampled Time	Client ID
	L1522556-4	Soil/Sediment	22-SEP-14	13:30	ST01-09-01-140922
	L1522556-6	Soil/Sediment	22-SEP-14	13:30	ST01-09-03-140922
Grouping	Analyte				
<b>SOIL</b>					
<b>Polycyclic Aromatic Hydrocarbons</b>	Surrogate: Phenanthrene d10 (%)				
	85.7	84.2			

\* 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)
Duplicate	Acenaphthene	DLM	L1522556-4, -6
Duplicate	Acenaphthylene	DLM	L1522556-4, -6
Duplicate	Anthracene	DLM	L1522556-4, -6
Duplicate	Benz(a)anthracene	DLM	L1522556-4, -6
Duplicate	Benzo(k)fluoranthene	DLM	L1522556-4, -6
Duplicate	Fluoranthene	DLM	L1522556-4, -6
Duplicate	Fluorene	DLM	L1522556-4, -6

### Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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**ALK-PASTE-VA** Soil Alkalinity in Soil (Paste) by Colour Carter-CSSS / EPA 310.2 (modified)

A soil extract produced by the saturated paste extraction procedure is analyzed for alkalinity by methyl orange colourimetry.

**C-INORG-SK** Soil Inorganic Carbon / Calcium Carbonate SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO<sub>2</sub> loss is proportional to the carbonate content of the soil.

Reference:

Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

**C-TOT-LECO-SK** Soil Total Carbon by combustion method SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO<sub>2</sub> gas is determined using a thermal conductivity detector.

**CAT-XTR-SK** Soil Ammonium Acetate Extractable Cations CSSS 19.4 - 1M NH<sub>4</sub>OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

**CEC-SK** Soil Cation Exchange Capacity (NH<sub>4</sub>OAc Extn) CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

**CL-PASTE-COLOR-VA** Soil Chloride in Soil (Paste) by Colourimetry Carter-CSSS / APHA 4500-Cl E (modified)

A soil extract produced by the saturated paste extraction procedure is analyzed for chloride by ferricyanide colourimetry.

**EC-PASTE-VA** Soil Conductivity in Soil (Paste) by Meter Carter-CSSS / APHA 2510B

A soil extract produced by the saturated paste extraction procedure is analyzed by conductivity meter.

**EPH-TUMB-FID-VA** Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

**ETL-ESP-SK** Soil Exchangeable Sodium Percentage - Calc Calculation

**GLY-EXT-FID-VA** Soil Glycols in Soil by Wrist Shaker GCFID SW-846, METHOD 8015B, EPA

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8015B, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of a subsample of the sediment/soil with deionized water, followed by treatment of the extract with a strong base (NaOH) and benzoyl chloride to form the corresponding benzoate esters. The benzoate esters are then extracted with iso-octane and the extract is analyzed by capillary column gas chromatography with flame ionization detection (FID).

**HG-200.2-CVAF-VA** Soil Mercury in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

## Reference Information

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

<b>IC-CACO3-CALC-SK</b>	Soil	Inorganic Carbon as CaCO <sub>3</sub> Equivalent	Calculation
<b>LEPH/HEPH-CALC-VA</b>	Soil	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

<b>ME-MS41-AX</b>	Soil	Aqua Regia ICPMS	Aqua Regia ICPMS
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A prepared sample (0.50 g) is digested with aqua regia in a graphite heating block. After cooling, the resulting solution is diluted with deionized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry. Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples are then analysed by ICP-MS for the remaining suite of elements. The analytical results are corrected for inter-element spectral interferences.

<b>MET-200.2-CCMS-VA</b>	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A
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This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

<b>MET-PASTE-ICP-VA</b>	Soil	Metals in Soil (Paste) by ICPOES	Carter-CSSS / EPA 6010B (modified)
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A soil extract produced by the saturated paste extraction procedure is analyzed for Sodium, Calcium, and Magnesium by ICPOES as per "Soil Sampling and Methods of Analysis" by M. Carter.

<b>MOISTURE-VA</b>	Soil	Moisture content	ASTM D2974-00 Method A
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This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

<b>N-TOT-LECO-SK</b>	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974
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The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

<b>NO3-AVAIL-SK</b>	Soil	Available Nitrate-N	Method = Alberta Ag (1988)
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Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution.

Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.

Reference:

Recommended Methods of Soil Analysis for Canadian Prairie Agricultural Soils. Alberta Agriculture (1988) p. 19 and 28

<b>NO3-PASTE-IC-VA</b>	Soil	Nitrate (N) in Soil (Paste) by IC	Carter-CSSS / EPA 300.1 (modified)
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A soil extract produced by the saturated paste extraction procedure is analyzed for nitrate (as N) by Ion Chromatography with conductivity or UV detection.

<b>PAH-TMB-H/A-MS-VA</b>	Soil	PAH - Rotary Extraction (Hexane/Acetone)	EPA 3570/8270
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This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

<b>PH-1:2-VA</b>	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL
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This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B

## Reference Information

Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

**PO4/K-AVAIL-SK** Soil Plant Available Phosphorus and Potassium Comm. Soil Sci. Plant Anal, 25 (5&6)

Plant available phosphorus and potassium are extracted from the soil using Modified Kelowna solution. Phosphorous in the soil extract is determined colorimetrically at 880 nm, while potassium is determined by flame emission at 770 nm.

**PSA-PIPET-DETAIL-SK** Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

### Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

**S-TOT-LECO-SK** Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO<sub>2</sub> gas is determined using a thermal conductivity detector.

**SAR-PASTE-CALC-VA** Soil Sodium Adsorption Ratio (Sat. Paste) Calculation

A soil extract produced by the saturated paste extraction procedure is analyzed for Sodium, Calcium, and Magnesium by ICPOES. Sodium Adsorption Ratio (SAR) is calculated as per "Soil Sampling and Methods of Analysis" by M. Carter.

**SAT-PCNT-VA** Soil Saturation Percentage Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

**SO4-AVAIL-SK** Soil Available Sulfate-S REC METH SOIL ANAL - AB. AG(1988)

Plant available sulfur in the soil is extracted with a weak calcium chloride solution. Total S in the extract is then determined by ICP-OES.

**SO4-PASTE-IC-VA** Soil Sulfate in Soil (Paste) by IC Carter-CSSS / EPA 300.1 (modified)

A soil extract produced by the saturated paste extraction procedure is analyzed for sulfate by Ion Chromatography with conductivity detection.

**TGR2-CALC-VA** Soil Theoretical Gypsum Requirement J. Ashworth et al (1999)

Theoretical Gypsum Requirement is an estimate of the gypsum amendment required to remediate brine-contaminated or sodic soils, and is provided in units of tonnes per hectare (t/ha) for a treatment depth of 15cm. TGR(brine), intended for brine-contaminated soils, is calculated using Method A from "A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils", by J. Ashworth (Cdn J. of Soil Science, 1999), available at www.alsglobal.com. TGR(sodic), intended for naturally sodic soils, uses the Oster and Frenkel method (Method B) from the same paper. Reported TGR values are capped at 50 t/ha, considered the maximum practical gypsum amendment. To convert TGR from t/ha to tons/acre, multiply by 0.446. To determine a TGR value for an alternate treatment depth, multiply by [desired treatment depth (cm) / 15 cm].

**VOC-M2-HSMS-VA** Soil Misc VOCs in soil by Headspace GCMS EPA8260B, 5021, BC MELP

The soil methanol extract is added to water and reagents, then 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.

**VOC7/VOC-SURR-MS-VA** Soil VOC7 and/or VOC Surrogates for Soils EPA METHODS 8260B & 524.2

\*\* 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

### Chain of Custody Numbers:

P0017

## 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.*



# Quality Control Report

Workorder: L1522556

Report Date: 30-OCT-14

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Client: MOUNT POLLEY MINING CORP.  
 PO Box 12  
 Likely BC V0L 1N0  
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>EPH-TUMB-FID-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2961400</b>							
<b>WG1960916-3</b>	<b>IRM</b>	<b>ALS PHC2 RM</b>						
EPH10-19			96.4		%		70-130	28-SEP-14
EPH19-32			95.2		%		70-130	28-SEP-14
<b>WG1960916-1</b>	<b>MB</b>							
EPH10-19			<200		mg/kg		200	28-SEP-14
EPH19-32			<200		mg/kg		200	28-SEP-14
<b>PAH-TMB-H/A-MS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2963445</b>							
<b>WG1960916-4</b>	<b>IRM</b>	<b>ALS PAH1 RM</b>						
Acenaphthene			96.3		%		60-130	29-SEP-14
Acenaphthylene			109.5		%		60-130	29-SEP-14
Anthracene			121.1		%		60-130	29-SEP-14
Benz(a)anthracene			100.6		%		60-130	29-SEP-14
Benzo(a)pyrene			96.7		%		60-130	29-SEP-14
Benzo(b)fluoranthene			102.8		%		60-130	29-SEP-14
Benzo(g,h,i)perylene			111.8		%		60-130	29-SEP-14
Benzo(k)fluoranthene			103.7		%		60-130	29-SEP-14
Chrysene			114.3		%		60-130	29-SEP-14
Dibenz(a,h)anthracene			98.1		%		60-130	29-SEP-14
Fluoranthene			105.8		%		60-130	29-SEP-14
Fluorene			100.9		%		60-130	29-SEP-14
Indeno(1,2,3-c,d)pyrene			107.2		%		60-130	29-SEP-14
2-Methylnaphthalene			92.4		%		60-130	29-SEP-14
Naphthalene			94.8		%		50-130	29-SEP-14
Phenanthrene			114.3		%		60-130	29-SEP-14
Pyrene			106.1		%		60-130	29-SEP-14
<b>WG1960916-1</b>	<b>MB</b>							
Acenaphthene			<0.0050		mg/kg		0.005	29-SEP-14
Acenaphthylene			<0.0050		mg/kg		0.005	29-SEP-14
Anthracene			<0.0040		mg/kg		0.004	29-SEP-14
Benz(a)anthracene			<0.010		mg/kg		0.01	29-SEP-14
Benzo(a)pyrene			<0.010		mg/kg		0.01	29-SEP-14
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	29-SEP-14
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	29-SEP-14
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	29-SEP-14
Chrysene			<0.010		mg/kg		0.01	29-SEP-14





## Quality Control Report

Workorder: L1522556

Report Date: 30-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PAH-TMB-H/A-MS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2963445</b>							
<b>WG1960916-1</b>	<b>MB</b>							
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	29-SEP-14
Fluoranthene			<0.010		mg/kg		0.01	29-SEP-14
Fluorene			<0.010		mg/kg		0.01	29-SEP-14
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	29-SEP-14
2-Methylnaphthalene			<0.010		mg/kg		0.01	29-SEP-14
Naphthalene			<0.010		mg/kg		0.01	29-SEP-14
Phenanthrene			<0.010		mg/kg		0.01	29-SEP-14
Pyrene			<0.010		mg/kg		0.01	29-SEP-14
Surrogate: Naphthalene d8			88.9		%		50-130	29-SEP-14
Surrogate: Acenaphthene d10			88.1		%		60-130	29-SEP-14
Surrogate: Phenanthrene d10			84.9		%		60-130	29-SEP-14
Surrogate: Chrysene d12			87.9		%		60-130	29-SEP-14
<b>VOC-M2-HSMS-VA</b>		<b>Soil</b>						
<b>Batch</b>	<b>R2952710</b>							
<b>WG1960923-2</b>	<b>LCS</b>							
Acetone			72.9		%		70-130	29-SEP-14
Carbon Disulfide			98.3		%		70-130	29-SEP-14
2-Hexanone			91.5		%		70-130	29-SEP-14
Methyl isobutyl ketone (MIBK)			95.8		%		70-130	29-SEP-14
Methyl isobutyl carbinol (MIBC)			95.7		%		70-130	29-SEP-14
n-Heptane (nC7)			105.0		%		70-130	29-SEP-14
n-Octane (nC8)			109.9		%		70-130	29-SEP-14
n-Pentane			87.2		%		70-130	29-SEP-14
1,2,3-Trimethylbenzene			112.4		%		70-130	29-SEP-14
<b>WG1960923-1</b>	<b>MB</b>							
Acetone			<4.0		mg/kg		4	29-SEP-14
Carbon Disulfide			<0.050		mg/kg		0.05	29-SEP-14
2-Hexanone			<0.050		mg/kg		0.05	29-SEP-14
Methyl ethyl ketone (MEK)			<20		mg/kg		20	29-SEP-14
Methyl isobutyl ketone (MIBK)			<0.050		mg/kg		0.05	29-SEP-14
Methyl isobutyl carbinol (MIBC)			<0.050		mg/kg		0.05	29-SEP-14
n-Heptane (nC7)			<0.050		mg/kg		0.05	29-SEP-14
n-Octane (nC8)			<0.050		mg/kg		0.05	29-SEP-14
n-Pentane			<2.5		mg/kg		2.5	29-SEP-14



## Quality Control Report

Workorder: L1522556

Report Date: 30-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-M2-HSMS-VA	Soil							
Batch	R2952710							
WG1960923-1 MB								
1,2,3-Trimethylbenzene			<0.050		mg/kg		0.05	29-SEP-14

# Quality Control Report

Workorder: L1522556

Report Date: 30-OCT-14

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## Legend:

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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:

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Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

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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 REPORT

<b>Sample ID</b>	L1522556-4	L1522556-6
<b>Client ID</b>	ST01-09-01-140922	ST01-09-03-140922
<b>Matrix</b>	Soil	Soil
<b>Units</b>	mg/kg	mg/kg
<b>Analyte</b>		
Xanthate as ethyl Xanthate	< 5 mg/kg	< 5 mg/kg
Matrix spike	80%	76%

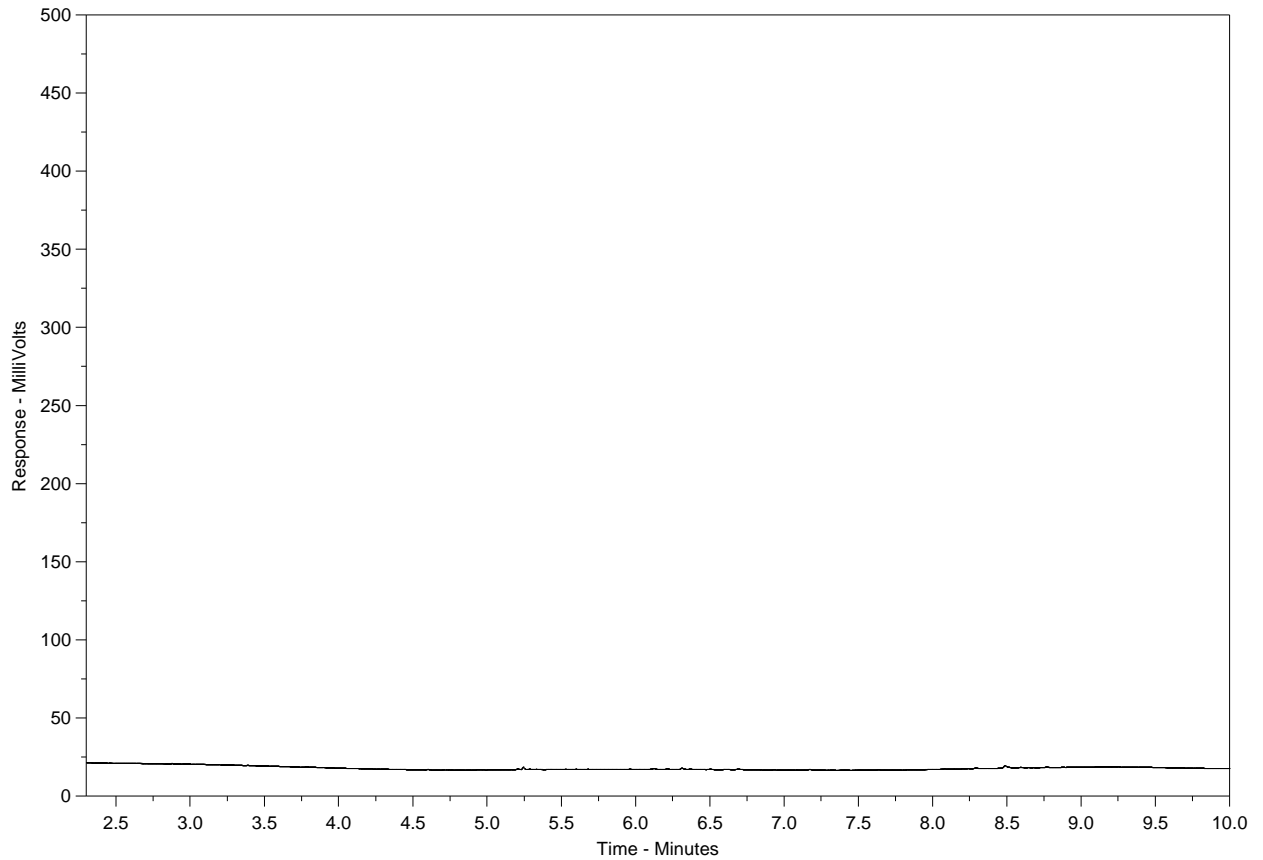
**Notes:**

Analysis of ethyl Xanthate in soil was conducted using procedures adapted from " *Flow injection analysis of ethyl xanthate by in-line dialysis and UV spectrophotometric detection. Talanta*, Volume 72, Issue 3, 15 May 2007, Pages 1017–1022."

# Hydrocarbon Distribution Report



ALS Sample ID: L1522556-4  
Client Sample ID: ST01-09-01-140922



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →		
← Diesel / Jet Fuels →		
← Motor Oils / Lube Oils / Grease →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

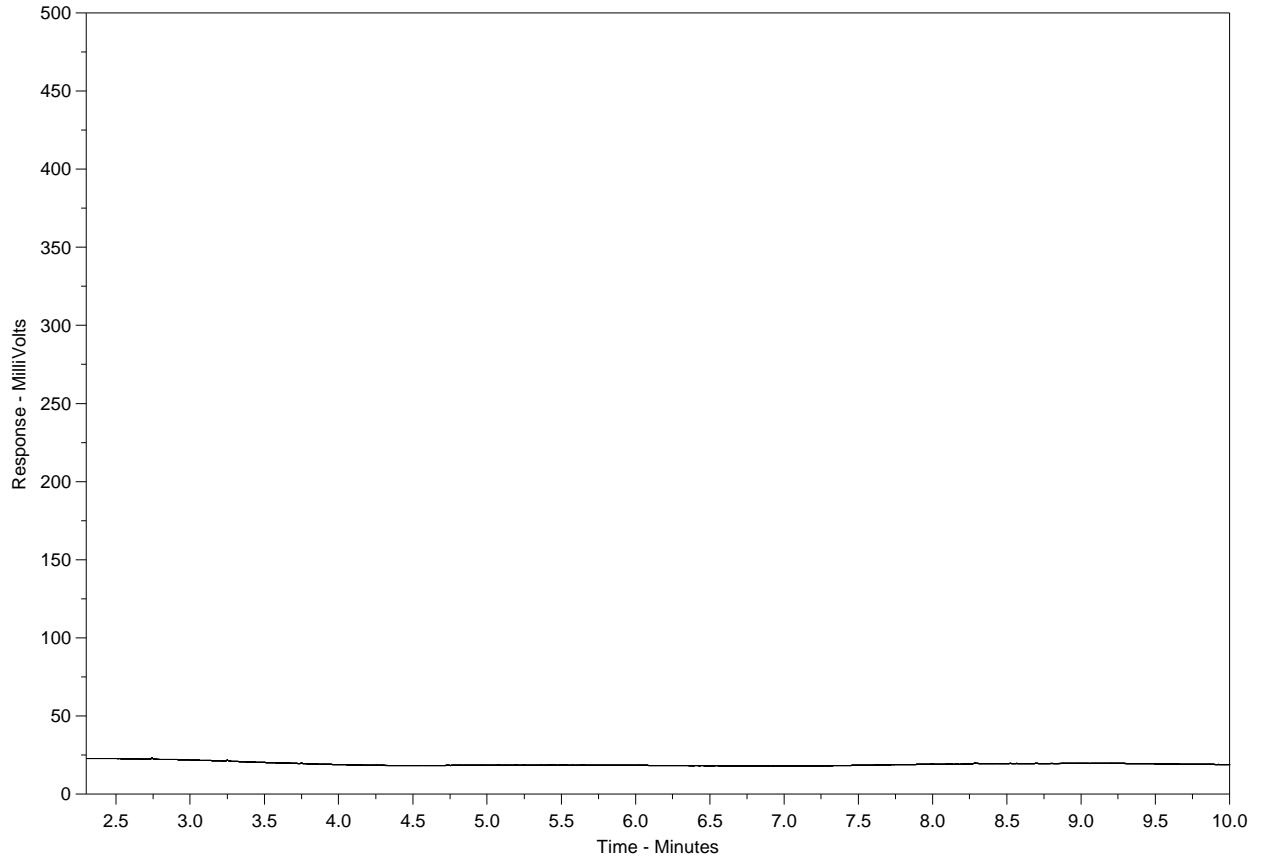
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report



ALS Sample ID: L1522556-6  
Client Sample ID: ST01-09-03-140922



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Diesel / Jet Fuels →	← Motor Oils / Lube Oils / Grease →

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on [www.alsglobal.com](http://www.alsglobal.com) or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.