MORRISON HERSHFIELD

Resort Municipality of Whistler Landfill Annual Monitoring Report – 2013

Whistler, BC

Presented to:

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1. INTRODUCTION

This annual report incorporates landfill monitoring data collected in 2013. The Resort Municipality of Whistler (RMOW) former landfill site is located approximately 8 km west of Whistler Village and is accessed off Highway 99 on Cheakamus Lake Road. The location of the site is illustrated in Figure 1.

The Whistler landfill opened in 1977 and initially accepted residential, industrial, commercial and institutional waste. This continued until the landfill's operating permit was amended in 1988 to also accept construction and demolition waste. The landfill site was closed in October, 2005, to accommodate plans to use the area east of the site as the location of the Athletes' Village for the 2010 Winter Olympic Games. Between 1977 and 2005 approximately 350,000 tonnes of waste was disposed of at the Whistler Landfill (CH2M Hill, 2008a).

Construction of residential and commercial buildings in the area commenced in 2007 following the installation of a cover system and landfill gas (LFG) collection system in 2006.

Morrison Hershfield was retained by RMOW to complete the annual environmental monitoring and fulfill reporting requirements as set out in Section 3.31 of the 2005 Whistler Landfill Operational Certificate (MR-04693) and the Whistler Landfill Closure Plan (CH2M Hill, 2006a).

This current report documents the 2013 monitoring program and presents a summary of its findings.

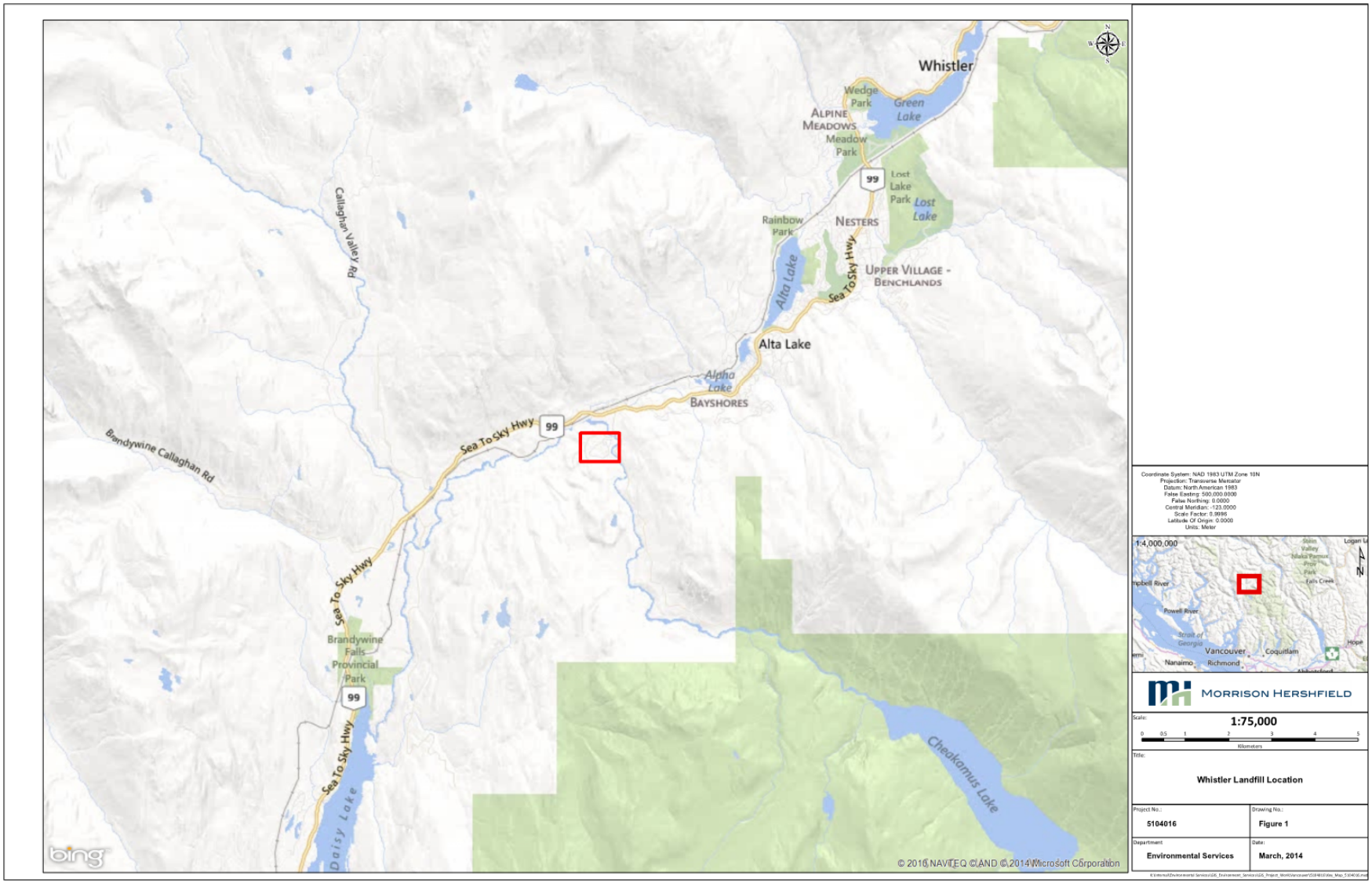


Figure 1: Former Whistler Landfill Location

1.1 Program Objectives

The overall objective of the Whistler landfill monitoring program is to help ensure and confirm that the closed landfill is not causing impacts to the surrounding environment. Three distinct facets of the former landfill site were assessed: on-site surface water, groundwater and migration of landfill gas (LFG).

The objectives of the Surface Water and Groundwater Monitoring Program are as follows:

- Determine if the landfill is negatively affecting local groundwater and surface water quality; and
- Apply corrective measures as necessary to minimize landfill effects on groundwater and surface water.

The objectives of the LFG monitoring program are as follows:

- Monitor levels of LFG generation;
- Assess the overall collection performance of the Landfill Gas Collection System (LFGCS)
- Identify the composition of LFG within the soil at monitoring probe locations; and
- Adjust LFGCS as necessary based on monitoring data results to prevent off-site gas migration.

As outlined in the Closure Plan (CH2M Hill, 2006a), the monitoring program was to be re-evaluated following the completion of monitoring over a 2-year period. This evaluation occurred in 2011. Subsequent monitoring reports, including this one, incorporate the MOE recommendations that were made in 2012 (see Appendix A).

1.2 Report Purpose

The purpose of this report is to address the reporting requirements of the facility's Landfill Operational Certificate (MR-04692) and the following requirements included in the Whistler Landfill Closure Plan:

- Annual reporting of monitoring data collected (2013); and
- Summary of maintenance activities that were competed on site in 2013, as well as any planned objectives in 2014.

2. SITE DESCRIPTION

2.1 Landfill

The former landfill contains three distinct cells that were developed at different times over its lifespan.

- The northeast cell commenced in 1977 and contains residential waste in addition to industrial, commercial and institutional (ICI) waste. This material is not contained in a lined cell and relies on natural attenuation, coupled with a perimeter collection system, to manage leachate.
- Operations within the southwest cell began in 1988. Only construction and demolition (C & D) waste was accepted within this cell, which also relies on natural attenuation and a perimeter collection system to manage leachate.
- A central cell was developed in 1988 between the northeast and southwest cells for further residential and ICI waste. This area was developed with a high-density polyethylene (HDPE) liner and a leachate collection system.

In addition to the three cells, a biosolids storage area was installed at the south end of the landfill, covering a portion of the old southwest cell. Based on CH2M Hill (2006a) preliminary survey information from 2005, there was an estimated 6,000 m^3 of biosolids stockpiled there.

2.2 Hydrological Conditions

The former landfill site is located within the Cheakamus River watershed. The Cheakamus River itself is located approximately 300 metres north of the waste mass and flows along the eastern boundary of the Athletes' Village (CH2M Hill, 2006a). The surface water features are concentrated mainly to the perimeter of the site, which is due to a combination of the natural and constructed topography of the area.

2.3 Geological Conditions

The following description of geological conditions associated with the site is described by CH2M Hill (2008a).

> *In general, the site topography slopes from south to north. As described in the Whistler Landfill Closure Plan, within areas on the site and within adjacent lands, aggregate extraction activities have removed much of the natural overburden materials for use as industrial aggregates and replaced them with imported fill materials. As a result, the present ground surface associated with the landfill has likely been altered by industrial activities. As part of historical aggregate extraction activities conducted at the site, much of the natural overburden materials had been removed from the area and replaced with imported fill, resulting in a disturbance of the natural topography of the site. Exposed bedrock surface, characterized by glaciated surfaces and steep inclines, are present throughout the site. Areas between the exposed bedrock are infilled by coarse and medium grain sediments.*

Based on the results of the borehole investigation conducted by CH2M Hill in January 2006, the top layer of the site stratigraphy is composed of sand, gravel, cobbles, and boulders (fill material), followed by a gravel-sand layer. The subsurface includes a poorly graded fine sand layer with some silt, followed by still sandy silt located above the bedrock (green basalt) (CH2M Hill, 2006a).

Overburden at the site was generally found to be consistent across the advanced boreholes and is characterized by progressively finer particle size of the sediments with increasing depth. Overburden thickness is highly variable, ranging from 0 to greater than 21 m. The overburden is consistent with fluvial or near-shore lacustrine deposition environments.

2.4 Hydrogeological Conditions

The following description of hydrogeological conditions associated with the site is described by CH2M Hill (2006a) as follows:

A single unconfined aquifer is within the overburden on the site. The saturated zone in most locations extends from the bedrock surface at depth to within less than one metre of the ground surface. Bedrock in the area was found to be relatively dry and presented no visual indication of water bearing fractures. Groundwater flow is generally in a south to north direction, consistent with the surface topography.

Interpreted groundwater flow at the site is illustrated in Figure 2 (from CH2M Hill, 2006a).

2.5 Climate

The long-term average climatic conditions (1971 – 2000) recorded at the Whistler meteorological station (approximately 8 km from the site) indicate the daily average annual temperature in the area is 6.3^{o}C, and the mean annual precipitation is 1229.1 mm. The precipitation can be further divided into an average of 850.1 mm of rainfall, and 411.2 cm of snowfall.

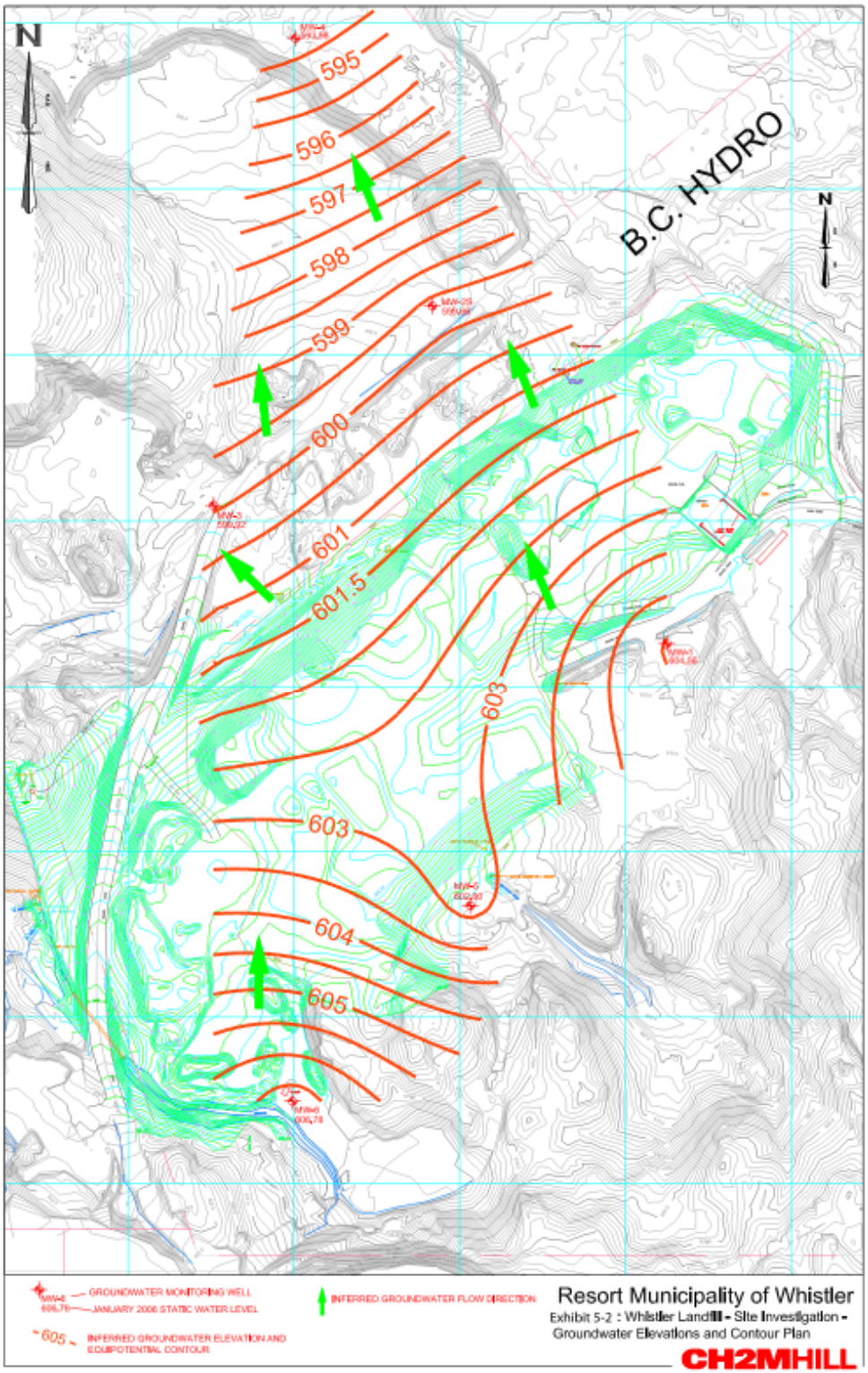


Figure 2: Groundwater Elevations and Flow Pattern at the Former Whistler Landfill Site (from CH2M Hill. 2006a)

3. MONITORING REQUIREMENTS

The following documents form the basis of the post-closure monitoring program and associated requirements, including parameters to be monitored. They are frequently referenced throughout this report.

- *Whistler Landfill Closure Plan, Final Report (CH2M HILL, 2006a)*
- *Whistler Landfill Gas Pre-Design Memorandum (CH2M HILL, 2006b)*
- *Landfill Operational Certificate MR-04692 (B.C. Ministry of Environment, 2005)*
- *Mitigation and Safety Measures for Reduction of Landfill Gas Migration Risks (CH2M HILL, 2008a)*
- *Landfill Gas Collection System Operation and Maintenance Manual (CH2M HILL, 2008b)*
- *Monitoring and Reporting Requirements (CH2M HILL, 2008c)*
- *Resort Municipality of Whistler Landfill Annual Monitoring Report – 2011 & Revised Monitoring Program Recommendations (Morrison Hershfield, June 2012).*

The original monitoring and reporting requirements have been included in past annual reports and were subsequently reviewed and amended by the Ministry of the Environment (MOE) in November 2012 after the completion of the 2011 monitoring program. The revisions requested by the MOE were implemented in subsequent annual monitoring reports and are presented in Appendix A.

4. METHODOLOGY

4.1 Sample Locations

Leachate, groundwater, surface water and landfill gas (LFG) monitoring locations are shown in Figure 3. Groundwater monitoring locations are identified as MW (monitoring well) followed by a number or number / letter combination (e.g. MW-3, MW-2S), a letter is added when both a shallow (S) and a deep (D) well were installed within a single borehole. Surface water sample locations are identified as SFC (surface), followed by a number or number / letter combination (e.g. SFC-2, SFC-2B), where the letter is used to indicate a second surface water sample on the same watercourse. L1 is the single leachate collection point.

The LFG collection system consists of the following components:

- Thirteen vertical LFG extraction wells connected to horizontal LFG collection trenches covering the landfill cell footprint;
- A 200mm diameter header approximately 800m in length that carries the LFG from the vertical well and horizontal trench network to a flare station;
- A LFG abstraction plant on the north side of the property that burns the collected LFG in a candle-stick flare;
- Twenty-one monitoring probes (MP) located around the perimeter of the landfill cell; and
- Approximately 91 test ports within selected buildings and residences in close proximity to the landfill.

The landfill gas monitoring probes around the circumference of the landfill mass are identified as MP followed by a number (e.g. MP 14). Also identified in Figure 3 are several components of the LFG collection system, including: thirteen LFG extraction wells (labeled as “W” followed by a number [e.g. W11]), the flare station, and header valves. A new monitoring probe was installed in November 2012 to the west of MP17 (identified as MP17A). As of December 2012, sampling commenced at MP17A and was omitted at MP17.

As per the requirements outlined in CH2M Hill (2008c) and confirmed by the MOE in 2012, groundwater and surface water monitoring have been conducted quarterly. Quarterly monitoring is tracked and reported based on a calendar year.

Figure 3: Post-Closure Monitoring Sites at the Former Whistler Landfill

Table 1: Monitoring Dates During 2013.

Monitoring Dates 2013	
Quarter 1 (Q1 2013)	March 19, 2013
Quarter 2 (Q2 2013)	June 25, 2013
Quarter 3 (Q3 2013)	October 9, 2013
Quarter 4 (Q4 2013)	December 19, 2013

The leachate, groundwater and surface water monitoring program was completed by Whistler Waste Water Treatment Plant staff for quarters 1, 2 and 3 in 2013. Morrison Hershfield completed groundwater and surface water monitoring for the fourth quarter sampling in 2013.

The LFG monitoring program has been in effect since 2009. LFG data is collected by Norseman Engineering Ltd. on a minimum monthly basis. During the winter months monitoring occurs on a weekly basis when there is snow cover on the landfill or frozen ground (i.e. conditions that could facilitate subsurface LFG migration).

4.2 Leachate Monitoring

A single leachate collection point located on the down-gradient side of the landfill mass (Figure 3) was sampled to provide an indicator of the elevated concentration of target parameters within the landfill cell. Leachate samples were obtained using a plastic pail rinsed three times with the leachate water.

A leachate sample was collected during first and third quarter sampling events. Appendix B includes the analytical parameters associated with leachate quality monitoring. In addition to the samples for laboratory analysis, standard leachate quality parameters were collected and measured during sampling events. The parameters measured include: pH, temperature (^{o}C), dissolved oxygen (mg/L), and conductivity (µS/cm). Field parameters were measured using an YSI model 556 multi-probe meter and are Tabulated in Appendix G.

Leachate quality monitoring results were compared to Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the Contaminated Sites Regulation B.C. (Reg. 375/96), as required by the Closure Plan. Following Ministry of the Environment recommendations that were first incorporated into the 2012 Annual Monitoring Report, the results have also been compared to the B.C. Working and Approved Water Quality Guidelines in Appendix D.

4.3 Groundwater Monitoring

CH2M Hill originally installed six monitoring wells (MW-1 to MW-6), one of which (MW-2) was constructed with a shallow and a deep screen, for a total of seven initial monitoring points. Monitoring wells were constructed with 50 mm (2”) diameter new PVC pipe. Screen intervals were constructed with 50 mm (2”) diameter #10 slot PVC screen. The depth and screen length

of each well was selected in the field based on observations made during drilling. Bentonite seals were installed (as required) to prevent infiltration of surface water into the well (CH2M Hill, 2006a).

The groundwater monitoring locations are situated both up- and down-gradient of the landfill to monitor the potential migration of any leachate, and to be able to separate groundwater impacts of residential and commercial development from impacts of the landfill. MW-6 is up-gradient of the landfill mass, while all of the other wells are down-gradient.

The installation of these wells by CH2M Hill was conducted prior to the extensive grading that occurred during construction of the Athlete's Village. During grading and construction operations four of the existing wells were destroyed: MW-1, MW-4, MW-5 and MW-6. The four destroyed wells are indicated in Figure 3 with the monitoring well name followed by "destroyed" (i.e. MW-1 DESTROYED).

Three of the four destroyed monitoring wells (MW-4, MW-5, and MW-6) were replaced prior to 2010 sampling to prevent data gaps in the monitoring program. However, due to insufficient groundwater levels since 2010, the replacement for MW-5 has since been omitted from the sampling program.

Table 2 provides a summary of groundwater wells monitored in 2013.

Table 2: Groundwater Monitoring Events in 2013.

Site	Q1	Q2	Q3	Q4
Year	2013			
MW-2S and 2D	✔	✔	✔	✔
MW-3	✔	✔	✔	✔
MW-4	✔	✔	✔	✔
MW-6	✔	✔	✔	✔

Groundwater samples were collected using dedicated HDPE tubing and foot valves. The procedure for the collection of all groundwater samples follows that described in CH2M Hill (2008c). Laboratory analyses for all of the samples were performed by ALS Laboratory Group (ALS) in Vancouver, BC. Appendix B includes the analytical parameters associated with groundwater quality monitoring. ALS follows a quality control program (ISO 17025) to ensure a high degree of accuracy and precision in their results. Appendix C includes the chain of custody for all samples collected in 2013 including the QA/QC samples (travel blanks and replicates).

All groundwater samples collected for dissolved metals analysis were filtered and preservative was added in the field. In addition to the samples for laboratory analysis, standard water quality parameters were collected at each sample location during sampling events. The parameters measured include: pH, temperature (°C), dissolved oxygen (mg/L), and conductivity (µS/cm). Field parameters were measured using an YSI model 556 multi-probe meter. The depth to static water level was also recorded for each monitoring well using a Solinst water level meter.

Groundwater quality monitoring results were compared to Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the Contaminated Sites Regulation B.C. Reg. 375/96, as required by the Closure Plan and the Revised Monitoring Program Recommendations (Morrison Hershfield, 2012). Following past Ministry of the Environment recommendations that were first incorporated within the 2012 Annual Monitoring Report, the results have also been compared to the B.C. Working and Approved Water Quality Guidelines in Appendix E. These guidelines provide element and compound concentrations to prevent detrimental effects in water bodies that support aquatic life. Unlike the B.C. Contaminated Sites Regulation there is no dilution factor incorporated; therefore the values represented in the B.C. Ambient Water Quality guidelines are more stringent for many parameters.

4.4 Surface Water Monitoring

Table 3 provides a summary of the surface water sites sampled in 2013. Sample station SFC-11 is located cross-gradient from the landfill and the tributary extends southwest away from the landfill; therefore the watershed for this tributary does not include the landfill area (Figure 3). Sample station SFC-2B is located in a watercourse which originates in the wetland feature immediately adjacent to the leachate collection point. It is also located immediately down-gradient of the lined ICI and Residential Waste Cell and the historic biosolids and wood chip storage area. SFC-2 is located approximately 10 m downstream of SFC-2B. The source of the water in SFC-2 is from a culvert extending from the Athlete's Village that collects surface water runoff. SFC-3 is located in a perimeter watercourse.

Table 3: Surface Water Monitoring in 2013.

Site	Q1	Q2	Q3	Q4
Year	2013			
SFC-2	✔	✔	✔	✔
SFC-2B	✔	✔	✔	✔
SFC-3	✔	✔	✔	✔
SFC-11	✔	✔	✔	✔
SFC 4B	✔	✔	✔	✔

Surface water samples were collected using the techniques outlined in CH2M Hill (2008c). Standard water quality parameters were measured in the field during sampling events. The parameters measured include: pH, temperature (°C), dissolved oxygen (mg/L), and conductivity (µS/cm). An YSI model 556 multi-probe meter was used to measure the field parameters.

Similar to the groundwater samples, all surface water samples were sent to ALS in Vancouver, B.C. for analysis. Appendix B includes the analytical parameters associated with surface water quality monitoring. Trace metal analyses are conducted on non-filtered samples to obtain "total" metal concentrations. Samples collected during the Q4 monitoring event were laboratory filtered (in error) resulting in dissolved metal results being reported (instead of total).

Surface water quality results were compared to Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the Contaminated Sites Regulation B.C. Reg. 375/96. Following Ministry of the Environment recommendations, the results have also been compared to the B.C. Working and Approved Water Quality Guidelines in Appendix F. The guidelines provide element and compound concentrations to prevent detrimental effects in water bodies that support aquatic life. Unlike the B.C. Contaminated Sites regulation there is no dilution factor incorporated; therefore the values represented in the BC Ambient Water Quality guidelines are more stringent for many parameters.

4.5 Landfill Gas Monitoring

Landfill gas monitoring was completed by Norseman Engineering Ltd. on a weekly (winter months) to monthly basis throughout the year.

Standard monitoring procedures were followed for LFG monitoring.

The following data has been collected:

- Methane content at the subsurface probes;
- Methane and oxygen contents, flow rate, and inlet suction at the flare station; and
- Valve position (percent open), methane content and suction at each of the extraction wells (monitored for assessing the operational efficiency of the LFG collection system).

Pressure at the wells is measured using 0 – 5" water column (w.c.) or 0 – 0.5" w.c. magnahelic pressure gauges. Methane content, as percent of the Lower Explosive Limit (LEL), is detected using a Gastech device, model NP204[1]. Other parameters measured at the flare station are obtained from the programmable logic controller associated with the LFG collection system. The data gathered are important for assessing the overall function of the LFG collection system, particularly the concentration of methane present in the landfill for flaring, and to determine if the gas is escaping into the atmosphere or migrating off-site.

Triggers levels for LFG monitoring results which indicate when additional action is required are based on the B.C. Environmental Monitoring Guidelines. They are provided in the Operation and Maintenance Manual for the project (CH2M Hill, 2008b) and are as follows:

- Methane gas concentrations in excess of, or predicted to exceed 10% LEL in subsurface soils at the eastern and southern property boundaries of the Whistler Landfill (MP 8 through MP 21, excluding MP 11)
- Methane gas concentrations in excess of, or predicted to exceed, 25% LEL in soils at the western and northern property boundaries (MP1 through MP7, and MP 11).

As per Morrison Hershfield (2012), the frequency of LFG monitoring should increase from monthly or weekly to daily in the event of LFG collection system malfunction or maintenance

[1] A concentration of 5% methane in the air is "the lower explosive limit" (LEL), and concentrations equal to or greater than the LEL are considered hazardous (BC MOE, 1996)

requirements, or if detection of methane in excess of the trigger level (10% LEL) is observed. Morrison Hershfield (2012) also notes that, following detection of methane in excess of the trigger levels, monitoring should be increased to daily at all of the monitoring probes and any buildings within 100 m of the MP which exceeded the trigger level will be monitored until there are two consecutive days of undetectable methane content in the monitoring probes. If gas concentrations at the property boundaries remain above recommended trigger limits for more than 2 days, additional measures are outlined in the revised LFG monitoring program.

4.6 Sample Analysis and Quality Control

In addition to using an accredited laboratory, Quality Assurance/Quality Control (QA/QC) samples were collected to certify the accuracy and precision of the field sampling and the laboratory testing procedures. For each surface and groundwater sampling event a sample replicate and a travel blank were submitted for analysis. Replicate samples are collected from a single monitoring location and are identified on the sample containers with the addition of a "Rep" at the end of the station name. Travel blanks are used to confirm that the primary samples have not been contaminated during transportation. They are transported in the same manner as monitoring sample bottles to and from the site, remain closed and are only reopened in the laboratory for analysis.

5. RESULTS & INTERPRETATION

The results section includes a comparison of the laboratory results for leachate, groundwater and surface water to Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the B.C. Contaminated Sites Regulation. These are the standards specified for comparison in the Landfill Closure Plan. Consistent with the recommendations made by the Ministry of the Environment (MOE) first incorporated into the 2012 annual monitoring report, monitoring results were also compared to the B.C. Working and Approved Water Quality Guidelines and the Contaminated Site Regulation Schedule 6, Column II Numerical Water Standards for Aquatic Life. These results are provided in Appendix D, E and F for leachate, groundwater and surface water, respectively.

5.1 Leachate

While raw leachate quality is included in the monitoring program, the leachate is captured and treated by the Whistler Wastewater Treatment Plant. The monitoring results will help to determine when in the future treatment of the leachate is no longer required.

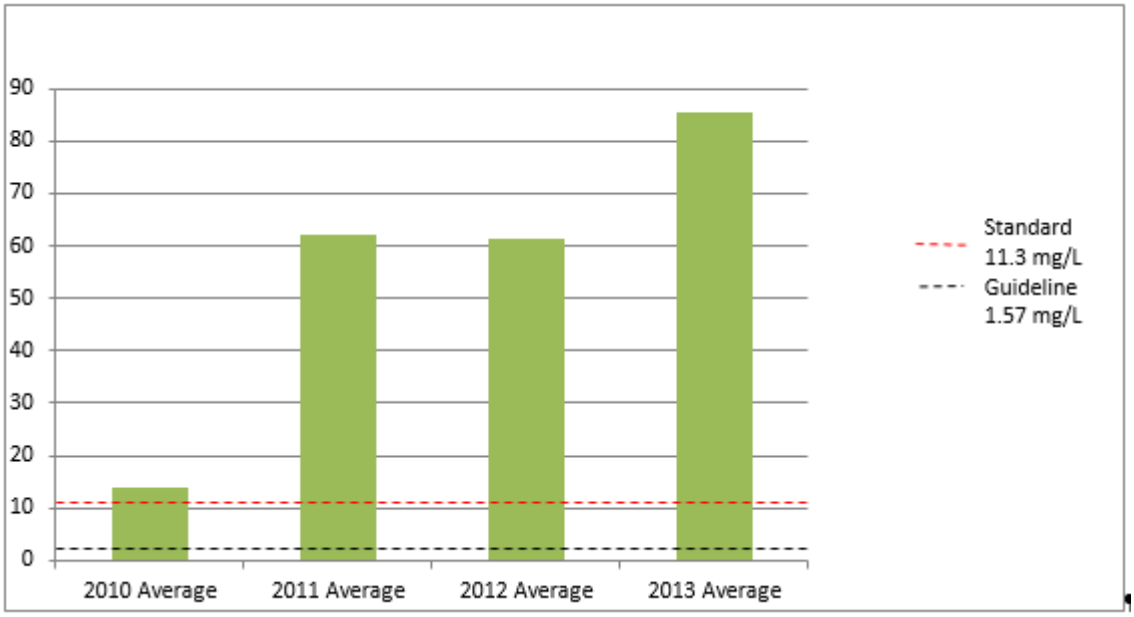
The results of leachate monitoring have been presented in a tabulated summary within Appendix D, including a comparison to both the standards and guidelines contained within the Contaminated Site Regulation Schedule 6, Column II Numerical Water Standards for Aquatic Life. Leachate field measurements are presented in Appendix G.

5.1.1 Results

Of the 119 parameters that are analyzed for, only two (ammonia and light extractable petroleum hydrocarbons) exceeded the Aquatic Life Standards.

Measured concentrations of ammonia in raw leachate regularly exceed the Generic Numerical Standards for Aquatic Life. Average annual ammonia concentrations appear to be increasing, as indicated in Figure 4. It is expected that ammonia concentrations are increasing since there is more controlled infiltration and less dilution occurring. Raw leachate is effectively treated at the RMOW Wastewater Treatment Plant.

Figure 4 Ammonia Concentrations in Raw Leachate Between 2010 and 2013 (mg/L)



NOTES: **Standard** = BC Contaminated Sites Regulation, Schedule 6, Column II, Generic Numerical Water Standards for Aquatic Life, assume pH between 7.5 and 8.0.

Guideline = BC Working and Approved Water Quality Guidelines for Freshwater Aquatic Life. The chronic guideline assumes the pH is 7.8 and a T= 11ºC.

5.1.2 Summary

Consistent with what was observed in the past, elevated concentrations of ammonia and light extractable petroleum hydrocarbons (LEPH) exceeding the CSR Aquatic Life Standards were observed during both 2013 sampling events. It is expected that ammonia concentrations are increasing since there is limited infiltration or dilution. As this leachate is currently treated in the Whistler Wastewater Treatment Plant prior to eventual discharge, these exceedances do not represent a concern at this time.

5.2 Groundwater

A tabulated summary of the laboratory results are presented in Appendix E that includes a comparison to the relevant standards and guidelines. Complete laboratory results are provided in Appendix C and field measurements are presented in Appendix G.

Monitoring locations up gradient as well as down gradient of the closed landfill provide a method to identify parameters that occur at naturally elevated levels in the local environment. MW 6 is up gradient of the landfill and is used to represent the local background conditions for the area, whereas MW 4 is down gradient of the landfill and the closest groundwater monitoring point to the Cheakamus River.

5.2.1 Results

The results from the quarterly sampling for groundwater were compared to the provincial standard for landfill closure: Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the B.C. Contaminated Sites Regulation (as required in the Closure Plan). The standards assume a minimum 1 to 10 dilution factor is available prior to the groundwater reaching any water body that supports aquatic life. Where a replicate sample was collected at a groundwater monitoring location the average of the sample results was compared to the standards.

The results are also compared to the B.C. Working and Approved Water Quality Guidelines (per MoE reporting recommendations). These guidelines are more restrictive since they generally apply to receiving water conditions and not to groundwater within the landfill site (the guidelines do not incorporate any dilution factors). However, while not directly applicable to monitoring locations at the landfill site, the guidelines provide a point of reference for assessing contaminant levels over time at the site.

During 2013 there were two recorded incidences of a groundwater monitoring parameters exceeding the Generic Numerical Water Standards for Aquatic Life of the approximately 115 parameters included for analysis. The recorded value of dissolved cobalt at MW-4 was 0.0422 mg/L in the third quarter, which slightly exceeds the Standard of 0.04 mg/L. Elevated levels of cobalt have been observed at this site in the past as illustrated in Figure 5. Elevated levels of cobalt measured in the up-gradient well (MW-6) in 2011 (displayed in Figure 5) indicate potentially elevated naturally occurring levels for this parameter.

The second recorded groundwater exceedance occurred for LEPH at MW-6 (well up-gradient of the former landfill) on March 19, 2013. The value recorded was 0.96 mg/L, which exceeds the applicable Standard of 0.5 mg/L. With the exception of this instance, all LEPH results were below the detection limit (<0.25 mg/L) at all other times and monitoring locations (see Appendix E). These results indicate a strong possibility that the high LEPH measurements observed at MW-6 in Q1 was the result of sampling contamination introduced during the sampling or analytical process.

A brief snapshot of contaminant trends over time is illustrated in Figures 6 – 8, below, for those parameters that have exceeded water quality guidelines sometime between 2010 and 2013. Ammonia concentrations at all groundwater locations in 2013 were below the applicable standards and appear to be decreasing over time at all impacted sites. The concentrations at

MW 4 although above those considered background (MW 6) appear to also be in decline and are notably less than the concentrations observed at MW-2D and MW-2S. This is likely due to dilution and other attenuation processes as any impacted groundwater moves down gradient.

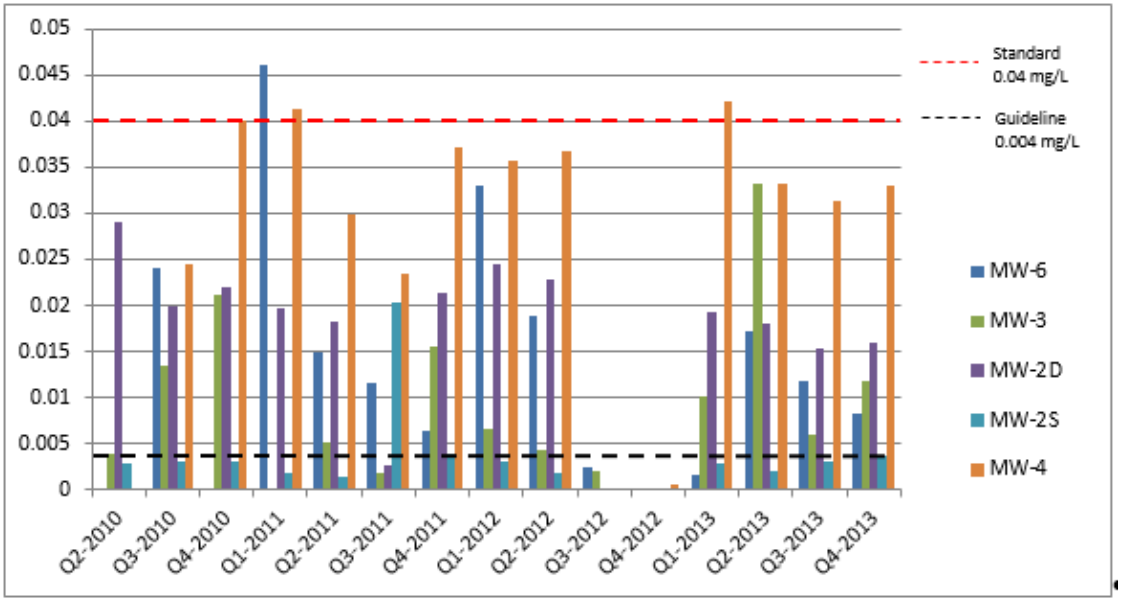


Figure 5: Dissolved Cobalt Concentrations in Groundwater (2010-2013)

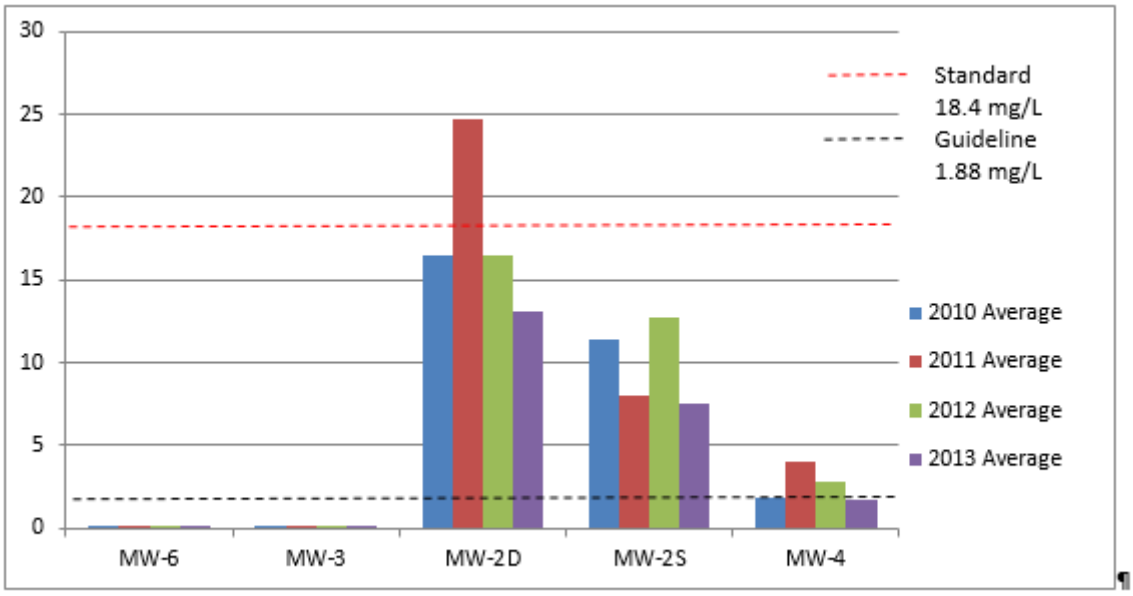


Figure 6: Ammonia concentrations in Groundwater Between 2010 and 2013 (mg/L)

NOTES: **Standard** = BC Contaminated Sites Regulation, Schedule 6, Column II, Generic Numerical Water Standards for Aquatic Life, assumes a pH value < 7.0.

Guideline = BC Working and Approved Water Quality Guidelines for Freshwater Aquatic Life. The chronic guideline assumes a pH value of 6.7 and T=8C.

Arsenic levels have consistently exceeded the BC Working and Approved Water Quality Guidelines (but not the applicable CSR Standard) at MW-2S and MW-2D, as indicated in Figure 7. There is, however, an apparent decrease from 2011 to the present.

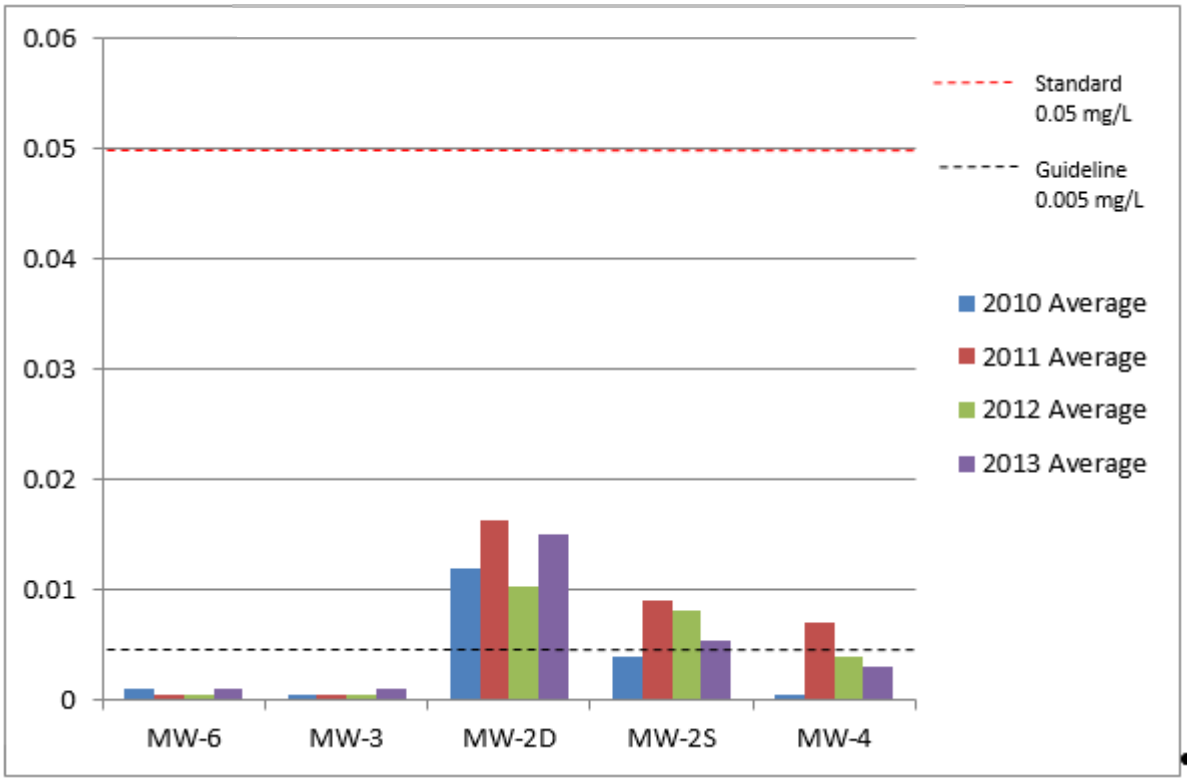


Figure 7: Arsenic concentrations in Groundwater Between 2010 and 2013 (mg/L)

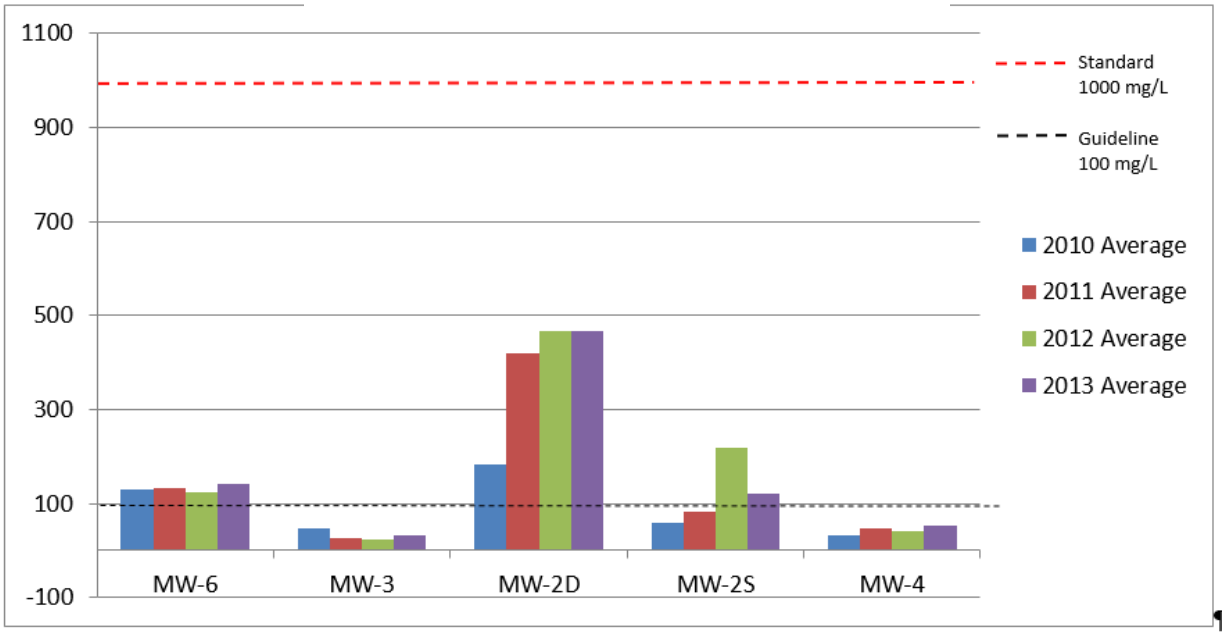


Figure 8: Sulfate concentrations in Groundwater Between 2010 and 2013 (mg/L)

Figure 8 indicates exceedances of the sulfate water quality guideline at several sites between 2010 and 2013 (including the up-gradient well, MW-6). The applicable CSR standard of 1000 mg/L has not been exceeded during the sampling period.

Concentrations of aluminum, copper, and manganese were consistently elevated in the upgradient well (MW-6) during 2013, compared to their respective water quality guidelines, indicating naturally high background levels of these elements. There are no applicable CSR standards for these elements.

5.2.2 Summary

Elevated concentrations of dissolved cobalt were observed at MW-4 in the first quarter of 2013, slightly exceeding the applicable standard. Elevated cobalt concentrations have been detected in previous years at MW-4 and at the up-gradient well, MW-6. An elevated LEPH concentration measured in Q1 at MW-6 (up gradient well) appears anomalous and may be the result of contamination introduced during sampling or analysis. Concentrations of aluminum, copper and manganese appear to all be elevated naturally as indicated by elevated concentrations at MW-6 (up gradient well).

5.3 Surface Water

A summary of the laboratory results are presented in Appendix F with a comparison to standards and guidelines, and the complete laboratory results are provided in Appendix C. Field measurements are presented in Appendix G.

Similarly to groundwater, there are surface water monitoring locations both up gradient and down gradient of the landfill. SFC-3 and SFC-11 are up gradient of the landfill and provide natural background surface water conditions. SFC-4B is the furthest down gradient and the closest monitoring point to the Cheakamus River.

5.3.1 Results

All surface water quality results have been compared to Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the B.C. Contaminated Sites Regulation. These standards for metals are directly applicable to total concentrations of metals measured in surface water. The standards assume a minimum 1 to 10 dilution factor is available prior to the surface water reaching aquatic life habitat.

The results are also compared to the B.C. Working and Approved Water Quality Guidelines (per MoE reporting recommendations). These guidelines are more restrictive since they generally apply to receiving water conditions and not to monitoring points within the landfill site (the guidelines do not incorporate any dilution factors). However, while not directly applicable to monitoring locations at the landfill site, the guidelines provide a point of reference for assessing contaminant levels over time at the site.

Total and dissolved measured concentrations were obtained for the Q1-Q3 sampling periods, while dissolved metals were determined during the Q4 sampling event. If a replicate sample was collected at a surface water monitoring location the average of the sample results were used to compare to the standards.

All 75 parameters at all surface water monitoring locations were below applicable standards with the exception of single event exceedances for cadmium, cobalt and copper at the SFC-2B location. Table 4 summarizes those results which exceeded standards during 2013 and also includes the relevant standard.

Table 4: Exceedances of Surface Water Standards in 2013 at SFC-2B

Parameter	Concentration (mg/L)	Standard (mg/L)	Sampling Event
Copper	0.127	0.09*	Q4
Cobalt	0.0422	0.04	Q1
Cadmium	0.00259	0.0005**	Q2

NOTES: * The standard for copper is dependent on the sample's measured hardness. The hardness value for the sample measured at SFC-2B in Q4 of 2013 was 281 mg/L

** The standard for cadmium is dependent on the sample's measured hardness. The hardness value for the sample measured at SFC-2B in Q2 of 2013 was 148 mg/L

Using the historic data presented in the following Figures 9 – 13, the surface water quality trends can be discerned over the long term, rather than just in the present monitoring year. The results provide an indication of the temporal trends of selected measured contaminants at all surface water monitoring sites since 2010.

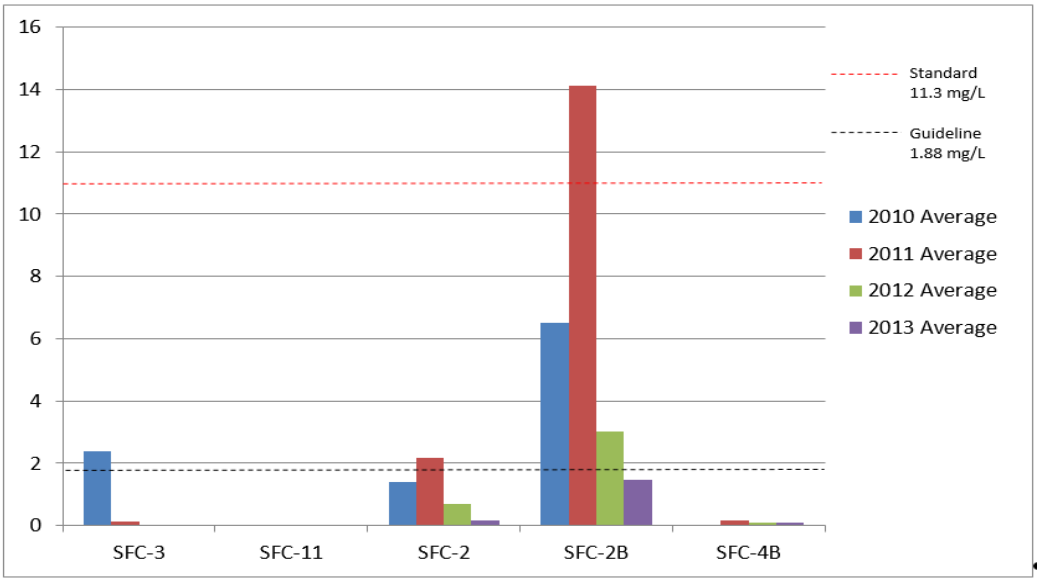


Figure 9: Ammonia concentrations in Surface Water Between 2010 and 2013 (mg/L)

NOTES: **Standard** = BC Contaminated Sites Regulation, Schedule 6, Column II, Generic Numerical Water Standards for Aquatic Life, assuming pH of 7.5.

Guideline = BC Working and Approved Water Quality Guidelines for Freshwater Aquatic Life. The chronic guideline value assumes a pH of 7.5 and T= 8° C.

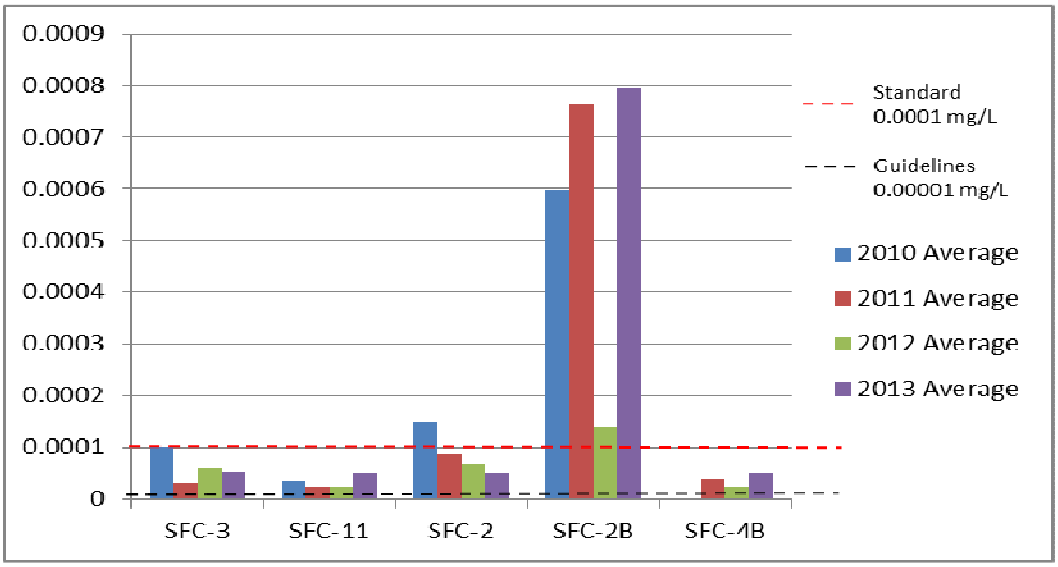


Figure 10: Cadmium concentrations in Surface Water Between 2010 and 2013 (mg/L)

NOTES:

Standard = BC Contaminated Sites Regulation, Schedule 6, Column II, Generic Numerical Water Standards for Aquatic Life, assuming hardness < 30mg/L

Guideline = BC Working and Approved Water Quality Guidelines for Freshwater Aquatic Life, assuming hardness < 30 mg/L.

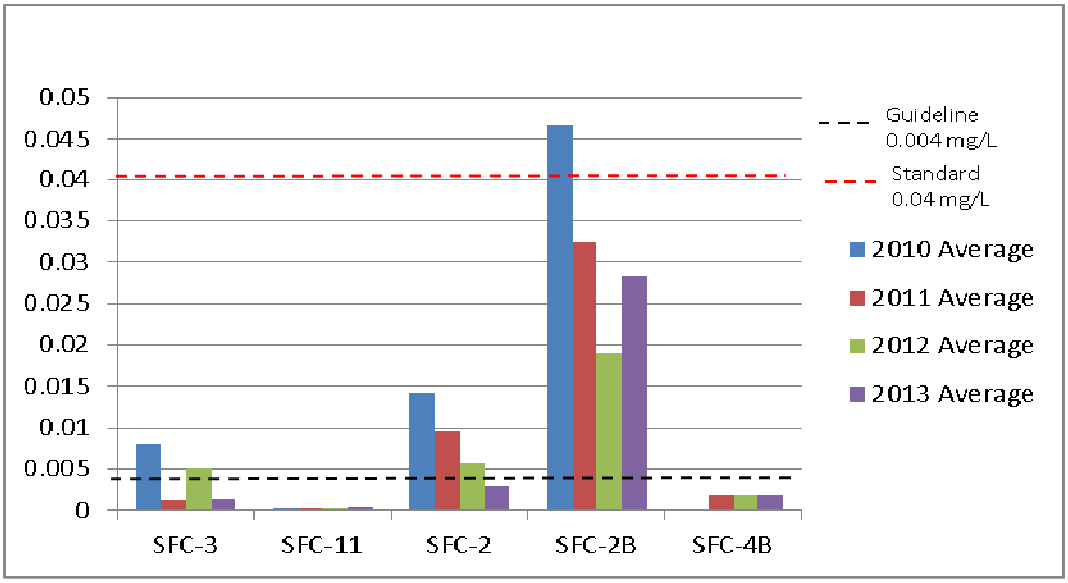


Figure 11: Cobalt concentrations in Surface Water Between 2010 and 2013 (mg/L)

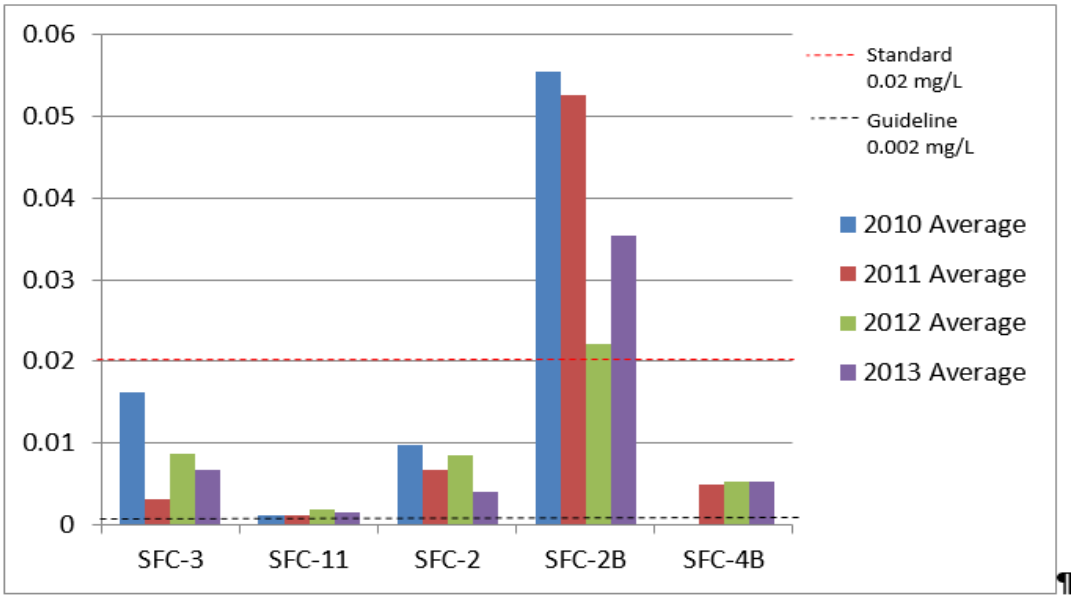


Figure 12: Copper concentrations in Surface Water Between 2010 and 2013 (mg/L)

NOTES: **Standard** = BC Contaminated Sites Regulation, Schedule 6, Column II, Generic Numerical Water Standards for Aquatic Life, assuming a hardness level <30 mg/L.

Guideline = BC Working and Approved Water Quality Guidelines for Freshwater Aquatic Life. The chronic guideline assumes a hardness level of <50 mg/L.

Figure 9 illustrates average annual ammonia concentrations at surface water monitoring locations since 2010. Results indicate an improving trend at the most heavily impacted sites (SFC-2 and SFC-2B). The concentrations at the most down gradient sample location (SFC 4B) are well within the Standard and guideline.

Cadmium concentrations in surface water are illustrated in Figure 10. The average 2013 cadmium concentration at the most heavily impacted site (SFC-2B) is similar to results obtained in 2011. It should be noted that there was a high degree of within-year variability measured at this site in 2013 (cadmium concentrations ranged between 0.00005 mg/L [the lower detection limit] and 0.00259 mg/L). Naturally occurring levels of cadmium in surface water (as indicated at the upgradient locations, SFC 3 and SFC 11) are elevated in comparison to the respective water quality guideline.

Average annual cobalt concentrations in surface water are illustrated in Figure 11. Although there was a single event standard exceedance at SFC-2B in 2013, the average annual concentration was below the respective standard. There appears to be a declining trend in cobalt concentrations at all impacted sites since 2010.

Average annual copper concentrations are illustrated in Figure 12. Similar to cobalt and ammonia, there appears to be a declining trend in copper concentrations at all impacted sites since 2010. Naturally occurring levels of copper in surface water (as indicated at the upgradient locations, SFC 3 and SFC 11) are elevated in comparison to the respective water quality guideline.

5.3.2 Summary

75 parameters were analyzed at five surface water monitoring locations in each of four monitoring periods. Within this 2013 monitoring dataset (1500 measurements) there were only three individual exceedances of site standards for copper, cobalt and cadmium (at monitoring location SFC 2-B). There appears to be a generally declining trend in concentrations since 2010 for these three metals (copper, cobalt and cadmium) at this monitoring location.

The monitoring point furthest downgradient at the site, and nearest to receiving water, is site SFC 4B. Monitoring at this location indicates that all parameters are well within all standards developed for the site. This monitoring location also meets all receiving water quality guidelines with the exception of those parameters which have been shown to be naturally elevated in the area (e.g. copper, cadmium, aluminum and manganese).

5.4 Landfill Gas

Methane measurements are obtained from perimeter monitoring probes located around the landfill.

5.4.1 Results

Table 5 summarizes all methane measurements at monitoring probes collected in 2013. Of the 651 measurements (21 sites x 27 monitoring events) there were 4 detections of methane. The highest methane concentration (2%) was observed at MP 12. All previous and subsequent measurements at this site were below trigger levels.

Following the observance of methane at MP 12 (recorded on October 1, 2013), the flow of landfill gas to the nearby flare was increased on October 7 and monitoring reverted to the winter (i.e. weekly) testing schedule for the remainder of the month. Methane levels at MP 12 were effectively decreased as a result of the modification of the LFG Collection system operation.

Table 6 indicates that methane detections at monitoring probes decreased in 2013 compared to the previous year.

5.4.1 Summary

There were very few detections of methane in monitoring probes surrounding the landfill in 2013. The highest recorded methane concentration (2%) was observed at MP 12. All other measurements were below the detection limit, except at MP 12 and MP 14 during the November 5 sampling event. Recorded concentrations during these events were 0.25%, below the “trigger” level warranting increased attention (0.5%). Detections of methane in monitoring probes decreased in 2013 compared to 2012.

5.5 Maintenance Activities

A number of maintenance activities were completed at groundwater and LFG monitoring points in 2013 to facilitate continued sampling. Specifically, watera pumps and foot valves were replaced during Q2 sampling at MW-2S, MW-4 and MW-6. The lower section of the PVC stand

pipe also failed at MW-2S sometime before the Q2 sampling event, which was fixed in time for the Q3 sampling event on October 9.

The main objective of LFG monitoring and management is to keep methane content at the flare high enough to prevent flame failures, while keeping the LFG flow high enough to prevent off-site migration. In order to do so, several slight valve adjustments were made to several monitoring wells throughout the course of the year.

LFG Extraction Well #5 and its associated signage could not be located during July sampling and it appears these features were buried by nearby landscaping activities. The well was found in time for sampling the following month, at which time methane concentrations were observed at 35% (the same as the previous recorded observation in June). The PVC cap of monitoring probe #13 was observed to be cracked during the September monitoring event and was subsequently repaired.

Table 5: Sampling Events Measuring Methane (as %) at Monitoring Probes in 2013

Monitoring Probe #	4-Jan	8-Jan	15-Jan	22-Jan	30-Jan	6-Feb	11-Feb	19-Feb	25-Feb	5-Mar	13-Mar	19-Mar	27-Mar	8-May	12-Jun	10-Jul	19-Aug	4-Sep	1-Oct	7-Oct	15-Oct	23-Oct	30-Oct	5-Nov	11-Nov	19-Nov	26-Nov	2-Dec	12-Dec	19-Dec	24-Dec
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**2**	0	0	0	0.25	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6: Monitoring Probes with Methane Observations > 0.5%* Between 2012 – 2013

Date	Methane Concentration (%)			
	MP 7	MP 12	MP 13	MP 14
January 3 /12	0	0	0	**4**
Oct. 30 /12	**3**	0	**23**	**37**
Oct. 31 /12	**2**	0	0	0
Oct. 1 /13	0	**2**	0	0

6. SUMMARY OF ENVIRONMENTAL ISSUES AND ACTIONS TAKEN

6.1 Leachate

Leachate is currently collected and pumped to the RMOW Wastewater Treatment Plant to treat contaminants typically elevated in landfill leachate (e.g. ammonia, light extractable petroleum hydrocarbons). Elevated concentrations of ammonia and light extractable petroleum hydrocarbons (LEPH) exceeding the corresponding CSR standards were measured during both 2013 sampling events, confirming the need for continued treatment of the leachate.

6.2 Groundwater

The applicable standards for groundwater at the site (as defined in the Closure Plan) are Schedule 6, Column II (Generic Numerical Water Standards for Aquatic Life) of the B.C. Contaminated Sites Regulation. There were only two recorded incidences of groundwater monitoring parameters exceeding these standards in 2013 out of approximately 115 analytes. Elevated concentrations of dissolved cobalt were observed at MW-4 in the first quarter of 2013, slightly exceeding the applicable standard. Elevated cobalt concentrations have been detected in previous years at MW-4 and at the up-gradient well, MW-6, indicating background levels of cobalt may be elevated at this site. An elevated LEPH concentration measured in Q1 at MW-6 (up gradient well) appears anomalous and may be the result of contamination introduced during sampling or analysis. Future monitoring will confirm if the LEPH observation was an anomalous result. Concentrations of aluminum, copper and manganese appear to all be naturally elevated in the area as indicated by elevated concentrations at MW-6 (up gradient well).

6.3 Surface Water

75 parameters were analyzed at five surface water monitoring locations in each of four monitoring periods. Within this 2013 monitoring dataset (1500 measurements) there were only three individual exceedances of site standards for copper, cobalt and cadmium (at monitoring location SFC 2-B). There appears to be a generally declining trend in concentrations since 2010 for these three metals (copper, cobalt and cadmium) at this monitoring location so no actions are recommended.

The monitoring point furthest downgradient at the site, and nearest to receiving water, is site SFC 4B. Monitoring at this location indicates that all parameters are well within all standards developed for the site. This monitoring location also meets all receiving water quality guidelines with the exception of those parameters which have been shown to be naturally elevated in the area (e.g. copper, cadmium, aluminum and manganese).

6.4 Landfill Gas

Of the 651 measurements at monitoring probes there were only 3 detections of methane in 2013. The highest methane concentration (2%) was recorded at MP 12. As a result of this measurement, the flow of landfill gas to the flare was increased and monitoring frequency was

increased to a weekly basis in October. The LFG Collection system adjustment effectively reduced the methane concentration at the monitoring probe.

6.5 Recommendations and Objectives for 2014

Continued monitoring in 2014 is required as per the Operational Certificate. Data from the 2013 monitoring results are generally similar to the previous years of monitoring. There were no major issues noted in the groundwater, surface water, leachate, or landfill gas monitoring result; therefore there are no proposed changes to the monitoring program for 2014.

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APPENDIX A: Ministry of the Environment's Response to Proposed Revised Monitoring Program (Dated October 5, 2012)

BRITISH COLUMBIA
The Best Place on Earth

Date: November 21, 2012

File: MR-04692

Manager of Environmental Projects
Resort Municipality of Whistler
4325 Blackcomb Way
Whistler, BC V0N 1B4

Dear Mr. Hallisey,

RE: Municipality of Whistler Landfill Annual Monitoring Report - 2011

Thank you for the Resort Municipality of Whistler Landfill Annual Monitoring Report - 2011, received on September 07, 2012. The report was reviewed by the Environmental Management and the Environmental Quality Sections.

The Environmental Quality Section compiled a memorandum and has proposed changes to the environmental monitoring programme. Please find the memorandum enclosed. The Ministry requires that the listed items below be incorporated into the environmental monitoring programme;

1: See comments & conclusions on pages 2 and 3,

2: See recommendations made in relation to ground water and surface water analysis, pages 3 and 4.

Please employ all memorandum recommendations into your current environmental monitoring programme.

If you have any questions about this letter, please contact the undersigned at (604) 582-5307 or Tracy Henderson at (604) 582-5277.

Sincerely,

David O'Malley

David O'Malley M.Sc.
Environmental Protection Officer
Environmental Management Section

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BRITISH COLUMBIA
Ministry of Environment

MEMORANDUM
File #: MR-04692

October 5, 2012

Attn: David O'Malley
Environmental Protection Officer

RE: Environmental Quality Review of the Resort Municipality of Whistler Landfill Annual Monitoring Report – 2011 & Revised Monitoring Program Recommendations, Report Dated: 06/12

I have reviewed the Whistler Landfill Annual Monitoring Report (submitted by Masse Morrison Hershfield) prepared as required in the 2005 Whistler Landfill Operation Certificate. My comments on the report and proposed changes to the environmental monitoring program are included below.

Background
The landfill opened in 1977 and accepted industrial, commercial, and institutional waste. In 1988, additional permitting was received to accept construction and demolition waste. The landfill is divided into three cells; two that rely on natural attenuation and one with a liner/leachate collection system. The landfill site was closed in October 2005 and a final cover system was installed in 2006. Approximately 350,000 tonnes of waste was disposed of at the Whistler Landfill.

The landfill is located within the Cheakamus watershed and based on hydrogeological studies, groundwater flows from south to north in direction. Sampling results were compared to Contaminated Site Regulations[1] (CSR) for drinking water and aquatic life. For both the groundwater and surface water monitoring components, the report states that exceedance of compliance criteria for more than two consecutive sampling events will trigger contingency plans as stated in the closure plan. The details of the contingency plans are not included in this annual report. This summary addresses contaminants of concern in groundwater and surface water attributable to the land filling waste at the Whistler Landfill.

Water Quality Monitoring Program
The water quality monitoring program for the landfill consists of leachate, groundwater, surface water, and gas sampling. For purpose of this memorandum, landfill gas monitoring was not reviewed. The monitoring program for the landfill is conducted to determine if leachate management is negatively affecting groundwater and surface water quality.

[1] http://www.bclaws.ca/

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Samples from monitoring wells (MW), surface water, and a leachate collection point were obtained and analysed for general chemistry, nutrients, dissolved metals, volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), and hydrocarbons. When possible, sampling was done on a quarterly basis. Groundwater and surface water was also monitored up gradient of the landfill to provide a basis for evaluation of water quality downgradient of the landfill.

Parameters that are generally associated with landfill leachate are: ammonia, chloride, iron, manganese, and sodium as they are typically found at elevated levels, inclined to migration and linked with leachate plume evolution. Chloride is known as a tracer of landfill leachate as it's subject to negligible attenuation, does not react or degrade, and is usually found at higher levels. Conductivity and metal levels are also normally found at elevated concentrations.

Results

Results provided in the report were reviewed and compared to Contaminated Site Regulations for drinking water (groundwater) and aquatic life (surface water).

Groundwater parameters that exceeded CSR drinking water guidelines in 2010 to 2012 were iron, manganese, arsenic, sulphate, and benzo(a)pyrene. The two most impacted wells from leachate contamination are: MW-2D and MW-2S (downgradient of the unlined portion of the landfill). These wells also had elevated ammonia levels, as well as frequently detected levels of PAHs, VOCs, and hydrocarbons.

Surface water parameters that exceeded CSR aquatic life guidelines in 2010 to 2012 were ammonia, cadmium, copper, and cobalt. Since CSR guidelines are higher than BC Ambient Water Quality Guidelines[2] for aquatic life, the frequency and magnitude of the surface water exceedances would be greater and for more parameters. The most impacted surface water site from leachate contamination is: SFC-2B (adjacent to the leachate collection point).

Comments and Conclusion

General comments and recommendations for the report:

- Groundwater (iron and manganese) and surface water (all parameters) data over time (2010 to 2012) for the monitoring locations were not graphed. Current and previous monitoring data needs to be illustrated to ensure that longer term trends are captured, while providing valuable information on the leachate plume evolution.

- Guidelines should be included on graphs to highlight magnitude of exceedances and these graphs should have monitoring locations moving from background to furthest downgradient.

- Groundwater sampling results were not compared to BC Ambient Water Quality Guidelines for aquatic life (only compared to CSR guidelines for drinking water). While these aquatic life

[2] http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html

- Site SFC-2B should be monitored quarterly instead of bi-annually because this site is connected to a wetland that was influenced by leachate flooding. Continued quarterly monitoring is required as the leachate was retained in the wetland and may be slowly released over time.

- Surface water analyses should not include PAHs or other organics, because PAHs partition to sediments rapidly.

- Due to elevated ammonia levels and sometimes elevated nitrate/nitrite levels in surface water, the landfill monitoring plan should consider conducting regular visual observations of surface water drainages near the closed landfill to document whether excessive algal growths and subsequent die-off is occurring. Heavy algal blooms directly affect aquatic integrity by smothering habitat, promoting accumulation of additional sediments and promoting excessive bacterial decomposition that leads to low dissolved oxygen vital for most aquatic species.

Overall the report appears to be thorough. The proposed receiving environment monitoring program looks adequate with a few clarifications necessary on schedule and parameters. If you have any questions and/or concerns about the above discussion of the monitoring program, please call me at (604) 582-5277.

Sincerely,

J Henderson

Tracy Henderson
Water Technician

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guidelines do not specifically apply directly to groundwater, they are important to be used as a "flag" to identify possible risks to aquatic life if groundwater intercepts nearby surface waters, such as the Cheakamus River. If sampling results were compared to BC Ambient Water Quality Guidelines, actual exceedances may be higher and for a larger number of parameters.

- Surface water data analyses were conducted for dissolved rather than total metals. Using only dissolved concentrations may underestimate the potential toxicity as this omits metals that may be weakly adsorbed onto particulates that are retained in filter; therefore, actual exceedances may be higher and for a larger number of parameters. Ensure future surface water samples include total metals analysis.

- The report did not mention whether the groundwater discharged to the Cheakamus River was ever confirmed. Based on the direction of groundwater flow, from south to north, the final discharge location would likely be into the Cheakamus River. Since monitoring wells downgradient of the landfill are impacted by leachate, an additional surface water monitoring site may need to be established on Cheakamus River. Investigate the landfill leachate groundwater plume interception with the Cheakamus River and whether this is a potentially meaningful monitoring location.

- The report could be strengthened if downstream aquatic and terrestrial ecological values were identified.

General comments and recommendations for the proposed changes to the environment monitoring program (pg 41):

- Leachate: I agree to all the terms listed.

- Groundwater: I agree to the terms listed, except for:

    - All sites should be monitored quarterly instead of bi-annually because many parameters were frequently found at elevated levels and/or exceeded guidelines. The annual report stated that these elevated levels are mainly caused by leachate contamination, specifically MW-2D and MW-2S (downgradient of the unlined portion of the landfill). Continuing to monitor groundwater sites will aid in understanding the leachate plume development and provide valuable information on whether mitigation efforts are effective.

    - Due to minor and infrequent exceedances, volatile organic compounds, polycyclic aromatic hydrocarbons, and hydrocarbons can be sampled bi-annually (spring and fall).

- Surface water: I agree to the terms listed, except for:

    - Surface water quality data should also be compared to the BC Approved and Working Criteria for Water Quality to highlight other potential parameters of concern.

APPENDIX B: Analytical Parameters Associated with Leachate / Groundwater/ Surface Water Quality Monitoring

APPENDIX

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Physical Tests			
Conductivity	APHA 2510 Auto. Conduc.	2.0	uS/cm
Hardness (as CaCO3)	APHA 2340B	0.50	mg/L
pH	APHA 4500-H pH Value	0.10	pH
Water - Anions and Nutrients			
Alkalinity, Bicarbonate (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Alkalinity, Carbonate (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Alkalinity, Hydroxide (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Alkalinity, Total (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC	0.0050	mg/L
Bromide (Br)	APHA 4110 B.	0.050	mg/L
Chloride (Cl)	APHA 4110 B.	0.50	mg/L
Fluoride (F)	APHA 4110 B.	0.020	mg/L
Nitrate (as N)	EPA 300.0	0.0050	mg/L
Nitrite (as N)	EPA 300.0	0.0010	mg/L
Phosphorus (P)-Total	APHA 4500-P Phosphorous	0.0020	mg/L
Sulfate (SO4)	APHA 4110 B.	0.50	mg/L
Total Kjeldahl Nitrogen	APHA 4500-NORG D.	0.050	mg/L
Total Nitrogen	BC MOE LABORATORY MANUAL (2005)	0.050	mg/L
Water - Dissolved Metals			
Aluminum (Al)-Dissolved	EPA SW-846 3005A/6020A	0.01	mg/L
Antimony (Sb)-Dissolved	EPA SW-846 3005A/6020A	0.0005	mg/L
Arsenic (As)-Dissolved	EPA SW-846 3005A/6020A	0.001	mg/L
Barium (Ba)-Dissolved	EPA SW-846 3005A/6010B	0.02	mg/L
Beryllium (Be)-Dissolved	EPA SW-846 3005A/6010B	0.005	mg/L
Bismuth (Bi)-Dissolved	EPA SW-846 3005A/6010B	0.2	mg/L
Boron (B)-Dissolved	EPA SW-846 3005A/6010B	0.1	mg/L
Cadmium (Cd)-Dissolved	EPA SW-846 3005A/6020A	0.00005	mg/L
Calcium (Ca)-Dissolved	EPA SW-846 3005A/6010B	0.1	mg/L
Chromium (Cr)-Dissolved	EPA SW-846 3005A/6020A	0.0005	mg/L
Cobalt (Co)-Dissolved	EPA SW-846 3005A/6020A	0.0005	mg/L
Copper (Cu)-Dissolved	EPA SW-846 3005A/6020A	0.001	mg/L
Iron (Fe)-Dissolved	EPA SW-846 3005A/6010B	0.03	mg/L
Lead (Pb)-Dissolved	EPA SW-846 3005A/6020A	0.001	mg/L
Lithium (Li)-Dissolved	EPA SW-846 3005A/6010B	0.05	mg/L
Magnesium (Mg)-Dissolved	EPA SW-846 3005A/6010B	0.1	mg/L
Manganese (Mn)-Dissolved	EPA SW-846 3005A/6010B	0.01	mg/L
Mercury (Hg)-Dissolved	EPA SW-846 3005A & EPA 245.7	0.0002	mg/L
Molybdenum (Mo)-Dissolved	EPA SW-846 3005A/6020A	0.001	mg/L
Nickel (Ni)-Dissolved	EPA SW-846 3005A/6020A	0.005	mg/L
Phosphorus (P)-Dissolved	EPA SW-846 3005A/6010B	0.3	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Dissolved Metals			
Potassium (K)-Dissolved	EPA SW-846 3005A/6010B	2	mg/L
Selenium (Se)-Dissolved	EPA SW-846 3005A/6020A	0.001	mg/L
Silicon (Si)-Dissolved	EPA SW-846 3005A/6010B	0.05	mg/L
Silver (Ag)-Dissolved	EPA SW-846 3005A/6020A	0.00005	mg/L
Sodium (Na)-Dissolved	EPA SW-846 3005A/6010B	2	mg/L
Strontium (Sr)-Dissolved	EPA SW-846 3005A/6010B	0.005	mg/L
Thallium (Tl)-Dissolved	EPA SW-846 3005A/6020A	0.0002	mg/L
Tin (Sn)-Dissolved	EPA SW-846 3005A/6010B	0.03	mg/L
Titanium (Ti)-Dissolved	EPA SW-846 3005A/6010B	0.05	mg/L
Uranium (U)-Dissolved	EPA SW-846 3005A/6020A	0.0002	mg/L
Vanadium (V)-Dissolved	EPA SW-846 3005A/6010B	0.03	mg/L
Zinc (Zn)-Dissolved	EPA SW-846 3005A/6010B	0.005	mg/L
Water - Aggregate Organics			
COD	APHA 5220 D. CHEMICAL OXYGEN DEMAND	20	mg/L
Water - Volatile Organic Compounds			
1,1,1,2-Tetrachloroethane	EPA8260B, 5021	0.0010	mg/L
1,1,1-Trichloroethane	EPA8260B, 5021	0.0010	mg/L
1,1,2,2-Tetrachloroethane	EPA8260B, 5021	0.0010	mg/L
1,1,2-Trichloroethane	EPA8260B, 5021	0.0010	mg/L
1,1-Dichloroethane	EPA8260B, 5021	0.0010	mg/L
1,1-Dichloroethylene	EPA8260B, 5021	0.0010	mg/L
1,1-Dichloropropylene	EPA 8260B, 5012A	0.0010	mg/L
1,2,3-Trichlorobenzene	EPA 8260B, 5012A	0.0010	mg/L
1,2,3-Trichloropropane	EPA 8260B, 5012A	0.0010	mg/L
1,2,3-Trimethylbenzene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
1,2,4-Trichlorobenzene	EPA 8260B, 5012A	0.0010	mg/L
1,2,4-Trimethylbenzene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
1,2-Dibromo-3-chloropropane	EPA 8260B, 5012A	0.0010	mg/L
1,2-Dichlorobenzene	EPA8260B, 5021	0.0010	mg/L
1,2-Dichloroethane	EPA8260B, 5021	0.0010	mg/L
1,2-Dichloroethane	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
1,2-Dichloropropane	EPA8260B, 5021	0.0010	mg/L
1,3,5-Trimethylbenzene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
1,3-Butadiene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
1,3-Dichlorobenzene	EPA8260B, 5021	0.0010	mg/L
1,3-Dichloropropane	EPA 8260B, 5012A	0.0010	mg/L
1,3-Dichloropropene (cis & trans)	EPA8260B, 5021	0.0010	mg/L
1,4-Dichlorobenzene	EPA8260B, 5021	0.0010	mg/L
1,4-Difluorobenzene (SS)	EPA8260B, 5021	1	%

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Volatile Organic Compounds			
2,2-Dichloropropane	EPA 8260B, 5012A	0.0010	mg/L
2-Chlorotoluene	EPA 8260B, 5012A	0.0010	mg/L
2-Hexanone	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
4-Bromofluorobenzene (SS)	EPA8260B, 5021	1	%
4-Chlorotoluene	EPA 8260B, 5012A	0.0010	mg/L
4-Isopropyltoluene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Methyl isobutyl carbinol (MIBC)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Acetone	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Benzene	EPA8260B, 5021	0.00050	mg/L
Bromobenzene	EPA 8260B, 5012A	0.0010	mg/L
Bromochloromethane	EPA 8260B, 5012A	0.0010	mg/L
Bromodichloromethane	EPA8260B, 5021	0.0010	mg/L
Bromoform	EPA8260B, 5021	0.0010	mg/L
Bromomethane	EPA 8260B, 5012A	0.0010	mg/L
Carbon Disulfide	EPA8260B, 5035A, 5021, BC MELP	0.0050	mg/L
Carbon Tetrachloride	EPA8260B, 5021	0.00050	mg/L
Chlorobenzene	EPA8260B, 5021	0.0010	mg/L
Dibromochloromethane	EPA8260B, 5021	0.0010	mg/L
Chloroethane	EPA8260B, 5021	0.0010	mg/L
Chloroform	EPA8260B, 5021	0.0010	mg/L
Chloromethane	EPA8260B, 5021	0.0050	mg/L
cis-1,2-Dichloroethylene	EPA8260B, 5021	0.0010	mg/L
cis-1,3-Dichloropropylene	EPA8260B, 5021	0.0010	mg/L
Decane (nC10)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Dibromomethane	EPA 8260B, 5012A	0.0010	mg/L
Dichlorodifluoromethane	EPA 8260B, 5012A	0.0010	mg/L
Ethylbenzene	EPA8260B, 5021	0.00050	mg/L
1,2-Dibromoethane	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
n-Heptane (nC7)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Hexachlorobutadiene	EPA 8260B, 5012A	0.0010	mg/L
n-Hexane (nC6)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Isopropylbenzene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
meta- & para-Xylene	EPA8260B, 5021	0.00050	mg/L
Methyl ethyl ketone (MEK)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Methyl isobutyl ketone (MIBK)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Methyl t-butyl ether (MTBE)	EPA8260B, 5021	0.00050	mg/L
Methylcyclohexane	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Dichloromethane	EPA8260B, 5021	0.0050	mg/L
n-Butylbenzene	EPA 8260B, 5012A	0.0010	mg/L
n-Propylbenzene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Volatile Organic Compounds			
Naphthalene	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
n-Octane (nC8)	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
ortho-Xylene	EPA8260B, 5021	0.00050	mg/L
n-Pentane	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
sec-Butylbenzene	EPA 8260B, 5012A	0.0010	mg/L
Styrene	EPA8260B, 5021	0.00050	mg/L
tert-Butylbenzene	EPA 8260B, 5012A	0.0010	mg/L
Tetrachloroethylene	EPA8260B, 5021	0.0010	mg/L
Toluene	EPA8260B, 5021	0.00050	mg/L
trans-1,2-Dichloroethylene	EPA8260B, 5021	0.0010	mg/L
trans-1,3-Dichloropropylene	EPA8260B, 5021	0.0010	mg/L
Trichloroethylene	EPA8260B, 5021	0.0010	mg/L
Trichlorofluoromethane	EPA8260B, 5021	0.0010	mg/L
Vinyl Acetate	EPA8260B, 5035A, 5021, BC MELP	0.0010	mg/L
Vinyl Chloride	EPA8260B, 5021	0.0010	mg/L
Xylenes	CALCULATION	0.00075	mg/L
Water - Hydrocarbons			
3,4-Dichlorotoluene (SS)	B.C. MIN. OF ENV. LAB. MAN. (2009)	1	%
EPH10-19	BCMOE EPH GCFID	0.3	mg/L
EPH19-32	BCMOE EPH GCFID	0.3	mg/L
HEPH	BC MOE LABORATORY MANUAL (2005)	0.25	ug/mL
LEPH	BC MOE LABORATORY MANUAL (2005)	0.25	ug/mL
Volatile Hydrocarbons (VH6-10)	B.C. MIN. OF ENV. LAB. MAN. (2009)	0.10	mg/L
VPH (C6-C10)	BC MOE LABORATORY MANUAL (2005)	0.10	mg/L
Water - Polycyclic Aromatic Hydrocarbons			
Acenaphthene	EPA 3510, 8270	0.000050	mg/L
Acenaphthene d10	EPA 3510, 8270	1	%
Acenaphthylene	EPA 3510, 8270	0.000050	mg/L
Acridine	EPA 3510, 8270	0.000050	mg/L
Acridine d9	EPA 3510, 8270	1	%
Anthracene	EPA 3510, 8270	0.000050	mg/L
Benz(a)anthracene	EPA 3510, 8270	0.000050	mg/L
Benzo(a)pyrene	EPA 3510, 8270	0.000010	mg/L
Benzo(b)fluoranthene	EPA 3510, 8270	0.000050	mg/L
Benzo(g,h,i)perylene	EPA 3510, 8270	0.000050	mg/L
Benzo(k)fluoranthene	EPA 3510, 8270	0.000050	mg/L
Chrysene	EPA 3510, 8270	0.000050	mg/L
Chrysene d12	EPA 3510, 8270	1	%
Dibenz(a,h)anthracene	EPA 3510, 8270	0.000050	mg/L
Fluoranthene	EPA 3510, 8270	0.000050	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Polycyclic Aromatic Hydrocarbons			
Fluorene	EPA 3510, 8270	0.000050	mg/L
Indeno(1,2,3-c,d)pyrene	EPA 3510, 8270	0.000050	mg/L
Naphthalene	EPA 3510, 8270	0.000050	mg/L
Naphthalene d8	EPA 3510, 8270	1	%
Phenanthrene	EPA 3510, 8270	0.000050	mg/L
Phenanthrene d10	EPA 3510, 8270	1	%
Pyrene	EPA 3510, 8270	0.000050	mg/L
Quinoline	EPA 3510, 8270	0.000050	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Physical Tests			
Conductivity	APHA 2510 Auto. Conduc.	2.0	uS/cm
Hardness (as CaCO3)	APHA 2340B	0.50	mg/L
pH	APHA 4500-H pH Value	0.10	pH
Total Suspended Solids	APHA 2540 D - GRAVIMETRIC	3.0	mg/L
Water - Anions and Nutrients			
Alkalinity, Bicarbonate (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Alkalinity, Carbonate (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Alkalinity, Hydroxide (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Alkalinity, Total (as CaCO3)	APHA 2320 Alkalinity	1.0	mg/L
Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC	0.0050	mg/L
Bromide (Br)	APHA 4110 B.	0.050	mg/L
Chloride (Cl)	APHA 4110 B.	0.50	mg/L
Fluoride (F)	APHA 4110 B.	0.020	mg/L
Nitrate (as N)	EPA 300.0	0.0050	mg/L
Nitrite (as N)	EPA 300.0	0.0010	mg/L
Phosphorus (P)-Total	APHA 4500-P Phosphorous	0.0020	mg/L
Sulfate (SO4)	APHA 4110 B.	0.50	mg/L
Total Kjeldahl Nitrogen	APHA 4500-NORG D.	0.050	mg/L
Total Nitrogen	BC MOE LABORATORY MANUAL (2005)	0.050	mg/L
Water - Total Metals			
Aluminum (Al)-Total	EPA SW-846 3005A/6020A	0.01	mg/L
Antimony (Sb)-Total	EPA SW-846 3005A/6020A	0.0005	mg/L
Arsenic (As)-Total	EPA SW-846 3005A/6020A	0.001	mg/L
Barium (Ba)-Total	EPA SW-846 3005A/6010B	0.02	mg/L
Beryllium (Be)-Total	EPA SW-846 3005A/6010B	0.005	mg/L
Bismuth (Bi)-Total	EPA SW-846 3005A/6010B	0.2	mg/L
Boron (B)-Total	EPA SW-846 3005A/6010B	0.1	mg/L
Cadmium (Cd)-Total	EPA SW-846 3005A/6020A	0.00005	mg/L
Calcium (Ca)-Total	EPA SW-846 3005A/6010B	0.1	mg/L
Chromium (Cr)-Total	EPA SW-846 3005A/6020A	0.0005	mg/L
Cobalt (Co)-Total	EPA SW-846 3005A/6020A	0.0005	mg/L
Copper (Cu)-Total	EPA SW-846 3005A/6020A	0.001	mg/L
Iron (Fe)-Total	EPA SW-846 3005A/6010B	0.03	mg/L
Lead (Pb)-Total	EPA SW-846 3005A/6020A	0.001	mg/L
Lithium (Li)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Magnesium (Mg)-Total	EPA SW-846 3005A/6010B	0.1	mg/L
Manganese (Mn)-Total	EPA SW-846 3005A/6010B	0.01	mg/L
Mercury (Hg)-Total	EPA 245.7	0.0002	mg/L
Molybdenum (Mo)-Total	EPA SW-846 3005A/6020A	0.001	mg/L
Nickel (Ni)-Total	EPA SW-846 3005A/6020A	0.005	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Total Metals			
Phosphorus (P)-Total	EPA SW-846 3005A/6010B	0.3	mg/L
Potassium (K)-Total	EPA SW-846 3005A/6010B	2	mg/L
Selenium (Se)-Total	EPA SW-846 3005A/6020A	0.001	mg/L
Silicon (Si)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Silver (Ag)-Total	EPA SW-846 3005A/6020A	0.00005	mg/L
Sodium (Na)-Total	EPA SW-846 3005A/6010B	2	mg/L
Strontium (Sr)-Total	EPA SW-846 3005A/6010B	0.005	mg/L
Thallium (Tl)-Total	EPA SW-846 3005A/6020A	0.0002	mg/L
Tin (Sn)-Total	EPA SW-846 3005A/6010B	0.03	mg/L
Titanium (Ti)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Uranium (U)-Total	EPA SW-846 3005A/6020A	0.0002	mg/L
Vanadium (V)-Total	EPA SW-846 3005A/6010B	0.03	mg/L
Zinc (Zn)-Total	EPA SW-846 3005A/6010B	0.005	mg/L
Water - Aggregate Organics			
COD	APHA 5220 D. CHEMICAL OXYGEN DEMAND	20	mg/L
Water - Hydrocarbons			
EPH10-19	BCMOE EPH GCFID	0.3	mg/L
EPH19-32	BCMOE EPH GCFID	0.3	mg/L
HEPH	BC MOE LABORATORY MANUAL (2005)	0.25	ug/mL
LEPH	BC MOE LABORATORY MANUAL (2005)	0.25	ug/mL
Water - Polycyclic Aromatic Hydrocarbons			
Acenaphthene	EPA 3510, 8270	0.000050	mg/L
Acenaphthene d10	EPA 3510, 8270	1	%
Acenaphthylene	EPA 3510, 8270	0.000050	mg/L
Acridine	EPA 3510, 8270	0.000050	mg/L
Acridine d9	EPA 3510, 8270	1	%
Anthracene	EPA 3510, 8270	0.000050	mg/L
Benz(a)anthracene	EPA 3510, 8270	0.000050	mg/L
Benzo(a)pyrene	EPA 3510, 8270	0.000010	mg/L
Benzo(b)fluoranthene	EPA 3510, 8270	0.000050	mg/L
Benzo(g,h,i)perylene	EPA 3510, 8270	0.000050	mg/L
Benzo(k)fluoranthene	EPA 3510, 8270	0.000050	mg/L
Chrysene	EPA 3510, 8270	0.000050	mg/L
Chrysene d12	EPA 3510, 8270	1	%
Dibenz(a,h)anthracene	EPA 3510, 8270	0.000050	mg/L
Fluoranthene	EPA 3510, 8270	0.000050	mg/L
Fluorene	EPA 3510, 8270	0.000050	mg/L
Indeno(1,2,3-c,d)pyrene	EPA 3510, 8270	0.000050	mg/L
Naphthalene	EPA 3510, 8270	0.000050	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Water - Polycyclic Aromatic Hydrocarbons			
Naphthalene d8	EPA 3510, 8270	1	%
Phenanthrene	EPA 3510, 8270	0.000050	mg/L
Phenanthrene d10	EPA 3510, 8270	1	%
Pyrene	EPA 3510, 8270	0.000050	mg/L
Quinoline	EPA 3510, 8270	0.000050	mg/L

Methodology

Product	Matrix	Product Description	Analytical Method Reference
ALK-PCT-VA	Water	Alkalinity by Auto. 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.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

Methodology

Product	Matrix	Product Description	Analytical Method Reference

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EPH-SF-FID-VA	Water	EPH in Water by GCFID	BCMOE EPH GCFID

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene and analysed by capillary column 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).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in water. 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 Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, 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 Water by GC/FID" (Version 2.1, July 20, 1999).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Methodology

Product	Matrix	Product Description	Analytical Method Reference
NH3-F-VA	Water	Ammonia in Water 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.

P-T-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PAH-SF-MS-VA	Water	PAH in Water by GCMS	EPA 3510, 8270

The entire water sample is extracted with dichloromethane, prior to analysis by gas chromatography with mass spectrometric detection (GC/MS). Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PAH-SURR-MS-VA	Water	PAH Surrogates for Waters	EPA 3510, 8270

Analysed as per the corresponding PAH test method. Known quantities of surrogate compounds are added prior to analysis to each sample to demonstrate analytical accuracy.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

SAMPLE-DISPOSAL-VA	Misc.	Sample Handling and Disposal Fee	
TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

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.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA	Water	Total Suspended Solids by Gravimetric	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, TSS is determined by drying the filter at 104 degrees celsius.

APPENDIX C: Analytical Laboratory Results for Leachate, Groundwater & Surface Water Results

MORRISON HERSHFIELD GROUP INC.
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 20-MAR-13
Report Date: 04-APR-13 15:04 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L1280951

Project P.O. #: NOT SUBMITTED
Job Reference: 5104016
C of C Numbers: 10-293948
Legal Site Desc:

Selam Worku
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-1	L1280951-2	L1280951-3	L1280951-4	L1280951-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-6	MW-6 DUP	MW-2S	MW-2D	MW-4
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	578	573	715	1520	500
	Hardness (as CaCO3) (mg/L)	121	121	212	658	184
	pH (pH)	6.26	6.21	6.78	6.78	6.64
	Total Suspended Solids (mg/L)					
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	21.8	16.1	164	266	156
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	21.8	16.1	164	266	156
	Ammonia, Total (as N) (mg/L)	0.0155	0.0168	10.4	17.6	1.66
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLM	<0.50 DLM	0.130
	Chloride (Cl) (mg/L)	79.0	78.0	39.0	57.0	33.5
	Fluoride (F) (mg/L)	0.072	0.068	0.22	0.37	<0.10 DLM
	Nitrate (as N) (mg/L)	0.0638	0.0656	<0.025 DLM	<0.050 DLM	0.0079
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0052	<0.010 DLM	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	2.81	2.75	11.4	19.1	1.68
	Total Nitrogen (mg/L)	2.87	2.82	11.4	19.1	1.69
	Phosphorus (P)-Total (mg/L)	18.6	13.0	0.075	0.584	0.408
	Sulfate (SO4) (mg/L)	135	133	153	539	61.6
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-6	L1280951-7	L1280951-8	L1280951-9	L1280951-10
	Description	GW	GW	GW	SW	SW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-3	L1	LM	SFC-2	SFC-2B
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	233	2120	1210	129	1210
	Hardness (as CaCO3) (mg/L)	63.2	491	519	35.6	561
	pH (pH)	6.47	7.17	6.66	7.19	6.81
	Total Suspended Solids (mg/L)				<3.0	26.6
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	36.9	804	160	24.2	127
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	36.9	804	160	24.2	127
	Ammonia, Total (as N) (mg/L)	0.273	66.2 DLM	2.23 DLM	<0.0050	1.57 DLM
	Bromide (Br) (mg/L)	0.140	<1.0	<0.50	<0.050	<0.50
	Chloride (Cl) (mg/L)	28.6	137 DLM	70.2	12.6	70.0
	Fluoride (F) (mg/L)	0.038	<0.40	0.24 DLM	0.051	0.21 DLM
	Nitrate (as N) (mg/L)	0.119	8.54	<0.050 DLM	0.331	<0.050 DLM
	Nitrite (as N) (mg/L)	<0.0010	0.243	<0.010	<0.0010	<0.010
	Total Kjeldahl Nitrogen (mg/L)	0.303	76.0	2.46	<0.050	1.67
	Total Nitrogen (mg/L)	0.422	84.7	2.46	0.331	1.67
	Phosphorus (P)-Total (mg/L)	0.0026	0.429	0.031	0.0093	0.0052
	Sulfate (SO4) (mg/L)	32.9	140	407	18.3	452
Total Metals	Aluminum (Al)-Total (mg/L)				0.290	0.022
	Antimony (Sb)-Total (mg/L)				<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)				<0.0010	<0.0010
	Barium (Ba)-Total (mg/L)				<0.020	0.142
	Beryllium (Be)-Total (mg/L)				<0.0050	<0.0050
	Bismuth (Bi)-Total (mg/L)				<0.20	<0.20
	Boron (B)-Total (mg/L)				<0.10	0.32
	Cadmium (Cd)-Total (mg/L)				<0.000050	<0.000050
	Calcium (Ca)-Total (mg/L)				11.6	192
	Chromium (Cr)-Total (mg/L)				<0.00050	<0.00050
	Cobalt (Co)-Total (mg/L)				<0.00050	0.00991
	Copper (Cu)-Total (mg/L)				0.0033	0.0011
	Iron (Fe)-Total (mg/L)				0.171	21.3
	Lead (Pb)-Total (mg/L)				<0.0010	<0.0010
	Lithium (Li)-Total (mg/L)				<0.050	<0.050
	Magnesium (Mg)-Total (mg/L)				1.64	19.7
	Manganese (Mn)-Total (mg/L)				<0.010	4.40
	Mercury (Hg)-Total (mg/L)				<0.00020	<0.00020
	Molybdenum (Mo)-Total (mg/L)				<0.0010	<0.0010

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

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Grouping	Analyte	L1280951-11 SW 19-MAR-13 SFC-3	L1280951-12 SW 19-MAR-13 SFC-11	L1280951-13 SW 20-MAR-13 SFC-4B	L1280951-14 GW TRAVEL BLANK GW	L1280951-15 SW TRAVEL BLANK SW
WATER						
Physical Tests	Conductivity (uS/cm)	332	77.6	261	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)	82.8	25.3	94.5	<0.50	<0.50
	pH (pH)	7.24	7.26	7.39	5.78	6.14
	Total Suspended Solids (mg/L)	<3.0	<3.0	5.8		<3.0
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	41.4	21.4	33.1	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	41.4	21.4	33.1	<1.0	<1.0
	Ammonia, Total (as N) (mg/L)	0.0118	<0.0050	0.167	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	45.6	3.87	18.8	<0.50	<0.50
	Fluoride (F) (mg/L)	0.038	0.056	0.053	<0.020	<0.020
	Nitrate (as N) (mg/L)	0.302	0.331	0.592	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.075	<0.050	0.240	<0.050	<0.050
	Total Nitrogen (mg/L)	0.377	0.331	0.833	<0.050	<0.050
	Phosphorus (P)-Total (mg/L)	0.0061	0.0110	0.0107	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	47.3	10.7	60.1	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.116	0.348	0.659		<0.010
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
	Arsenic (As)-Total (mg/L)	<0.0010	<0.0010	<0.0010		<0.0010
	Barium (Ba)-Total (mg/L)	0.037	<0.020	0.029		<0.020
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0050	<0.0050		<0.0050
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.20		<0.20
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10		<0.10
	Cadmium (Cd)-Total (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Calcium (Ca)-Total (mg/L)	28.6	7.71	31.9		<0.10
	Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
	Cobalt (Co)-Total (mg/L)	0.00059	<0.00050	0.00300		<0.00050
	Copper (Cu)-Total (mg/L)	0.0058	0.0029	0.0105		<0.0010
	Iron (Fe)-Total (mg/L)	0.106	0.215	1.41		<0.030
	Lead (Pb)-Total (mg/L)	<0.0010	<0.0010	<0.0010		<0.0010
	Lithium (Li)-Total (mg/L)	<0.050	<0.050	<0.050		<0.050
	Magnesium (Mg)-Total (mg/L)	2.75	1.46	3.58		<0.10
	Manganese (Mn)-Total (mg/L)	0.028	<0.010	0.414		<0.010
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020		<0.00020
	Molybdenum (Mo)-Total (mg/L)	0.0027	<0.0010	0.0012		<0.0010

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

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Grouping	Analyte	L1280951-1 GW 19-MAR-13 MW-6	L1280951-2 GW 19-MAR-13 MW-6 DUP	L1280951-3 GW 19-MAR-13 MW-2S	L1280951-4 GW 19-MAR-13 MW-2D	L1280951-5 GW 19-MAR-13 MW-4
	Sample ID	L1280951-1	L1280951-2	L1280951-3	L1280951-4	L1280951-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-6	MW-6 DUP	MW-2S	MW-2D	MW-4
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.076	0.074	<0.010	<0.010	<0.010
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	<0.0010	<0.0010	0.0026	0.0159	0.0025
	Barium (Ba)-Dissolved (mg/L)	0.044	0.045	0.170	0.038	0.191
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	0.18	0.35	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	0.000250	0.000261	0.000052	<0.000050	0.000373
	Calcium (Ca)-Dissolved (mg/L)	39.1	39.3	69.3	215	58.7
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	0.00156	0.00159	0.00287	0.0193	0.0422
	Copper (Cu)-Dissolved (mg/L)	0.0022	0.0021	<0.0010	<0.0010	<0.0010
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	38.5	76.7	33.2
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Magnesium (Mg)-Dissolved (mg/L)	5.60	5.61	9.47	29.4	8.99
	Manganese (Mn)-Dissolved (mg/L)	0.604	0.597	2.78	3.02	4.20
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010	<0.0010	0.0030	0.0170	0.0050
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0059
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	3.6	3.6	14.5	28.5	7.2

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

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Grouping	Analyte	L1280951-6 GW 19-MAR-13 MW-3	L1280951-7 GW 19-MAR-13 L1	L1280951-8 GW 19-MAR-13 LM	L1280951-9 SW 19-MAR-13 SFC-2	L1280951-10 SW 19-MAR-13 SFC-2B
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)				<0.0050	<0.0050 DLB
	Phosphorus (P)-Total (mg/L)				<0.30	<0.30
	Potassium (K)-Total (mg/L)				<2.0	9.0
	Selenium (Se)-Total (mg/L)				<0.0010	<0.0010
	Silicon (Si)-Total (mg/L)				6.38	9.94
	Silver (Ag)-Total (mg/L)				<0.000050	<0.000050
	Sodium (Na)-Total (mg/L)				10.8	41.6
	Strontium (Sr)-Total (mg/L)				0.0985	1.14
	Thallium (Tl)-Total (mg/L)				<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)				<0.030	<0.030
	Titanium (Ti)-Total (mg/L)				<0.050	<0.050
	Uranium (U)-Total (mg/L)				<0.00020	<0.00020
	Vanadium (V)-Total (mg/L)				<0.030	<0.030
	Zinc (Zn)-Total (mg/L)				<0.0050	0.0497
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	LAB	LAB		
	Aluminum (Al)-Dissolved (mg/L)	0.031	<0.010	<0.010		
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Arsenic (As)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Barium (Ba)-Dissolved (mg/L)	0.080	0.093	0.114		
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20		
	Boron (B)-Dissolved (mg/L)	<0.10	2.26	0.38		
	Cadmium (Cd)-Dissolved (mg/L)	0.000264	<0.000050	0.000066		
	Calcium (Ca)-Dissolved (mg/L)	19.4	154	179		
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	0.00182	<0.00050		
	Cobalt (Co)-Dissolved (mg/L)	0.0102	0.00663	0.0209		
	Copper (Cu)-Dissolved (mg/L)	0.0042	0.0077	<0.0010		
	Iron (Fe)-Dissolved (mg/L)	0.922	0.101	11.4		
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Magnesium (Mg)-Dissolved (mg/L)	3.59	25.8	17.7		
	Manganese (Mn)-Dissolved (mg/L)	2.12	3.55	3.99		
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010	0.0023 DLA	<0.0010		
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0079	0.0119		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	3.6	88.0	9.9		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1280951-11 SW 19-MAR-13 SFC-3	L1280951-12 SW 19-MAR-13 SFC-11	L1280951-13 SW 20-MAR-13 SFC-4B	L1280951-14 GW TRAVEL BLANK GW	L1280951-15 SW TRAVEL BLANK SW
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	<0.0050 DLB	<0.0050	<0.0050 DLB		<0.0050
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30		<0.30
	Potassium (K)-Total (mg/L)	3.2	<2.0	2.7		<2.0
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010		<0.0010
	Silicon (Si)-Total (mg/L)	5.06	7.11	6.14		<0.050
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Sodium (Na)-Total (mg/L)	29.5	6.2	14.4		<2.0
	Strontium (Sr)-Total (mg/L)	0.178	0.0817	0.216		<0.0050
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00020	<0.00020		<0.00020
	Tin (Sn)-Total (mg/L)	<0.030	<0.030	<0.030		<0.030
	Titanium (Ti)-Total (mg/L)	<0.050	<0.050	<0.050		<0.050
	Uranium (U)-Total (mg/L)	<0.00020	<0.00020	<0.00020		<0.00020
	Vanadium (V)-Total (mg/L)	<0.030	<0.030	<0.030		<0.030
	Zinc (Zn)-Total (mg/L)	0.0084	<0.0050	0.0117		<0.0050
Dissolved Metals	Dissolved Metals Filtration Location				FIELD	
	Aluminum (Al)-Dissolved (mg/L)				<0.010	
	Antimony (Sb)-Dissolved (mg/L)				<0.00050	
	Arsenic (As)-Dissolved (mg/L)				<0.0010	
	Barium (Ba)-Dissolved (mg/L)				<0.020	
	Beryllium (Be)-Dissolved (mg/L)				<0.0050	
	Bismuth (Bi)-Dissolved (mg/L)				<0.20	
	Boron (B)-Dissolved (mg/L)				<0.10	
	Cadmium (Cd)-Dissolved (mg/L)				<0.000050	
	Calcium (Ca)-Dissolved (mg/L)				<0.10	
	Chromium (Cr)-Dissolved (mg/L)				<0.00050	
	Cobalt (Co)-Dissolved (mg/L)				<0.00050	
	Copper (Cu)-Dissolved (mg/L)				<0.0010	
	Iron (Fe)-Dissolved (mg/L)				<0.030	
	Lead (Pb)-Dissolved (mg/L)				<0.0010	
	Lithium (Li)-Dissolved (mg/L)				<0.050	
	Magnesium (Mg)-Dissolved (mg/L)				<0.10	
	Manganese (Mn)-Dissolved (mg/L)				<0.010	
	Mercury (Hg)-Dissolved (mg/L)				<0.00020	
	Molybdenum (Mo)-Dissolved (mg/L)				<0.0010	
	Nickel (Ni)-Dissolved (mg/L)				<0.0050	
	Phosphorus (P)-Dissolved (mg/L)				<0.30	
	Potassium (K)-Dissolved (mg/L)				<2.0	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-1	L1280951-2	L1280951-3	L1280951-4	L1280951-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-6	MW-6 DUP	MW-2S	MW-2D	MW-4
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)	8.06	8.06	8.01	14.0	11.2
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Dissolved (mg/L)	64.4	63.1	14.4	33.3	14.7
	Strontium (Sr)-Dissolved (mg/L)	0.551	0.556	0.358	0.825	0.326
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Uranium (U)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	0.00033	<0.00020
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0102
Aggregate Organics	COD (mg/L)	50	86	33	52	29
Volatile Organic Compounds	Acetone (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bromoform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bromomethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,3-Butadiene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Chlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	<0.0010
	Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Dibromomethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
	1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
	Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1280951-6 GW 19-MAR-13 MW-3	L1280951-7 GW 19-MAR-13 L1	L1280951-8 GW 19-MAR-13 LM	L1280951-9 SW 19-MAR-13 SFC-2	L1280951-10 SW 19-MAR-13 SFC-2B
Sample ID		L1280951-6	L1280951-7	L1280951-8	L1280951-9	L1280951-10
Description		GW	GW	GW	SW	SW
Sampled Date		19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
Sampled Time						
Client ID		MW-3	L1	LM	SFC-2	SFC-2B
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Silicon (Si)-Dissolved (mg/L)	7.24	8.04	9.15		
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Sodium (Na)-Dissolved (mg/L)	17.1	159	43.2		
	Strontium (Sr)-Dissolved (mg/L)	0.148	0.853	1.05		
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030		
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050		
	Uranium (U)-Dissolved (mg/L)	<0.00020	0.00026	<0.00020		
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030		
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	0.0900	0.321		
Aggregate Organics	COD (mg/L)	<20	160	31	<20	32
Volatile Organic Compounds	Acetone (mg/L)	<0.010		<0.010		
	Benzene (mg/L)	<0.00050		<0.00050		
	Bromodichloromethane (mg/L)	<0.0010		<0.0010		
	Bromoform (mg/L)	<0.0010		<0.0010		
	Bromomethane (mg/L)	<0.0010		<0.0010		
	1,3-Butadiene (mg/L)	<0.0010		<0.0010		
	Carbon Tetrachloride (mg/L)	<0.00050		<0.00050		
	Chlorobenzene (mg/L)	<0.0010		<0.0010		
	Dibromochloromethane (mg/L)	<0.0010		<0.0010		
	Chloroethane (mg/L)	<0.0010		<0.0010		
	Chloroform (mg/L)	<0.0010		<0.0010		
	Chloromethane (mg/L)	<0.0050		<0.0050		
	Dibromomethane (mg/L)	<0.0010		<0.0010		
	1,2-Dichlorobenzene (mg/L)	<0.00070		<0.00070		
	1,3-Dichlorobenzene (mg/L)	<0.0010		<0.0010		
	1,4-Dichlorobenzene (mg/L)	<0.0010		<0.0010		
	1,1-Dichloroethane (mg/L)	<0.0010		<0.0010		
	1,2-Dichloroethane (mg/L)	<0.0010		<0.0010		
	1,1-Dichloroethylene (mg/L)	<0.0010		<0.0010		
	cis-1,2-Dichloroethylene (mg/L)	<0.0010		<0.0010		
	trans-1,2-Dichloroethylene (mg/L)	<0.0010		<0.0010		
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014		<0.0014		
	Dichloromethane (mg/L)	<0.0050		<0.0050		
	1,2-Dichloropropane (mg/L)	<0.0010		<0.0010		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1280951-11	L1280951-12	L1280951-13	L1280951-14	L1280951-15
Description	SW	SW	SW	GW	SW
Sampled Date	19-MAR-13	19-MAR-13	20-MAR-13		
Sampled Time					
Client ID	SFC-3	SFC-11	SFC-4B	TRAVEL BLANK GW	TRAVEL BLANK SW
Grouping	**Analyte**					
WATER					
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)				<0.0010	
	Silicon (Si)-Dissolved (mg/L)				<0.050	
	Silver (Ag)-Dissolved (mg/L)				<0.000050	
	Sodium (Na)-Dissolved (mg/L)				<2.0	
	Strontium (Sr)-Dissolved (mg/L)				<0.0050	
	Thallium (Tl)-Dissolved (mg/L)				<0.00020	
	Tin (Sn)-Dissolved (mg/L)				<0.030	
	Titanium (Ti)-Dissolved (mg/L)				<0.050	
	Uranium (U)-Dissolved (mg/L)				<0.00020	
	Vanadium (V)-Dissolved (mg/L)				<0.030	
	Zinc (Zn)-Dissolved (mg/L)				<0.0050	
Aggregate Organics	COD (mg/L)	<20	<20	<20	<20	<20
Volatile Organic Compounds	Acetone (mg/L)				<0.010	
	Benzene (mg/L)				<0.00050	
	Bromodichloromethane (mg/L)				<0.0010	
	Bromoform (mg/L)				<0.0010	
	Bromomethane (mg/L)				<0.0010	
	1,3-Butadiene (mg/L)				<0.0010	
	Carbon Tetrachloride (mg/L)				<0.00050	
	Chlorobenzene (mg/L)				<0.0010	
	Dibromochloromethane (mg/L)				<0.0010	
	Chloroethane (mg/L)				<0.0010	
	Chloroform (mg/L)				<0.0010	
	Chloromethane (mg/L)				<0.0050	
	Dibromomethane (mg/L)				<0.0010	
	1,2-Dichlorobenzene (mg/L)				<0.00070	
	1,3-Dichlorobenzene (mg/L)				<0.0010	
	1,4-Dichlorobenzene (mg/L)				<0.0010	
	1,1-Dichloroethane (mg/L)				<0.0010	
	1,2-Dichloroethane (mg/L)				<0.0010	
	1,1-Dichloroethylene (mg/L)				<0.0010	
	cis-1,2-Dichloroethylene (mg/L)				<0.0010	
	trans-1,2-Dichloroethylene (mg/L)				<0.0010	
	1,3-Dichloropropene (cis & trans) (mg/L)				<0.0014	
	Dichloromethane (mg/L)				<0.0050	
	1,2-Dichloropropane (mg/L)				<0.0010	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-1	L1280951-2	L1280951-3	L1280951-4	L1280951-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-6	MW-6 DUP	MW-2S	MW-2D	MW-4
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl ethyl ketone (MEK) (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Methyl isobutyl ketone (MIBK) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Toluene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	93.4	91.9	92.5	93.8	93.7
	Surrogate: 1,4-Difluorobenzene (SS) (%)	99.3	99.7	99.7	101.0	99.9
Hydrocarbons	EPH10-19 (mg/L)	0.96	0.59	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	1.20	0.67	<0.25	<0.25	<0.25
	LEPH (mg/L)	0.96	0.59	<0.25	<0.25	<0.25
	HEPH (mg/L)	1.20	0.67	<0.25	<0.25	<0.25
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	105.6	98.3	99.3	93.8	108.7
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.00010 DLM	<0.000050	<0.000050	<0.000050	<0.000050
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-6	L1280951-7	L1280951-8	L1280951-9	L1280951-10
	Description	GW	GW	GW	SW	SW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-3	L1	LM	SFC-2	SFC-2B
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	cis-1,3-Dichloropropylene (mg/L)	<0.0010		<0.0010		
	trans-1,3-Dichloropropylene (mg/L)	<0.0010		<0.0010		
	Ethylbenzene (mg/L)	<0.00050		<0.00050		
	Methyl ethyl ketone (MEK) (mg/L)	<0.0020		<0.0020		
	Methyl isobutyl ketone (MIBK) (mg/L)	<0.0010		<0.0010		
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050		<0.00050		
	Styrene (mg/L)	<0.00050		<0.00050		
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010		<0.0010		
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010		<0.0010		
	Tetrachloroethylene (mg/L)	<0.0010		<0.0010		
	Toluene (mg/L)	<0.00050		<0.00050		
	1,1,1-Trichloroethane (mg/L)	<0.0010		<0.0010		
	1,1,2-Trichloroethane (mg/L)	<0.0010		<0.0010		
	Trichloroethylene (mg/L)	<0.0010		<0.0010		
	Trichlorofluoromethane (mg/L)	<0.0010		<0.0010		
	Vinyl Chloride (mg/L)	<0.0010		<0.0010		
	ortho-Xylene (mg/L)	<0.00050		<0.00050		
	meta- & para-Xylene (mg/L)	<0.00050		<0.00050		
	Xylenes (mg/L)	<0.00075		<0.00075		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	91.3		94.4		
	Surrogate: 1,4-Difluorobenzene (SS) (%)	100.1		99.3		
Hydrocarbons	EPH10-19 (mg/L)	<0.25	0.58	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	<0.25	0.40	<0.25	<0.25	<0.25
	LEPH (mg/L)	<0.25	0.58	<0.25	<0.25	<0.25
	HEPH (mg/L)	<0.25	0.40	<0.25	<0.25	<0.25
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10		<0.10		
	VPH (C6-C10) (mg/L)	<0.10		<0.10		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	94.9		102.1		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	0.000829	<0.000050	0.000375
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1280951-11	L1280951-12	L1280951-13	L1280951-14	L1280951-15
Description	SW	SW	SW	GW	SW
Sampled Date	19-MAR-13	19-MAR-13	20-MAR-13		
Sampled Time					
Client ID	SFC-3	SFC-11	SFC-4B	TRAVEL BLANK GW	TRAVEL BLANK SW
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds cis-1,3-Dichloropropylene (mg/L)				<0.0010	
trans-1,3-Dichloropropylene (mg/L)				<0.0010	
Ethylbenzene (mg/L)				<0.00050	
Methyl ethyl ketone (MEK) (mg/L)				<0.0020	
Methyl isobutyl ketone (MIBK) (mg/L)				<0.0010	
Methyl t-butyl ether (MTBE) (mg/L)				<0.00050	
Styrene (mg/L)				<0.00050	
1,1,1,2-Tetrachloroethane (mg/L)				<0.0010	
1,1,2,2-Tetrachloroethane (mg/L)				<0.0010	
Tetrachloroethylene (mg/L)				<0.0010	
Toluene (mg/L)				<0.00050	
1,1,1-Trichloroethane (mg/L)				<0.0010	
1,1,2-Trichloroethane (mg/L)				<0.0010	
Trichloroethylene (mg/L)				<0.0010	
Trichlorofluoromethane (mg/L)				<0.0010	
Vinyl Chloride (mg/L)				<0.0010	
ortho-Xylene (mg/L)				<0.00050	
meta- & para-Xylene (mg/L)				<0.00050	
Xylenes (mg/L)				<0.00075	
Surrogate: 4-Bromofluorobenzene (SS) (%)				94.8	
Surrogate: 1,4-Difluorobenzene (SS) (%)				100.1	
Hydrocarbons EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	
EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	
LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	
HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	
Volatile Hydrocarbons (VH6-10) (mg/L)				<0.10	
VPH (C6-C10) (mg/L)				<0.10	
Surrogate: 3,4-Dichlorotoluene (SS) (%)				110.8	
Polycyclic Aromatic Hydrocarbons Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-1	L1280951-2	L1280951-3	L1280951-4	L1280951-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-6	MW-6 DUP	MW-2S	MW-2D	MW-4
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	95.2	95.5	98.8	101.5	100.8
	Surrogate: Acridine d9 (%)	92.1	101.6	102.7	107.4	101.9
	Surrogate: Chrysene d12 (%)	90.4	89.0	96.0	96.9	95.7
	Surrogate: Naphthalene d8 (%)	89.8	85.7	96.2	98.6	96.3
	Surrogate: Phenanthrene d10 (%)	88.6	89.8	100.8	105.1	101.9

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1280951-6	L1280951-7	L1280951-8	L1280951-9	L1280951-10
	Description	GW	GW	GW	SW	SW
	Sampled Date	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13	19-MAR-13
	Sampled Time					
	Client ID	MW-3	L1	LM	SFC-2	SFC-2B
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluoranthene (mg/L)	<0.000050	<0.000050	0.000105	<0.000050	0.000089
	Fluorene (mg/L)	<0.000050	<0.000050	0.000340	<0.000050	0.000167
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	0.000158	0.000104	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	0.000057	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.00010 DLM	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	103.7	92.9	94.4	91.6	92.4
	Surrogate: Acridine d9 (%)	100.3	97.1	95.9	90.6	93.3
	Surrogate: Chrysene d12 (%)	96.3	86.5	90.0	88.6	86.2
	Surrogate: Naphthalene d8 (%)	101.5	92.0	91.4	90.7	87.9
	Surrogate: Phenanthrene d10 (%)	104.2	92.9	94.9	92.7	92.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1280951-11 SW 19-MAR-13 SFC-3	L1280951-12 SW 19-MAR-13 SFC-11	L1280951-13 SW 20-MAR-13 SFC-4B	L1280951-14 GW TRAVEL BLANK GW	L1280951-15 SW TRAVEL BLANK SW
Sample ID		L1280951-11	L1280951-12	L1280951-13	L1280951-14	L1280951-15
Description		SW	SW	SW	GW	SW
Sampled Date		19-MAR-13	19-MAR-13	20-MAR-13		
Sampled Time						
Client ID		SFC-3	SFC-11	SFC-4B	TRAVEL BLANK GW	TRAVEL BLANK SW
WATER						
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Fluorene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Naphthalene (mg/L)	0.000073	<0.000050	<0.000050	<0.000050	
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Surrogate: Acenaphthene d10 (%)	91.6	94.4	97.0	95.6	
	Surrogate: Acridine d9 (%)	89.5	93.9	93.6	93.4	
	Surrogate: Chrysene d12 (%)	86.4	87.6	91.1	88.2	
	Surrogate: Naphthalene d8 (%)	91.6	93.1	95.3	92.2	
	Surrogate: Phenanthrene d10 (%)	91.9	94.7	99.0	92.9	

* 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)
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Bicarbonate (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Alkalinity, Total (as CaCO3)	B	L1280951-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Total	DLB	L1280951-10, -11, -12, -13, -9
Duplicate	Sulfate (SO4)	DLM	L1280951-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chloride (Cl)	DLM	L1280951-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1280951-7, -8
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1280951-7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1280951-7, -8
Matrix Spike	Phosphorus (P)-Total	MS-B	L1280951-1, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1280951-1, -14, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L1280951-10, -11, -12, -13, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L1280951-10, -11, -12, -13, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1280951-1, -14, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit Adjusted For required dilution
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.
DLM	Detection Limit Adjusted For Sample Matrix Effects
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-VA	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.

ALK-MAN-VA	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.

ALK-PCT-VA	Water	Alkalinity by Auto. 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.

ALK-PCT-VA	Water	Alkalinity by Auto. 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.

Reference Information

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EPH-SF-FID-VA	Water	EPH in Water by GCFID	BCMOE EPH GCFID

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene and analysed by capillary column 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).

FUELS-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA8260B, 5035A, 5021, BC MELP

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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-DIS-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in water. 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 Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, 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 Water by GC/FID" (Version 2.1, July 20, 1999).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma -

Reference Information

optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia in Water 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.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PAH-SF-MS-VA Water PAH in Water by GCMS EPA 3510, 8270

The entire water sample is extracted with dichloromethane, prior to analysis by gas chromatography with mass spectrometric detection (GC/MS). Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PAH-SURR-MS-VA Water PAH Surrogates for Waters EPA 3510, 8270

Analysed as per the corresponding PAH test method. Known quantities of surrogate compounds are added prior to analysis to each sample to demonstrate analytical accuracy.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

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.

TN-CALC-VA Water Total Nitrogen (Calculation) BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA Water Total Suspended Solids by Gravimetric 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, TSS is determined by drying the filter at 104 degrees celsius.

VH-HSFID-VA Water VH in Water by Headspace GCFID B.C. MIN. OF ENV. LAB. MAN. (2009)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA Water VH Surrogates for Waters B.C. MIN. OF ENV. LAB. MAN. (2009)

VOC-HSMS-VA Water VOCs in water by Headspace GCMS EPA8260B, 5021

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.

Reference Information

VOC-M-HSMS-VA	Water	Volatile Organic Compounds - GC-MS	EPA 8260B, 5012A

Water samples, with reagents, are heated and an aliquot of the headspace at equilibrium is analysed by GC-MS.

VOC-M2-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA8260B, 5035A, 5021, BC MELP

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA8260B, 5021

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Water	VOC7 and/or VOC Surrogates for Waters	EPA8260B, 5021
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water". The concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and, in solids, Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10).

XYLENES-CALC-VA	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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-293948

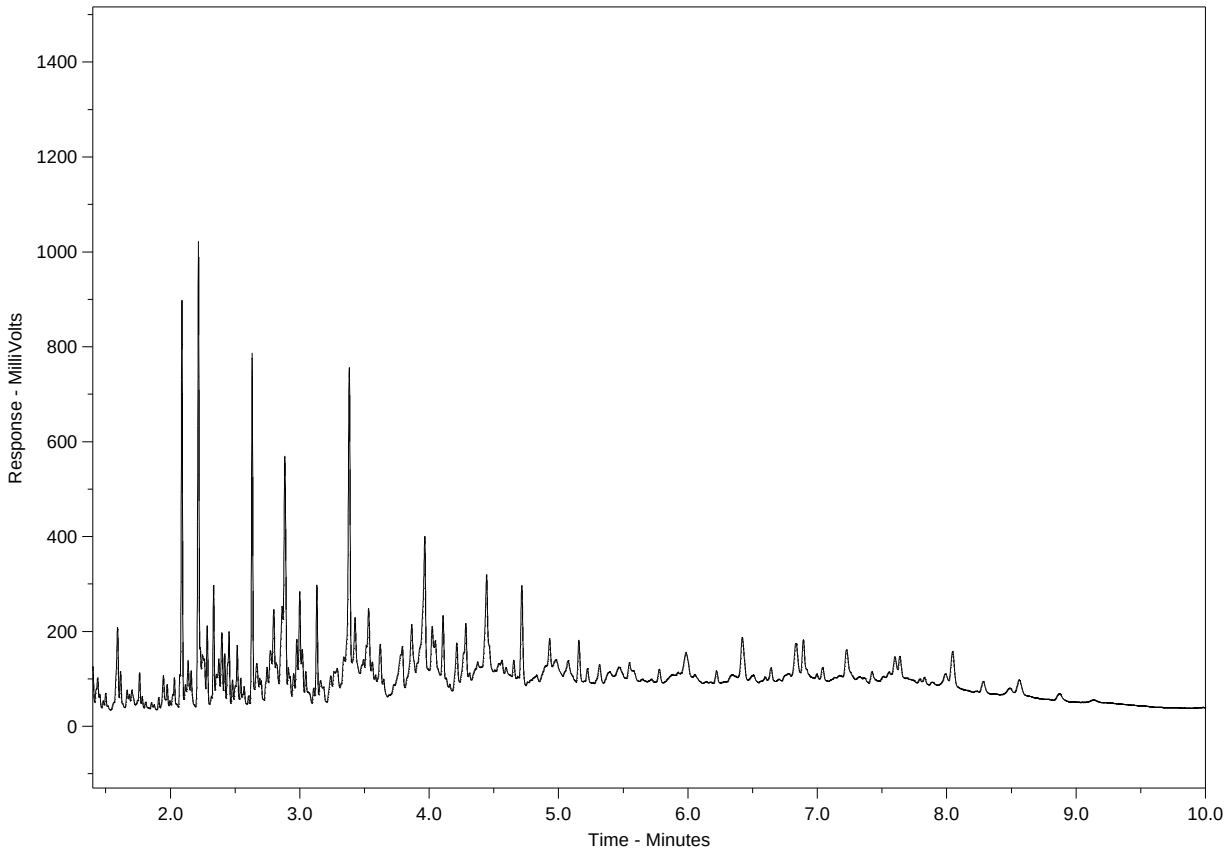
GLOSSARY OF REPORT TERMS

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.

Hydrocarbon Distribution Report

ALS Sample ID: L1280951-1
Client Sample ID: MW-6



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 or upon request.

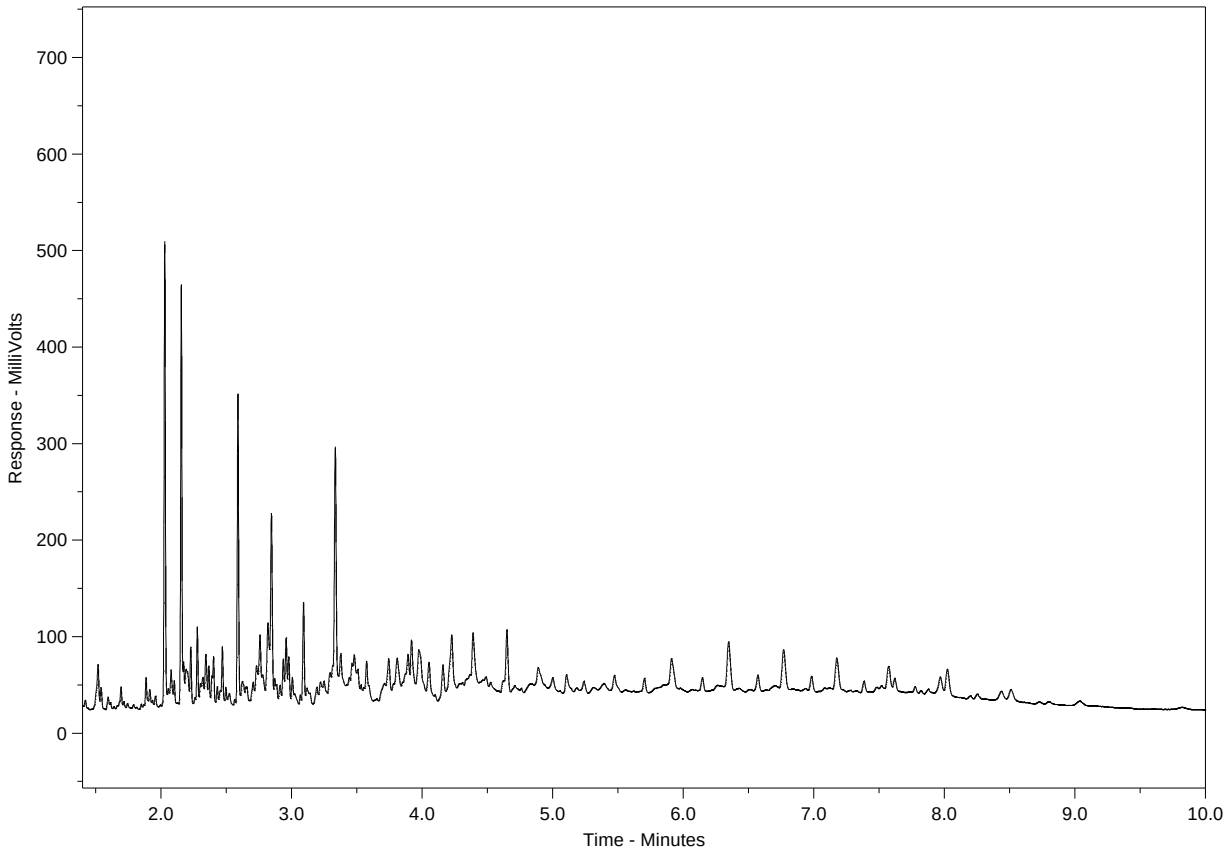
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-2
Client Sample ID: MW-6 DUP



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

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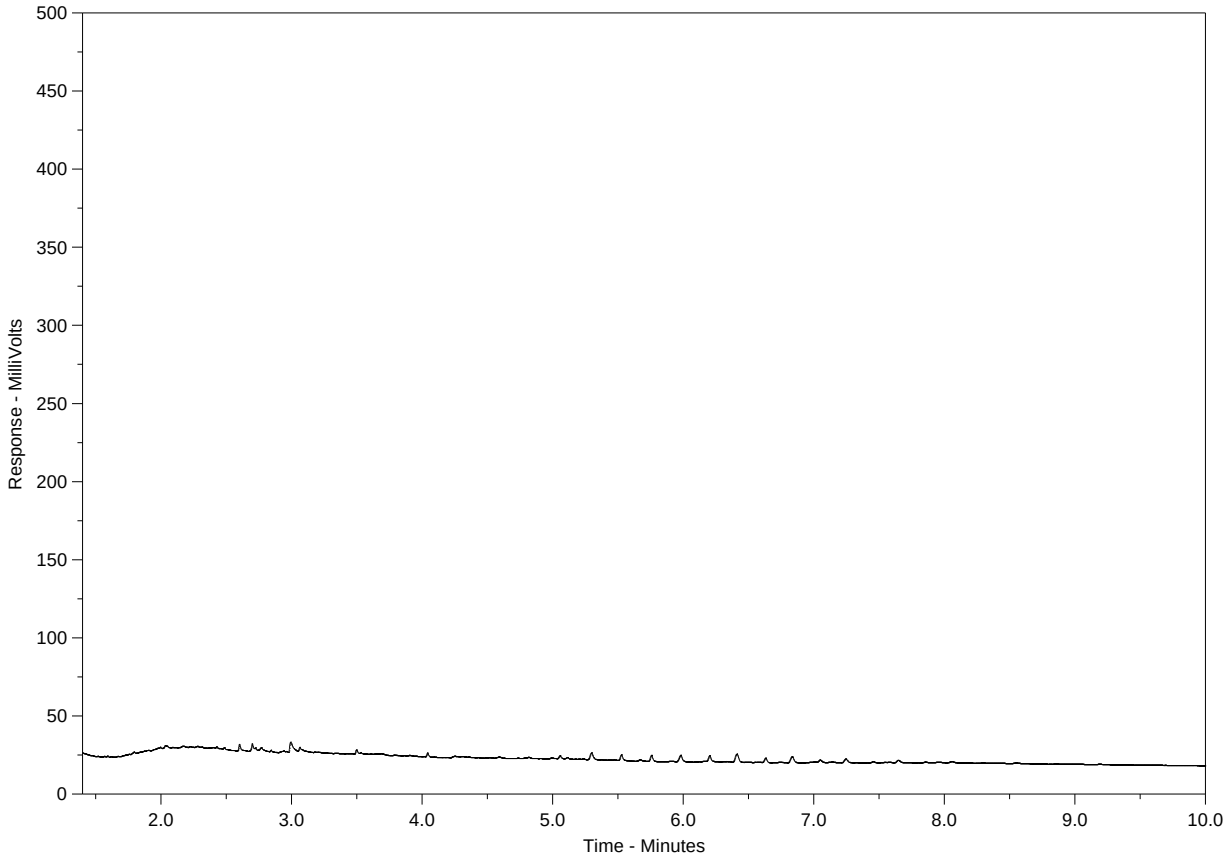
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-3
Client Sample ID: MW-2S



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 or upon request.

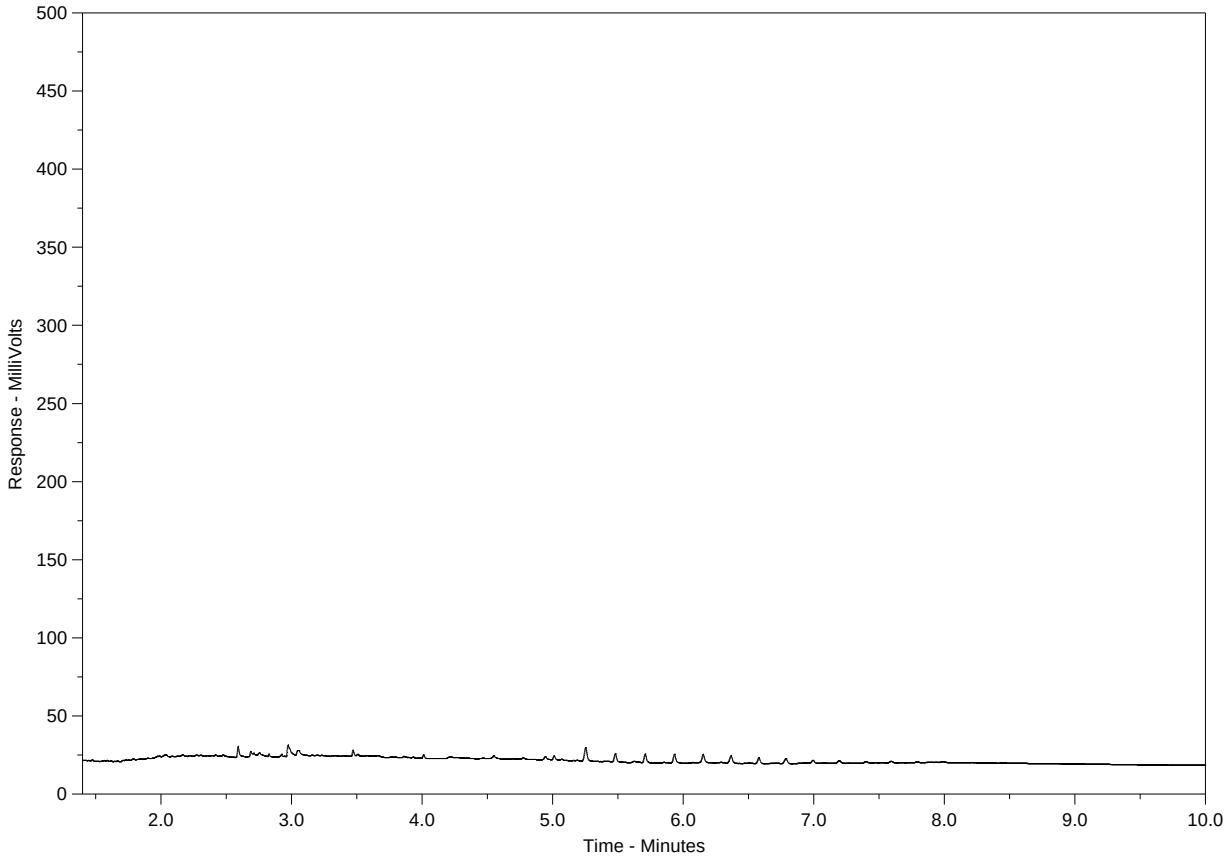
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-4
Client Sample ID: MW-2D



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 or upon request.

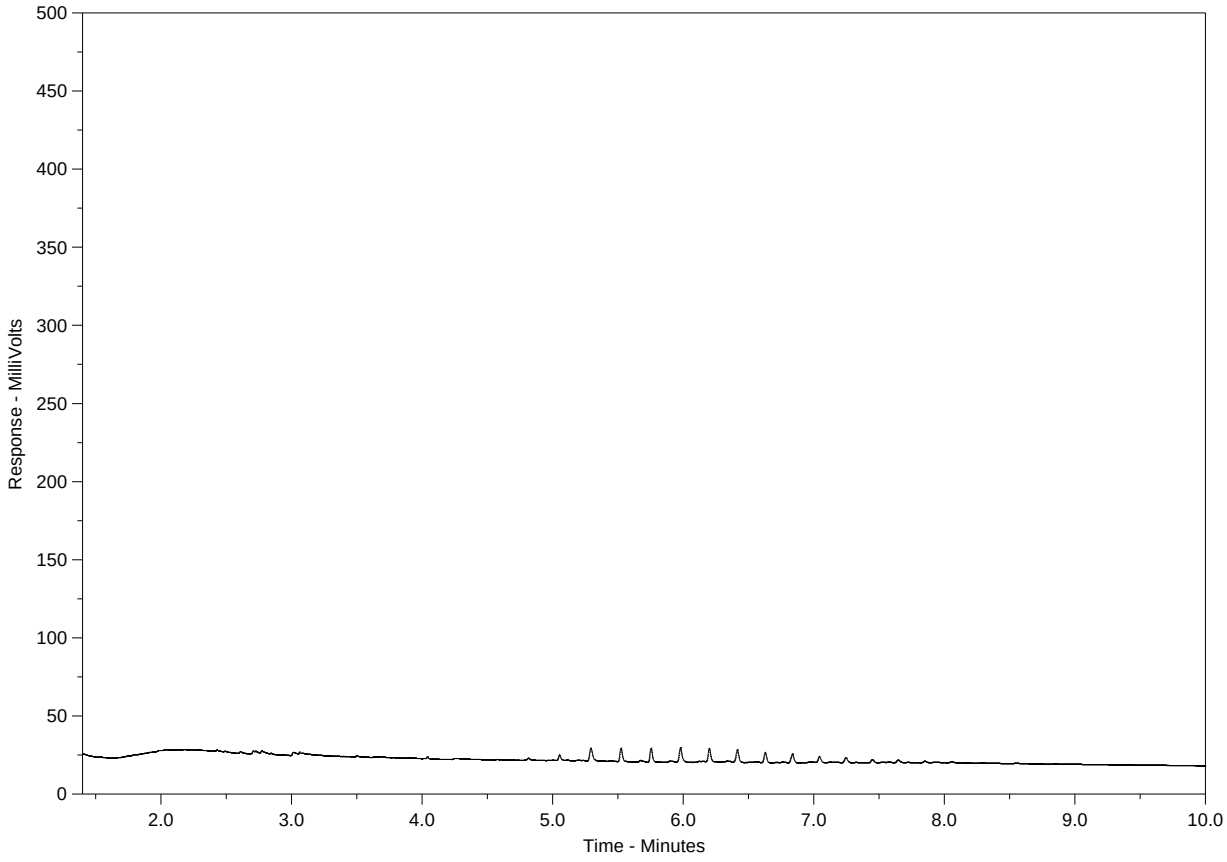
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-5
Client Sample ID: MW-4



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 or upon request.

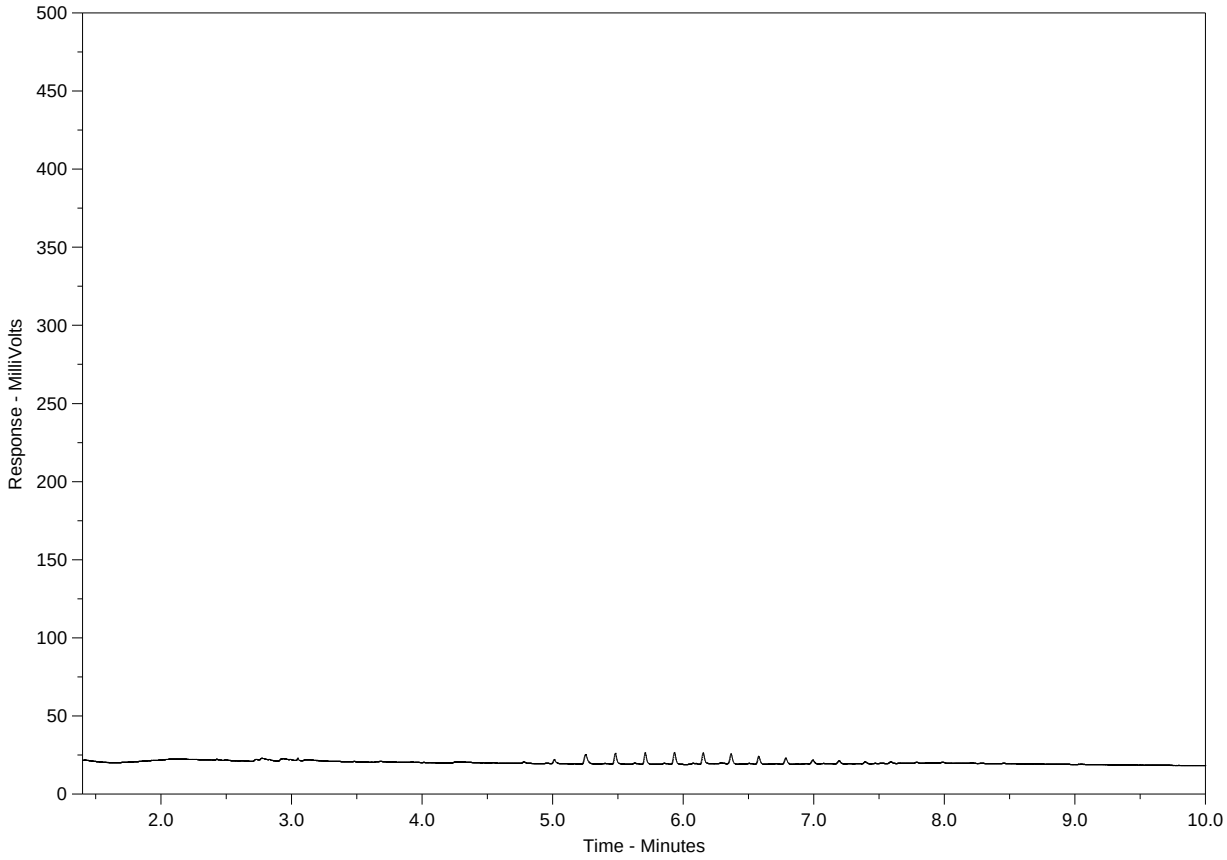
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-6
Client Sample ID: MW-3



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 or upon request.

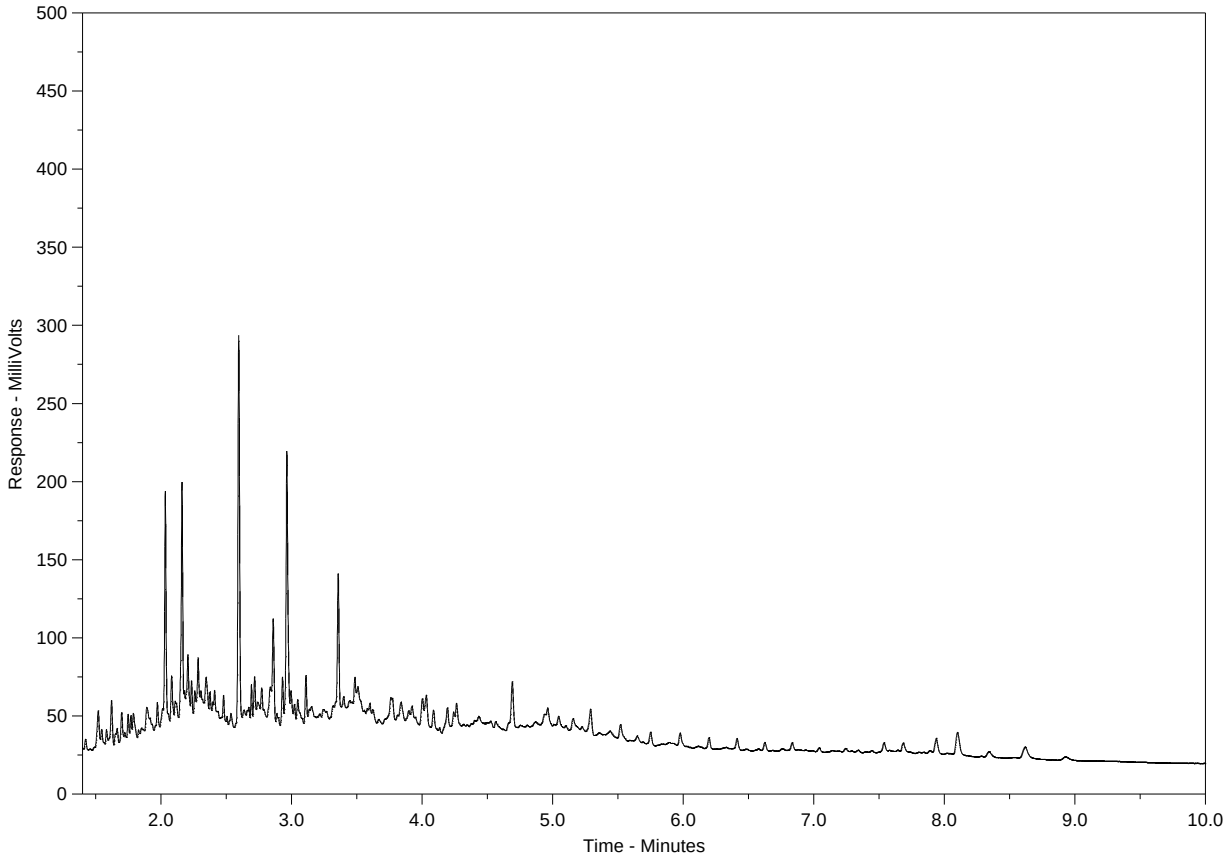
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-7
Client Sample ID: L1



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 or upon request.

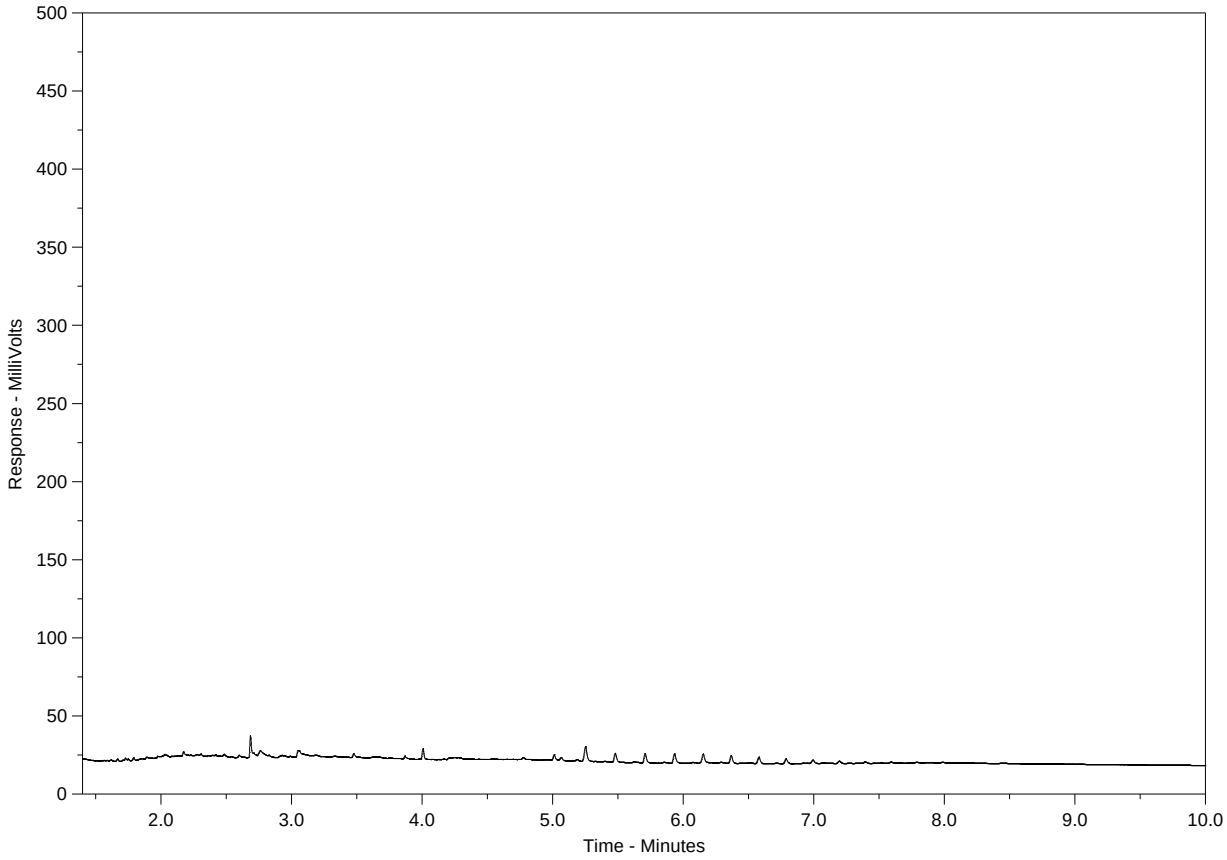
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-8
Client Sample ID: LM



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

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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.

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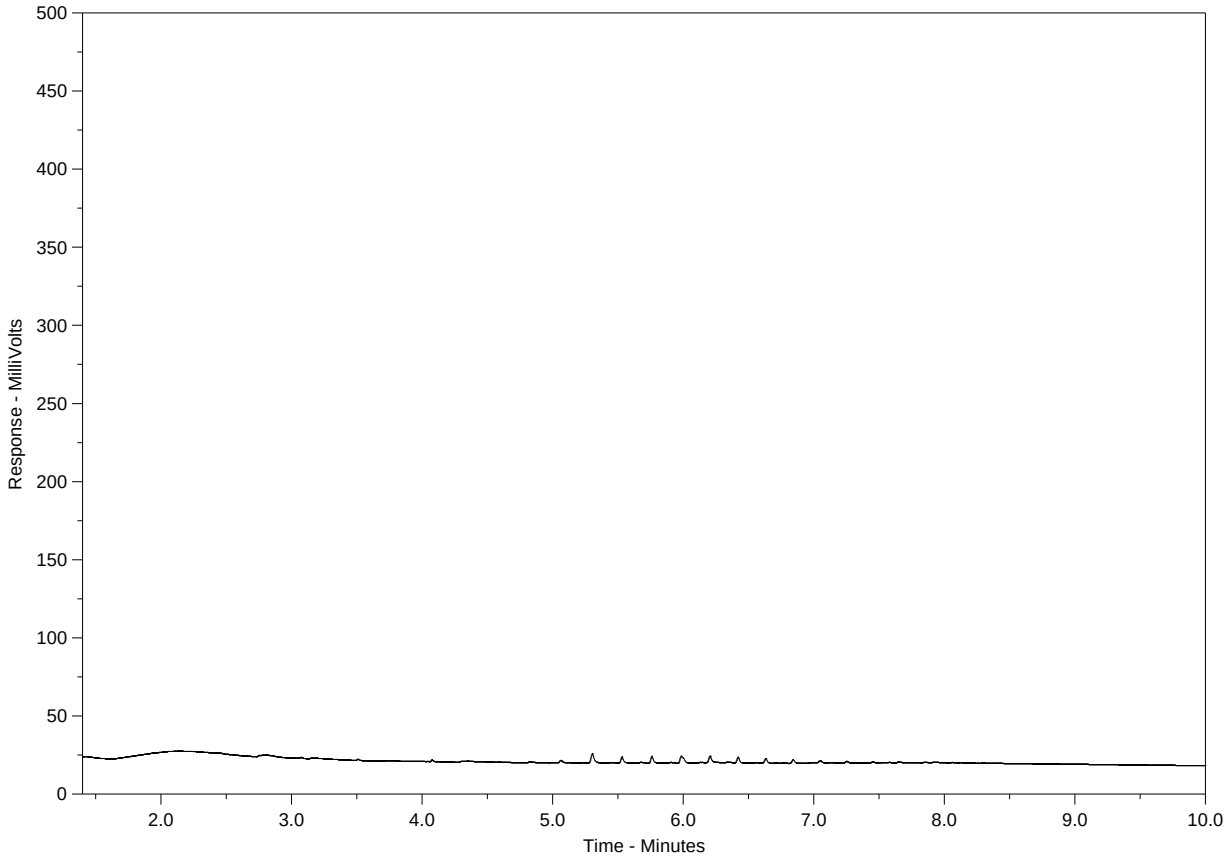
Hydrocarbon Distribution Report

ALS Sample ID: L1280951-9
Client Sample ID: SFC-2



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 or upon request.

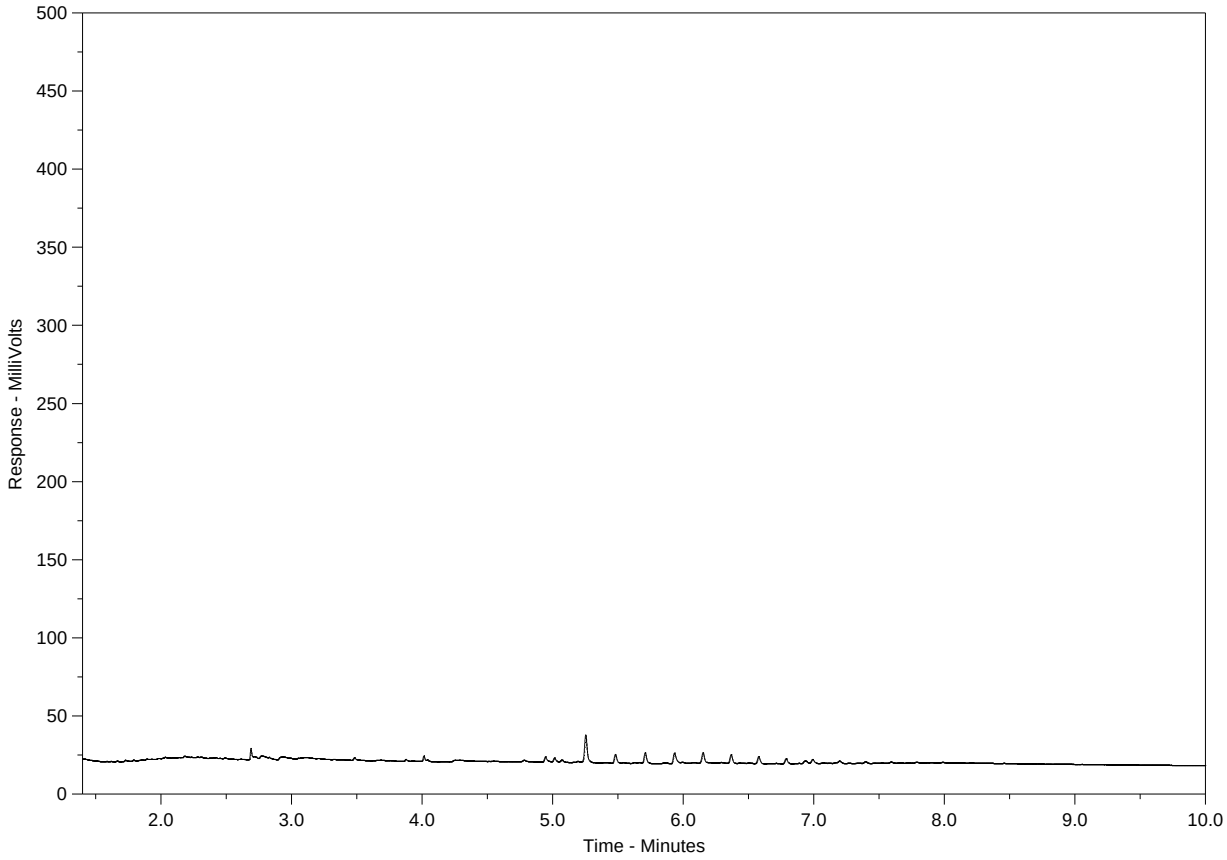
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-10
Client Sample ID: SFC-2B



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 or upon request.

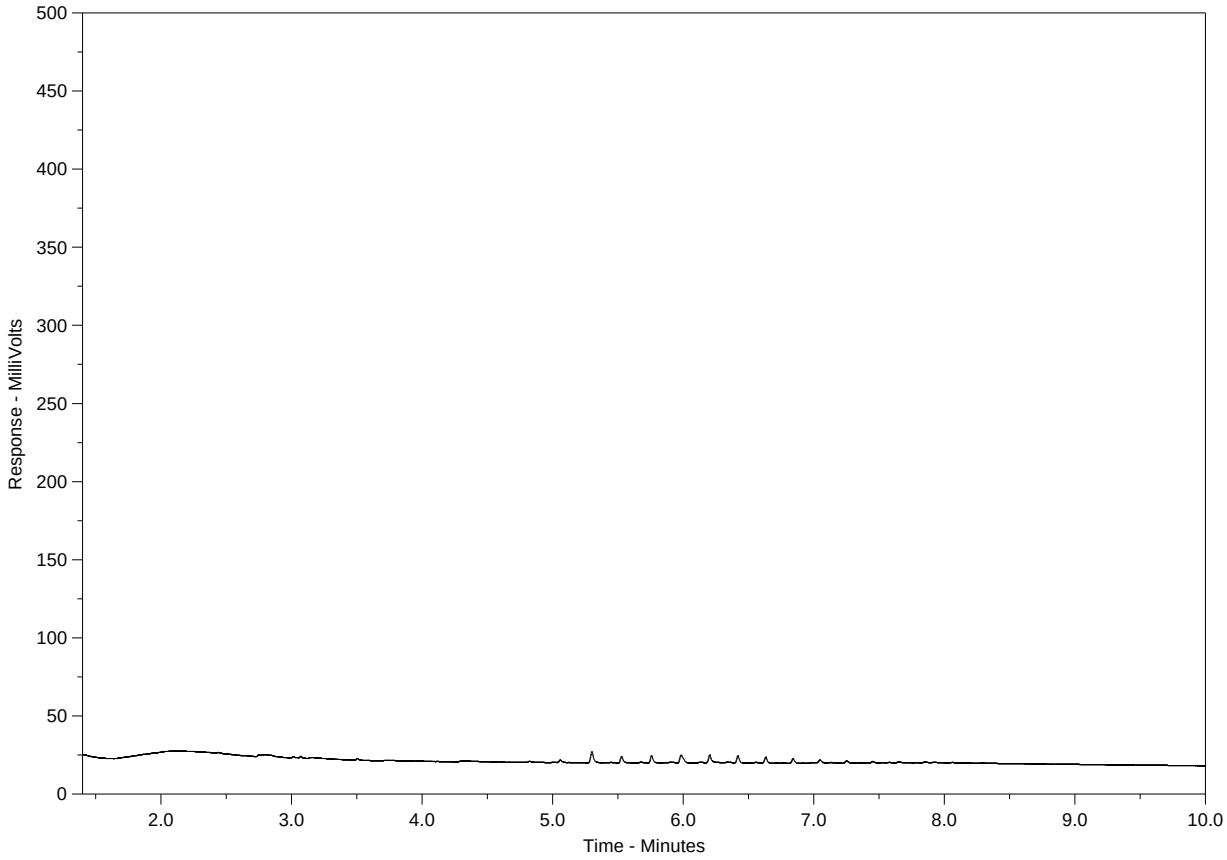
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-11
Client Sample ID: SFC-3



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 or upon request.

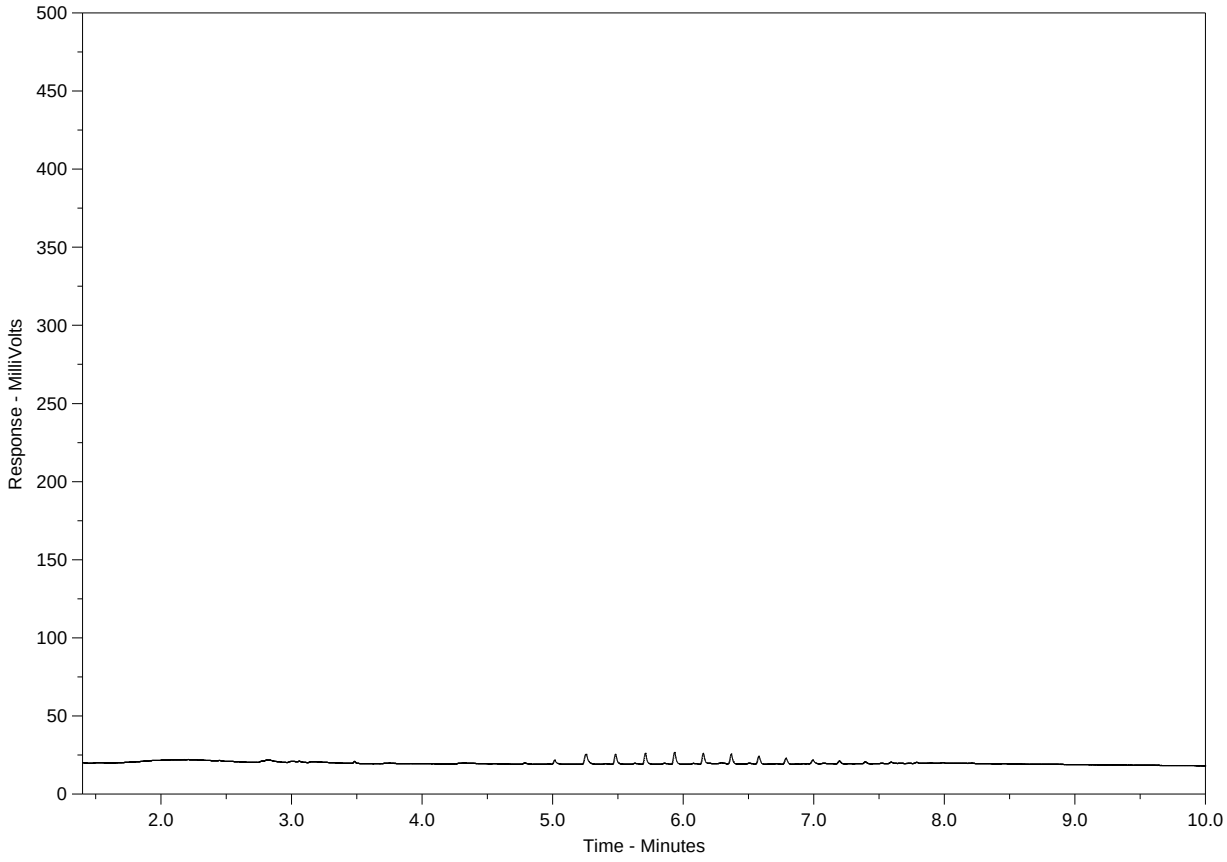
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-12
Client Sample ID: SFC-11



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 or upon request.

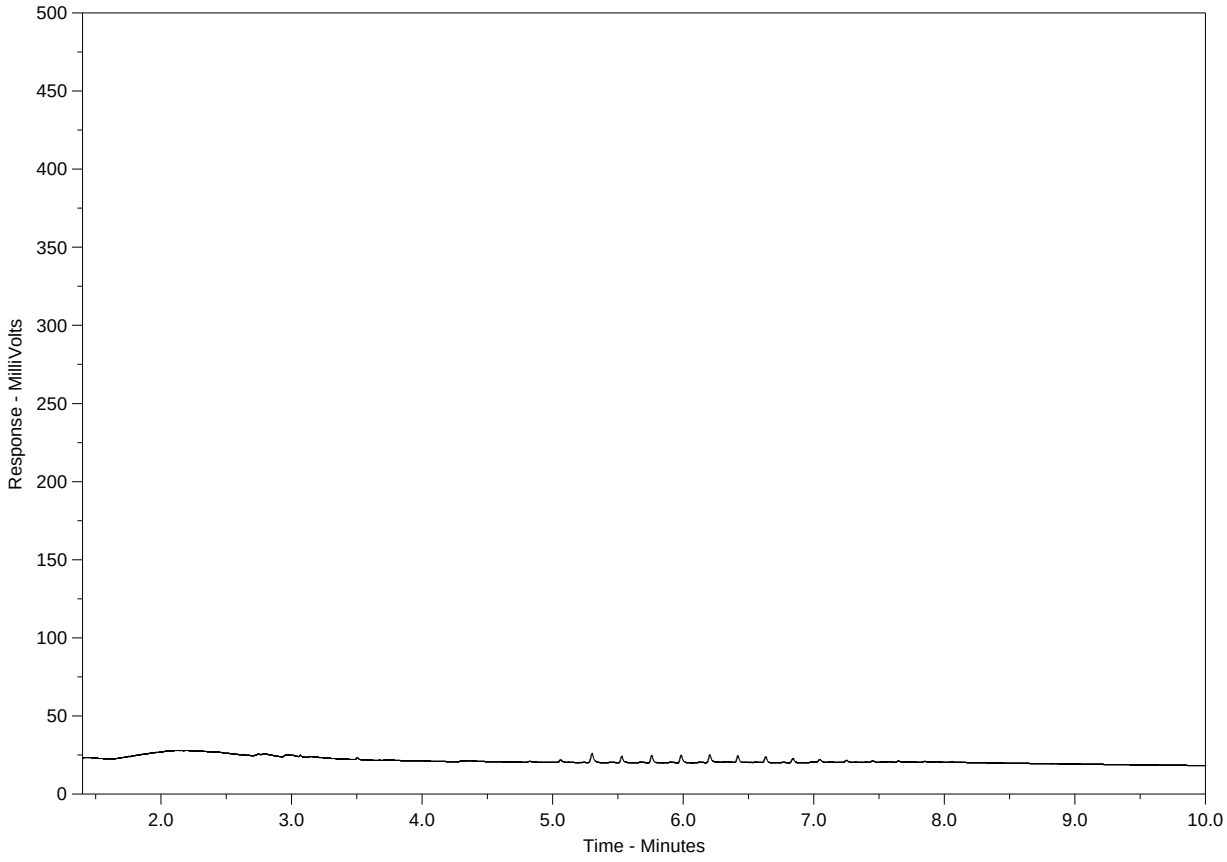
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-13
Client Sample ID: SFC-4B



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 or upon request.

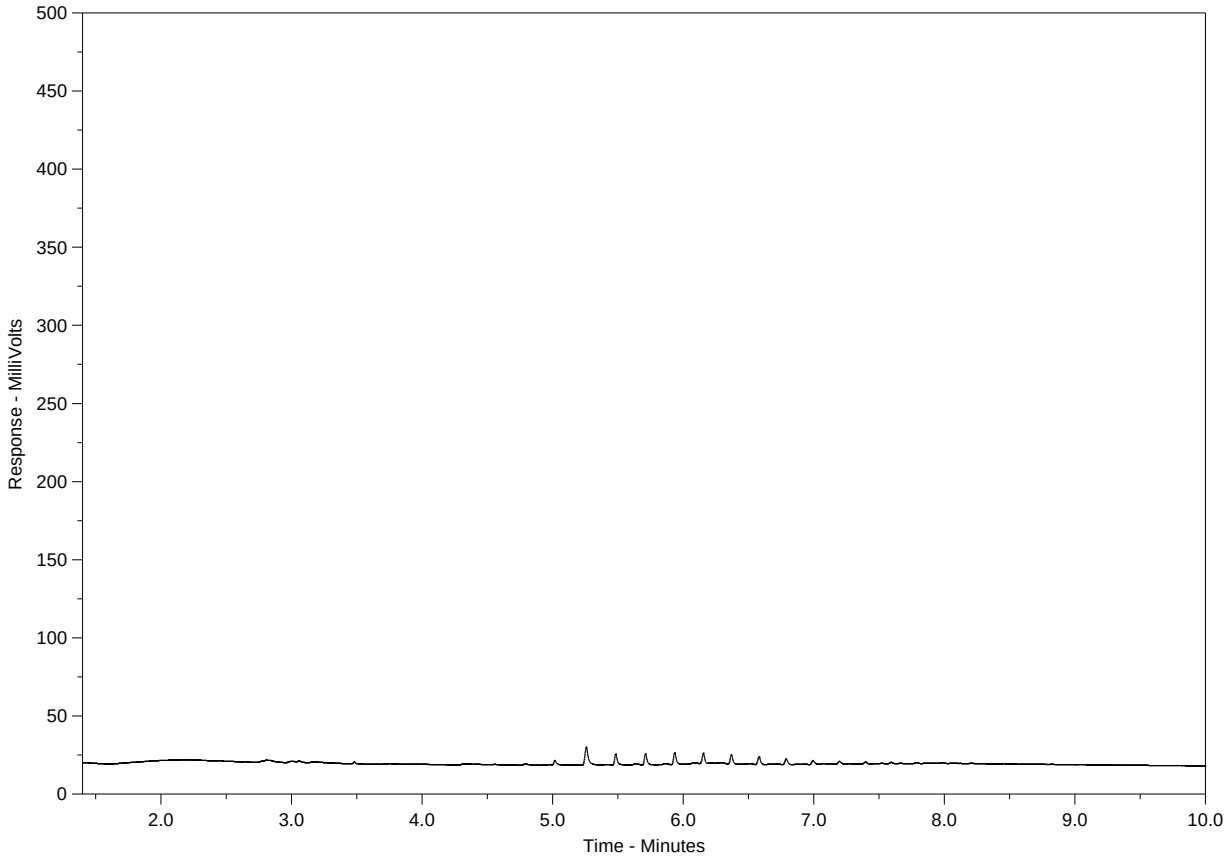
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1280951-14
Client Sample ID: TRAVEL BLANK GW



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 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.

L1280951-COFC

10- 293948

Short Holding Time

Rush Processing

(ALS) Environmental

Chain of Custody / Analytical Request Form
Toll Free: 1 800 668 9878
www.alsglobal.com

Page ____ of ____

Report To Morrison Hershfield	**Report Format / Distribution**
Company:	Standard: ✓ Other (specify):
Contact: Josie Gilson	Select: PDF ✓ Excel ✓ Digital Fax
Address: 310-4321 Still Creek Drive	Email 1: jgilson@morrisonhershfield.com
Burnaby BC	Email 2:
Phone: 604-459-0402 Fax:	
Invoice To Same as Report ? (circle) Yes or (No) (if No, provide details)	**Client / Project Information**
Copy of Invoice with Report? (circle) Yes or No	Job #: 5104016
Company: Resort Municipality of Whistler	PO / AFE:
Contact: Andrew Tucker	LSD:
Address: 1135 Cheakamus Lk Rd	
Phone: 604-935-8386 Fax:	Quote #:
Lab Work Order # (lab use only) L1280951	**ALS Contact:** Selam Worku — **Sampler:** E. Toole

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)

- ✓ Regular (Standard Turnaround Times - Business Days)
- Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
- Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
- Same Day or Weekend Emergency - Contact ALS to confirm TAT

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	COD/TKN/NH3 (P)	Organics (chem/Cl) (P)	Physical Parameters	VOC's (BTEX) MIBR MER (P)	VOC's Acetone, Dibromomethane, 1-3 butadiene	Metals Dissolved (F/P)	Metals Dissolved	Metals Total (P)					Number of Containers
	MW-6 + Duplicate	19/03/13		GW	X	X	X	X	X	X							12
	MW-2S	"		GW	X	X	X	X	X	X							6
	MW-2D	"		GW	X	X	X	X	X	X							6
	MW-4	"		GW	X	X	X	X	X	X							6
	MW-3	"		GW	X	X	X	X	X	X							6
	L1 Dissolved metals pls filter	"		GW	X	X	X	X	X		X						6
	LM Dissolved metals pls filter	"		GW	X	X	X	X	X		X						6
	SFC-2	"		SW	X	X	X					X					4
	SFC-2B	"		SW	X	X	X					X					4
	SFC-3	"		SW	X	X	X					X					4
	SFC-11	"		SW	X	X	X					X					4
	SFC-4B March 20/13 am	20/03/13	am	SW	X	X	X					X					4

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

VOC's Pls include Acetone, dibromomethane, bromomethane, 1-3 butadiene, MIBR, MER.

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: E. Toole	Date: March 20/13	Time: 10am	Received by: TN	Date: Mar 20	Time: 12:50	Temperature: 10 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

MORRISON HERSHFIELD GROUP INC.
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 26-JUN-13
Report Date: 16-JUL-13 12:38 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L1323011

Project P.O. #: NOT SUBMITTED
Job Reference: 5104016
C of C Numbers: 10-268417
Legal Site Desc:

Selam Worku
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1323011-1 GW 25-JUN-13 MW-2D	L1323011-2 GW 25-JUN-13 MW-2S	L1323011-3 GW 25-JUN-13 MW-4	L1323011-4 GW 25-JUN-13 MW-3	L1323011-5 GW 25-JUN-13 MW-6
WATER						
Physical Tests	Conductivity (uS/cm)	1410	528	433	169	713
	Hardness (as CaCO3) (mg/L)	622	195	148	47.8	145
	pH (pH)	6.95	6.99	7.00	6.85	6.48
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	238	138	136	35.7	21.7
	Ammonia, Total (as N) (mg/L)	1.47	7.76	3.27	0.0256	0.0492
	Bromide (Br) (mg/L)	<0.50 DLM	0.063	0.074	<0.050	<0.25 DLM
	Chloride (Cl) (mg/L)	52.8	16.3	25.1	15.4	117
	Fluoride (F) (mg/L)	0.28	<0.10 DLM	<0.10 DLM	0.022	0.10
	Nitrate (as N) (mg/L)	<0.050 DLM	0.0155	<0.0050	0.112	0.031
	Nitrite (as N) (mg/L)	0.012	<0.0010	<0.0010	<0.0010	0.0050
	Total Kjeldahl Nitrogen (mg/L)	17.7	7.96	3.04	0.093	1.22
	Total Nitrogen (mg/L)	17.8	7.97	3.04	0.205	1.25
	Phosphorus (P)-Total (mg/L)	0.153	0.618	0.171	<0.0020	7.70
	Sulfate (SO4) (mg/L)	482	107	56.1	21.1	134
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1323011-6	L1323011-7	L1323011-8	L1323011-9	L1323011-10
Description	GW	GW	GW	GW	GW
Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
Sampled Time					
Client ID	SFC-2	SFC-3	SFC-11	SFC-4B	MW-4 DUPLICATE
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	136	184	119	223	441
Hardness (as CaCO3) (mg/L)	40.7	48.9	39.2	74.5	149
pH (pH)	7.66	7.55	7.53	7.70	6.96
Anions and Nutrients Alkalinity, Total (as CaCO3) (mg/L)	28.9	34.4	27.9	34.7	131
Ammonia, Total (as N) (mg/L)	<0.0050	0.0079	<0.0050	0.0194	3.20
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	0.078
Chloride (Cl) (mg/L)	12.9	18.6	10.6	22.9	24.9
Fluoride (F) (mg/L)	0.042	0.045	0.043	0.046	0.11
Nitrate (as N) (mg/L)	0.0998	0.0924	0.105	0.263	0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	0.0015	<0.0010
Total Kjeldahl Nitrogen (mg/L)	0.058	0.102	0.067	0.159	3.13
Total Nitrogen (mg/L)	0.158	0.195	0.172	0.424	3.14
Phosphorus (P)-Total (mg/L)	0.0058	0.480	0.0047	0.0418	0.110
Sulfate (SO4) (mg/L)	15.5	24.3	12.4	34.5	56.0
Total Metals Aluminum (Al)-Total (mg/L)	0.044	0.060	0.046	0.150	
Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Arsenic (As)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Barium (Ba)-Total (mg/L)	<0.020	0.022	<0.020	0.020	
Beryllium (Be)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.20	<0.20	
Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	
Cadmium (Cd)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Calcium (Ca)-Total (mg/L)	13.0	16.1	12.4	25.1	
Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt (Co)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Copper (Cu)-Total (mg/L)	<0.0010	0.0023	<0.0010	0.0028	
Iron (Fe)-Total (mg/L)	0.085	0.389	0.058	0.365	
Lead (Pb)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Lithium (Li)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
Magnesium (Mg)-Total (mg/L)	1.99	2.09	2.03	2.89	
Manganese (Mn)-Total (mg/L)	0.012	0.027	0.012	0.122	
Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
Molybdenum (Mo)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Nickel (Ni)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	
Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	2.0	
Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1323011-1	L1323011-2	L1323011-3	L1323011-4	L1323011-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
	Sampled Time					
	Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping	**Analyte**					
WATER						
Total Metals	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.086
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	0.0141	0.0064	0.0047	<0.0010	<0.0010
	Barium (Ba)-Dissolved (mg/L)	0.035	0.125	0.186	0.055	0.044
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	0.37	0.19	<0.10	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	0.000059	0.000109	0.000268
	Calcium (Ca)-Dissolved (mg/L)	207	63.3	47.9	13.9	47.7
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	0.0180	0.00196	0.0333	0.00209	0.0171
	Copper (Cu)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	0.0018	0.0031
	Iron (Fe)-Dissolved (mg/L)	72.2	43.7	56.7	<0.030	1.84
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Magnesium (Mg)-Dissolved (mg/L)	25.8	8.94	6.89	2.31	6.33
	Manganese (Mn)-Dissolved (mg/L)	2.87	2.70	3.10	1.11	1.21
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)	0.0160	0.0040	0.0167	<0.0010	<0.0010
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	0.0110	0.0129	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	26.2	12.7	7.3	2.8	4.1
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)	13.5	9.31	10.0	7.36	8.11
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Dissolved (mg/L)	37.7	15.7	21.4	11.2	84.6

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1323011-6 GW 25-JUN-13 SFC-2	L1323011-7 GW 25-JUN-13 SFC-3	L1323011-8 GW 25-JUN-13 SFC-11	L1323011-9 GW 25-JUN-13 SFC-4B	L1323011-10 GW 25-JUN-13 MW-4 DUPLICATE
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
WATER						
Total Metals	Silicon (Si)-Total (mg/L)	8.23	6.96	8.78	6.48	
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Sodium (Na)-Total (mg/L)	9.8	19.2	7.5	12.6	
	Strontium (Sr)-Total (mg/L)	0.155	0.145	0.158	0.264	
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	
	Titanium (Ti)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Uranium (U)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Vanadium (V)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	
	Zinc (Zn)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Dissolved Metals	Dissolved Metals Filtration Location					FIELD
	Aluminum (Al)-Dissolved (mg/L)					<0.010
	Antimony (Sb)-Dissolved (mg/L)					<0.00050
	Arsenic (As)-Dissolved (mg/L)					0.0048
	Barium (Ba)-Dissolved (mg/L)					0.188
	Beryllium (Be)-Dissolved (mg/L)					<0.0050
	Bismuth (Bi)-Dissolved (mg/L)					<0.20
	Boron (B)-Dissolved (mg/L)					<0.10
	Cadmium (Cd)-Dissolved (mg/L)					0.000056
	Calcium (Ca)-Dissolved (mg/L)					48.5
	Chromium (Cr)-Dissolved (mg/L)					<0.00050
	Cobalt (Co)-Dissolved (mg/L)					0.0330
	Copper (Cu)-Dissolved (mg/L)					<0.0010
	Iron (Fe)-Dissolved (mg/L)					57.1
	Lead (Pb)-Dissolved (mg/L)					<0.0010
	Lithium (Li)-Dissolved (mg/L)					<0.050
	Magnesium (Mg)-Dissolved (mg/L)					6.82
	Manganese (Mn)-Dissolved (mg/L)					3.08
	Mercury (Hg)-Dissolved (mg/L)					<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)					0.0169
	Nickel (Ni)-Dissolved (mg/L)					<0.0050
	Phosphorus (P)-Dissolved (mg/L)					<0.30
	Potassium (K)-Dissolved (mg/L)					7.4
	Selenium (Se)-Dissolved (mg/L)					<0.0010
	Silicon (Si)-Dissolved (mg/L)					9.97
	Silver (Ag)-Dissolved (mg/L)					<0.000050
	Sodium (Na)-Dissolved (mg/L)					21.4

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1323011-1	L1323011-2	L1323011-3	L1323011-4	L1323011-5
Description	GW	GW	GW	GW	GW
Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
Sampled Time					
Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping / **Analyte**					
WATER					
Dissolved Metals					
Strontium (Sr)-Dissolved (mg/L)	0.793	0.320	0.286	0.124	0.443
Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved (mg/L)	0.00031	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aggregate Organics					
COD (mg/L)	114	36	145	<20	163
Volatile Organic Compounds					
Acetone (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Butadiene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene (mg/L)	0.0012	<0.0010	<0.0010	<0.0010	<0.0010
Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dibromomethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl ethyl ketone (MEK) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1323011-6	L1323011-7	L1323011-8	L1323011-9	L1323011-10
Description	GW	GW	GW	GW	GW
Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
Sampled Time					
Client ID	SFC-2	SFC-3	SFC-11	SFC-4B	MW-4 DUPLICATE
Grouping / **Analyte**					
WATER					
Dissolved Metals Strontium (Sr)-Dissolved (mg/L)					0.286
Thallium (Tl)-Dissolved (mg/L)					<0.00020
Tin (Sn)-Dissolved (mg/L)					<0.030
Titanium (Ti)-Dissolved (mg/L)					<0.050
Uranium (U)-Dissolved (mg/L)					<0.00020
Vanadium (V)-Dissolved (mg/L)					<0.030
Zinc (Zn)-Dissolved (mg/L)					<0.0050
Aggregate Organics COD (mg/L)	<20	<20	<20	<20	27
Volatile Organic Compounds Acetone (mg/L)					<0.010
Benzene (mg/L)					<0.00050
Bromodichloromethane (mg/L)					<0.0010
Bromoform (mg/L)					<0.0010
Bromomethane (mg/L)					<0.0010
1,3-Butadiene (mg/L)					<0.0010
Carbon Tetrachloride (mg/L)					<0.00050
Chlorobenzene (mg/L)					<0.0010
Dibromochloromethane (mg/L)					<0.0010
Chloroethane (mg/L)					<0.0010
Chloroform (mg/L)					<0.0010
Chloromethane (mg/L)					<0.0050
Dibromomethane (mg/L)					<0.0010
1,2-Dichlorobenzene (mg/L)					<0.00070
1,3-Dichlorobenzene (mg/L)					<0.0010
1,4-Dichlorobenzene (mg/L)					<0.0010
1,1-Dichloroethane (mg/L)					<0.0010
1,2-Dichloroethane (mg/L)					<0.0010
1,1-Dichloroethylene (mg/L)					<0.0010
cis-1,2-Dichloroethylene (mg/L)					<0.0010
trans-1,2-Dichloroethylene (mg/L)					<0.0010
1,3-Dichloropropene (cis & trans) (mg/L)					<0.0014
Dichloromethane (mg/L)					<0.0050
1,2-Dichloropropane (mg/L)					<0.0010
cis-1,3-Dichloropropylene (mg/L)					<0.0010
trans-1,3-Dichloropropylene (mg/L)					<0.0010
Ethylbenzene (mg/L)					<0.00050
Methyl ethyl ketone (MEK) (mg/L)					<0.010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1323011-1	L1323011-2	L1323011-3	L1323011-4	L1323011-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
	Sampled Time					
	Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	Methyl isobutyl ketone (MIBK) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Toluene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	97.3	98.3	98.8	97.4	96.7
	Surrogate: 1,4-Difluorobenzene (SS) (%)	102.5	102.1	103.0	102.7	102.9
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	99.7	108.0	112.4	104.0	113.6
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1323011-6	L1323011-7	L1323011-8	L1323011-9	L1323011-10
Description	GW	GW	GW	GW	GW
Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
Sampled Time					
Client ID	SFC-2	SFC-3	SFC-11	SFC-4B	MW-4 DUPLICATE
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds / Methyl isobutyl ketone (MIBK) (mg/L)					<0.0010
Methyl t-butyl ether (MTBE) (mg/L)					<0.00050
Styrene (mg/L)					<0.00050
1,1,1,2-Tetrachloroethane (mg/L)					<0.0010
1,1,2,2-Tetrachloroethane (mg/L)					<0.0010
Tetrachloroethylene (mg/L)					<0.0010
Toluene (mg/L)					<0.00050
1,1,1-Trichloroethane (mg/L)					<0.0010
1,1,2-Trichloroethane (mg/L)					<0.0010
Trichloroethylene (mg/L)					<0.0010
Trichlorofluoromethane (mg/L)					<0.0010
Vinyl Chloride (mg/L)					<0.0010
ortho-Xylene (mg/L)					<0.00050
meta- & para-Xylene (mg/L)					<0.00050
Xylenes (mg/L)					<0.00075
Surrogate: 4-Bromofluorobenzene (SS) (%)					96.8
Surrogate: 1,4-Difluorobenzene (SS) (%)					101.8
Hydrocarbons / EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
Volatile Hydrocarbons (VH6-10) (mg/L)					<0.10
VPH (C6-C10) (mg/L)					<0.10
Surrogate: 3,4-Dichlorotoluene (SS) (%)					96.6
Polycyclic Aromatic Hydrocarbons / Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1323011-1 GW 25-JUN-13 MW-2D	L1323011-2 GW 25-JUN-13 MW-2S	L1323011-3 GW 25-JUN-13 MW-4	L1323011-4 GW 25-JUN-13 MW-3	L1323011-5 GW 25-JUN-13 MW-6
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Polycyclic Aromatic Hydrocarbons	Fluorene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	91.7	92.7	92.9	95.8	95.1
	Surrogate: Acridine d9 (%)	102.9	101.7	98.5	103.3	102.0
	Surrogate: Chrysene d12 (%)	88.3	99.2	100.0	100.7	101.1
	Surrogate: Naphthalene d8 (%)	92.1	91.2	92.4	94.2	94.4
	Surrogate: Phenanthrene d10 (%)	90.8	95.7	94.3	97.4	96.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1323011-6	L1323011-7	L1323011-8	L1323011-9	L1323011-10
	Description	GW	GW	GW	GW	GW
	Sampled Date	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13	25-JUN-13
	Sampled Time					
	Client ID	SFC-2	SFC-3	SFC-11	SFC-4B	MW-4 DUPLICATE
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Fluorene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	95.8	96.5	94.9	94.6	88.4
	Surrogate: Acridine d9 (%)	101.7	106.4	102.1	101.3	95.2
	Surrogate: Chrysene d12 (%)	98.4	99.7	100.6	98.1	92.3
	Surrogate: Naphthalene d8 (%)	95.0	96.0	94.2	93.8	86.7
	Surrogate: Phenanthrene d10 (%)	97.0	98.8	96.6	96.4	91.0

* 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)
Duplicate	Bromide (Br)	DLM	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLM	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1323011-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1323011-1, -10, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects
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-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EPH-SF-FID-VA	Water	EPH in Water by Tumbler and GCFID	BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Water by GC/FID", v2.1, July 1999. Whole water samples are extracted with DCM 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).

FUELS-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA8260B, 5035A, 5021, BC MELP

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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-DIS-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS	EPA SW-846 3005A & EPA 245.7

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-CVAFS-VA Water Total Mercury in Water by CVAFS EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

LEPH/HEPH-CALC-VA Water LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in water. 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 Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, 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 Water by GC/FID" (Version 2.1, July 20, 1999).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia in Water 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.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PAH-SF-MS-VA Water PAH in Water by GCMS EPA 3510, 8270

The entire water sample is extracted with dichloromethane, prior to analysis by gas chromatography with mass spectrometric detection (GC/MS). Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PAH-SURR-MS-VA Water PAH Surrogates for Waters EPA 3510, 8270

Analysed as per the corresponding PAH test method. Known quantities of surrogate compounds are added prior to analysis to each sample to demonstrate analytical accuracy.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

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.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	B.C. MIN. OF ENV. LAB. MAN. (2009)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA	Water	VH Surrogates for Waters	B.C. MIN. OF ENV. LAB. MAN. (2009)
VOC-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA8260B, 5021

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.

VOC-M-HSMS-VA	Water	Volatile Organic Compounds - GC-MS	EPA 8260B, 5012A

Water samples, with reagents, are heated and an aliquot of the headspace at equilibrium is analysed by GC-MS.

VOC-M2-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA8260B, 5035A, 5021, BC MELP

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA8260B, 5021

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Water	VOC7 and/or VOC Surrogates for Waters	EPA8260B, 5021
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water". The concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and, in solids, Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10).

XYLENES-CALC-VA	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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-268417

Reference Information

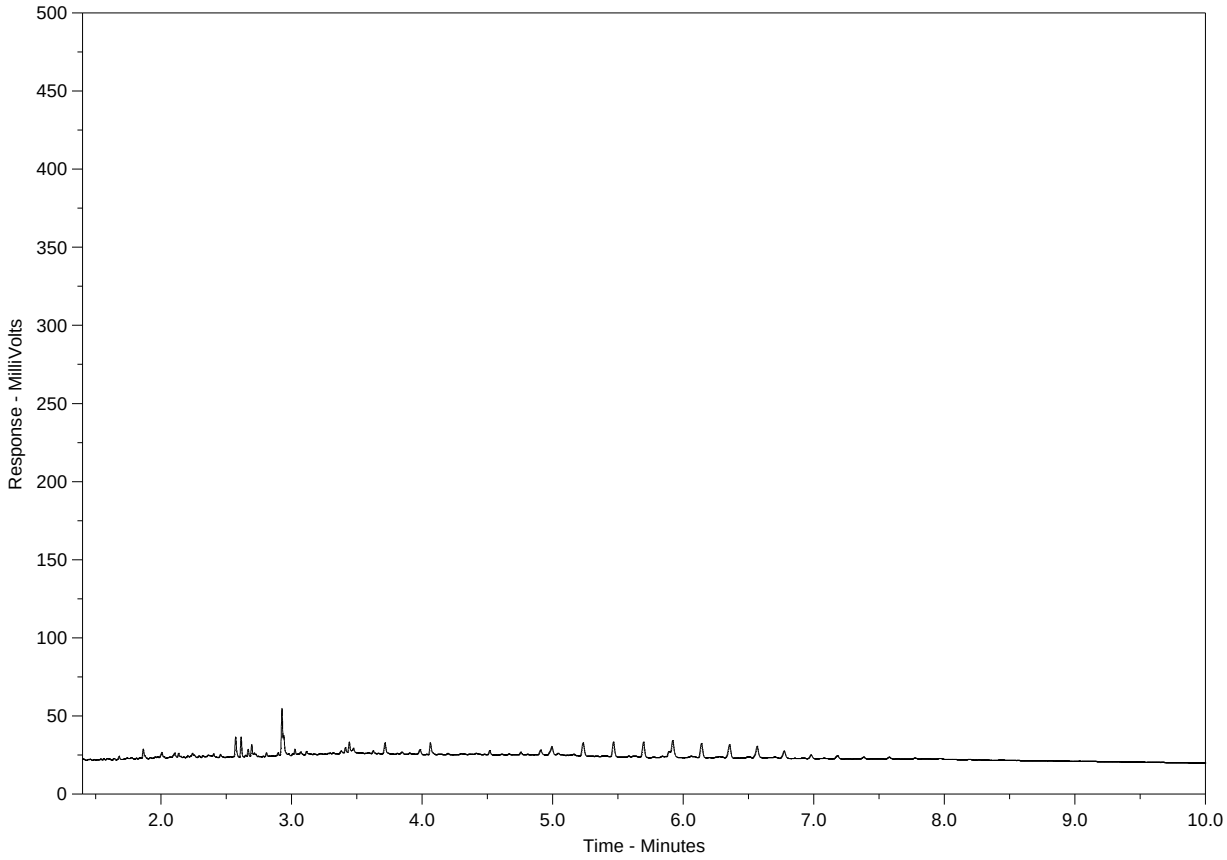
GLOSSARY OF REPORT TERMS

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.

Hydrocarbon Distribution Report

ALS Sample ID: L1323011-1
Client Sample ID: MW-2D



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 or upon request.

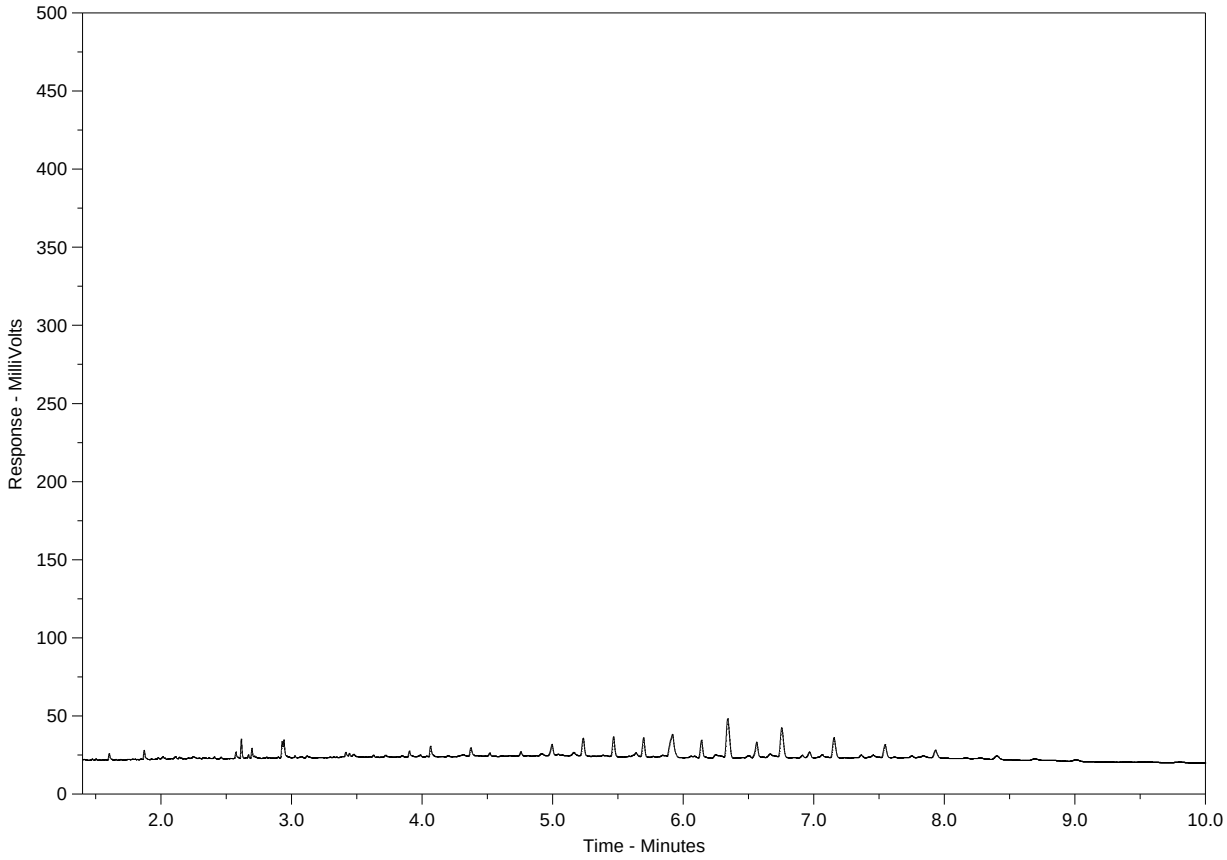
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1323011-2
Client Sample ID: MW-2S



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

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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.

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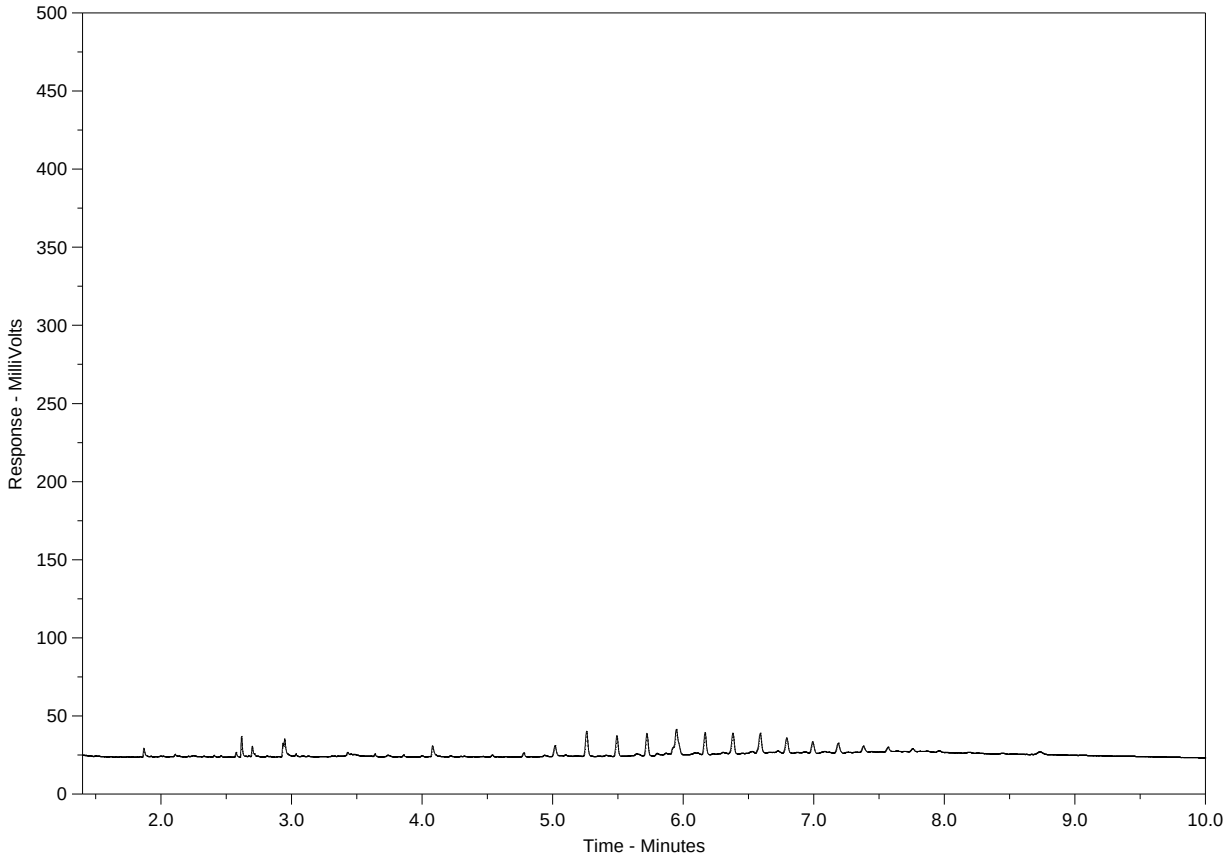
Hydrocarbon Distribution Report

ALS Sample ID: L1323011-3
Client Sample ID: MW-4



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

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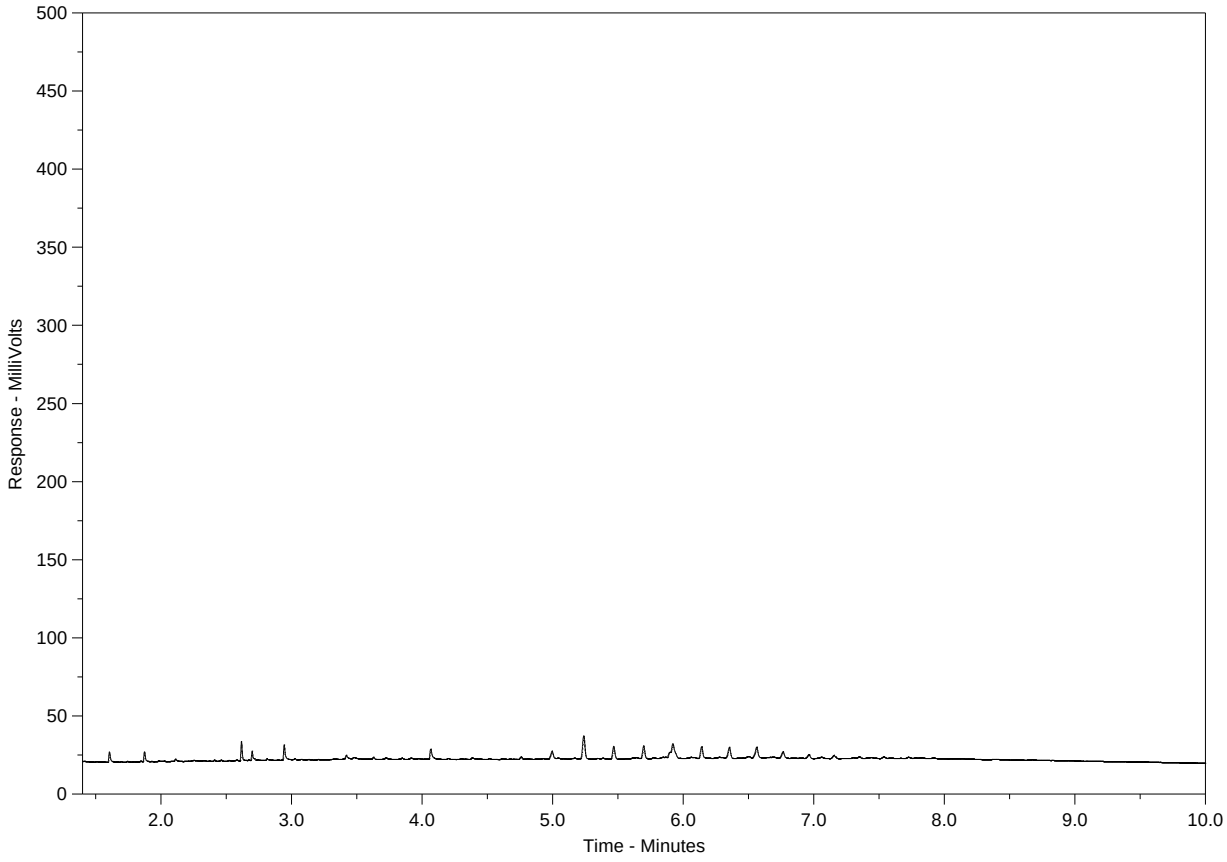
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1323011-4
Client Sample ID: MW-3



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

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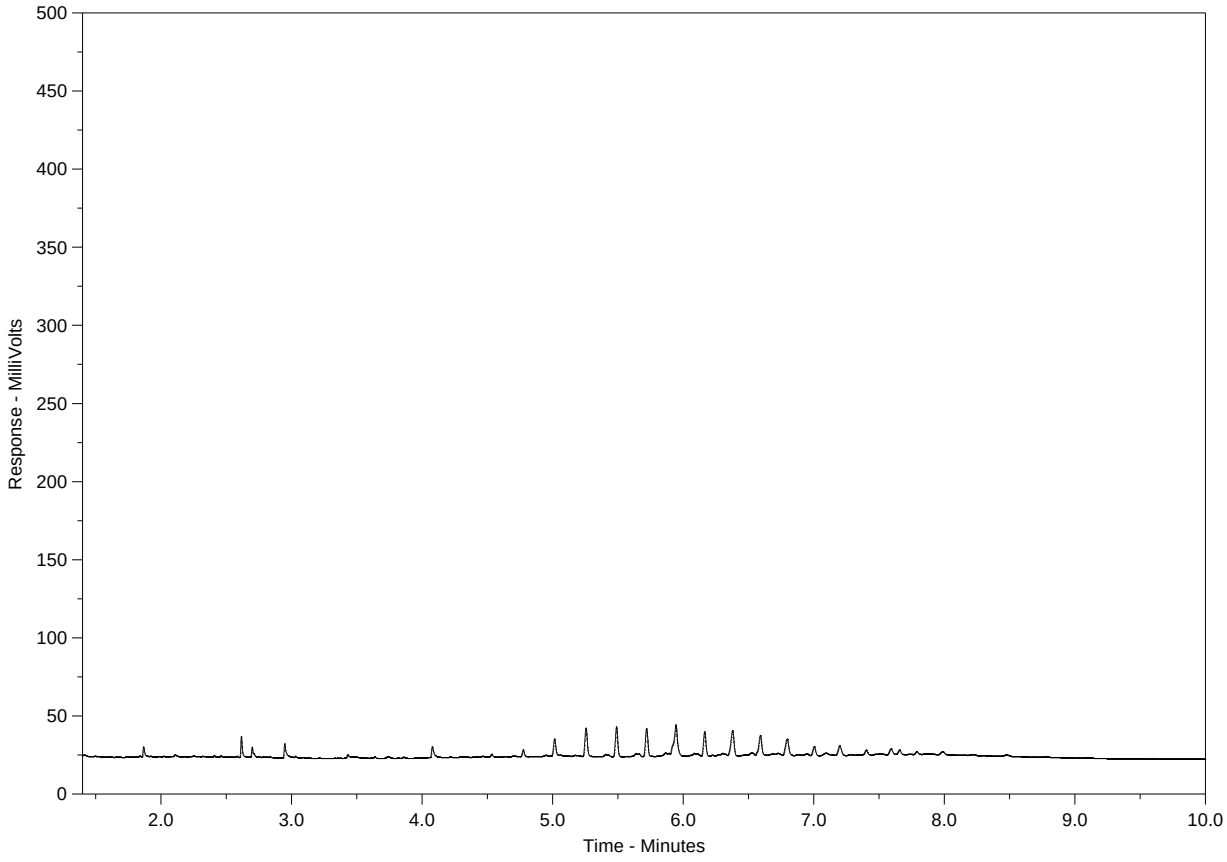
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1323011-5
Client Sample ID: MW-6



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 or upon request.

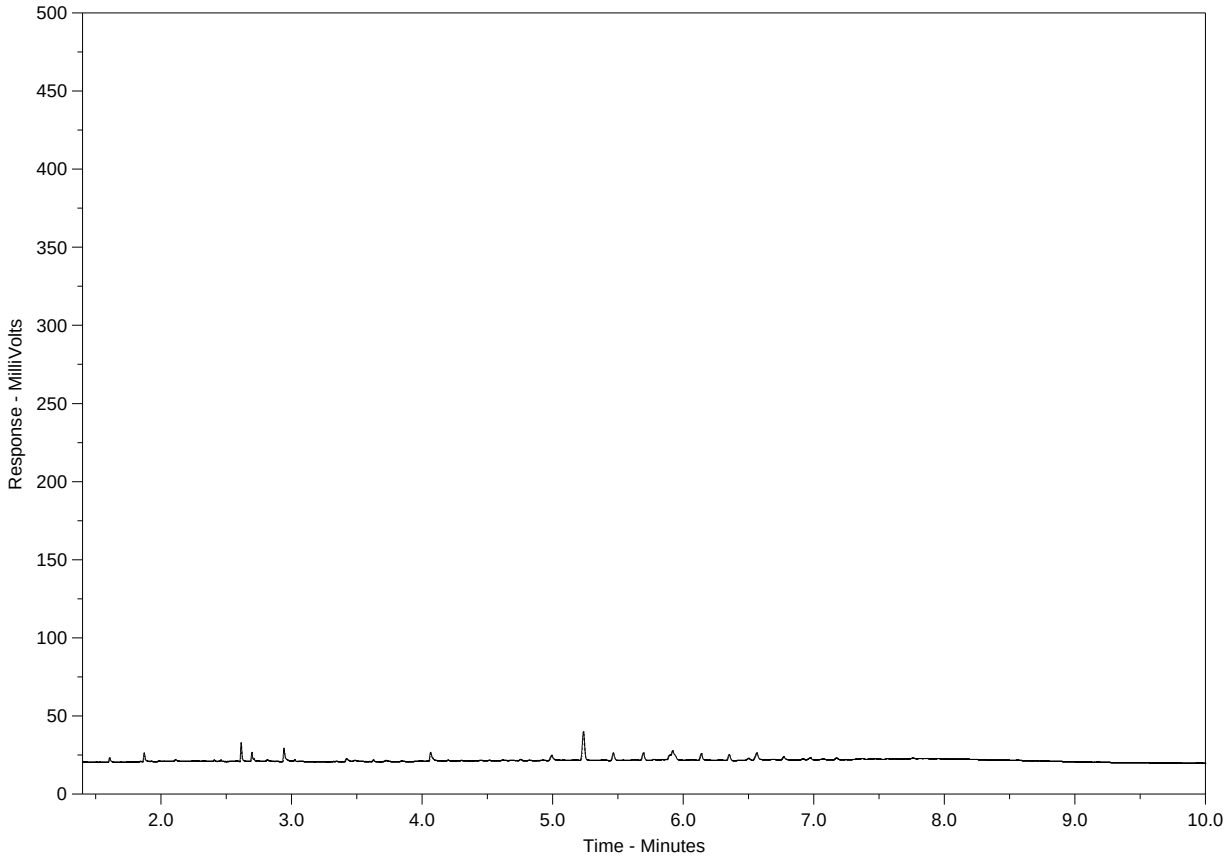
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1323011-6
Client Sample ID: SFC-2



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 or upon request.

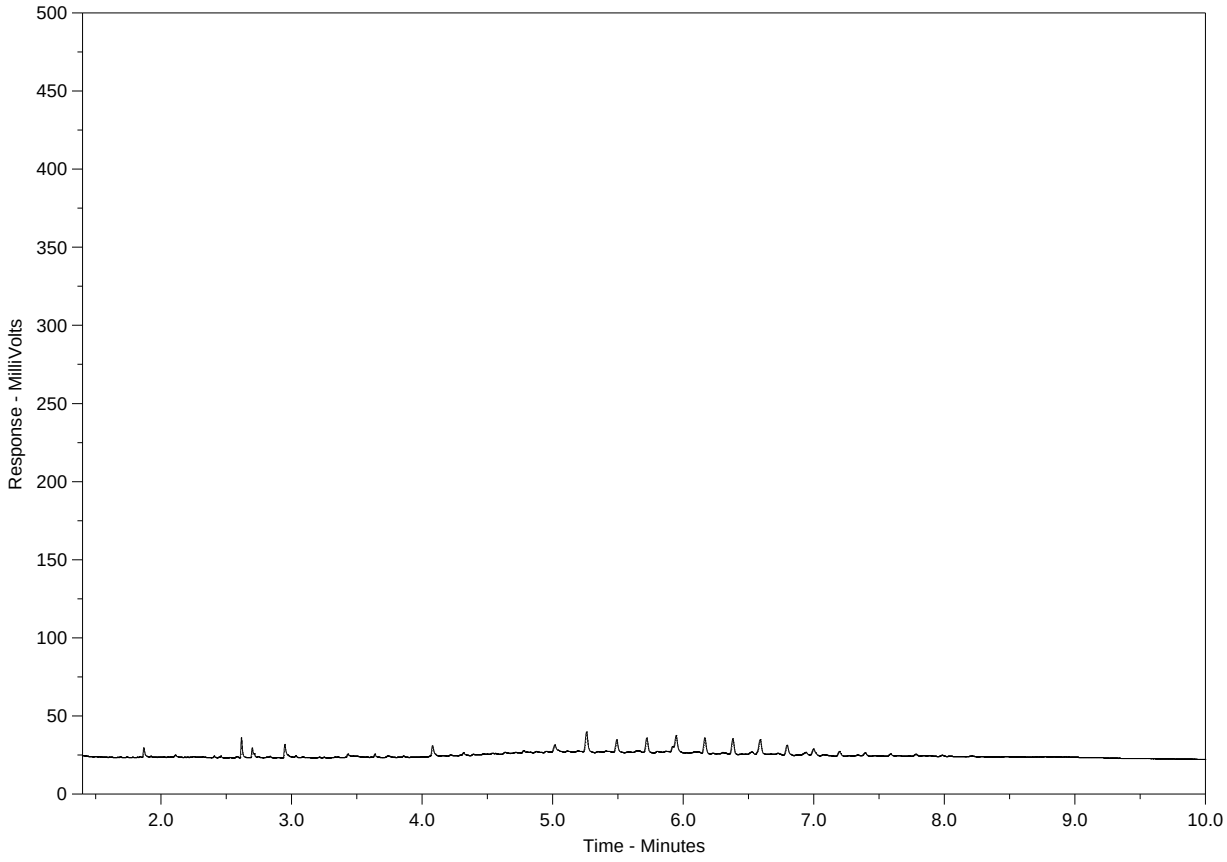
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1323011-7
Client Sample ID: SFC-3



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 or upon request.

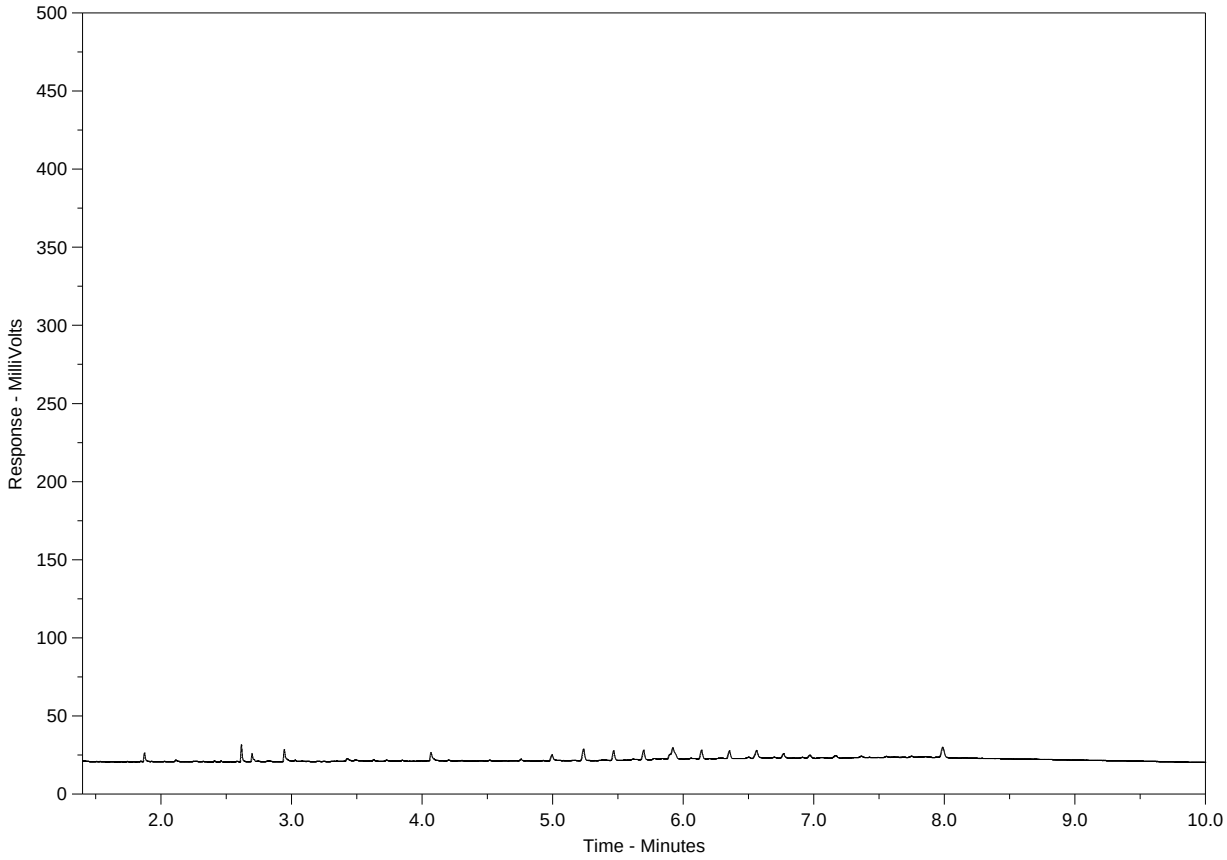
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1323011-8
Client Sample ID: SFC-11



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 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.

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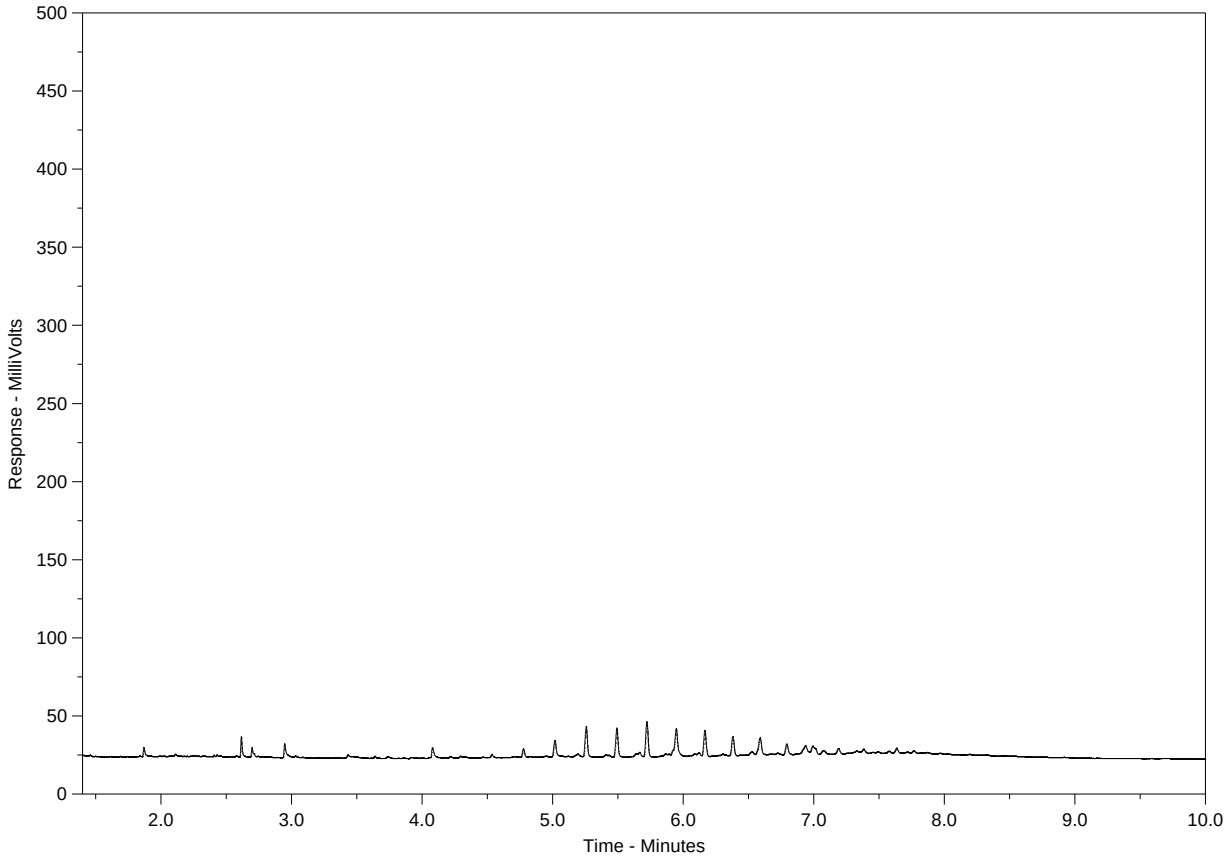
Hydrocarbon Distribution Report

ALS Sample ID: L1323011-9
Client Sample ID: SFC-4B



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

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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.

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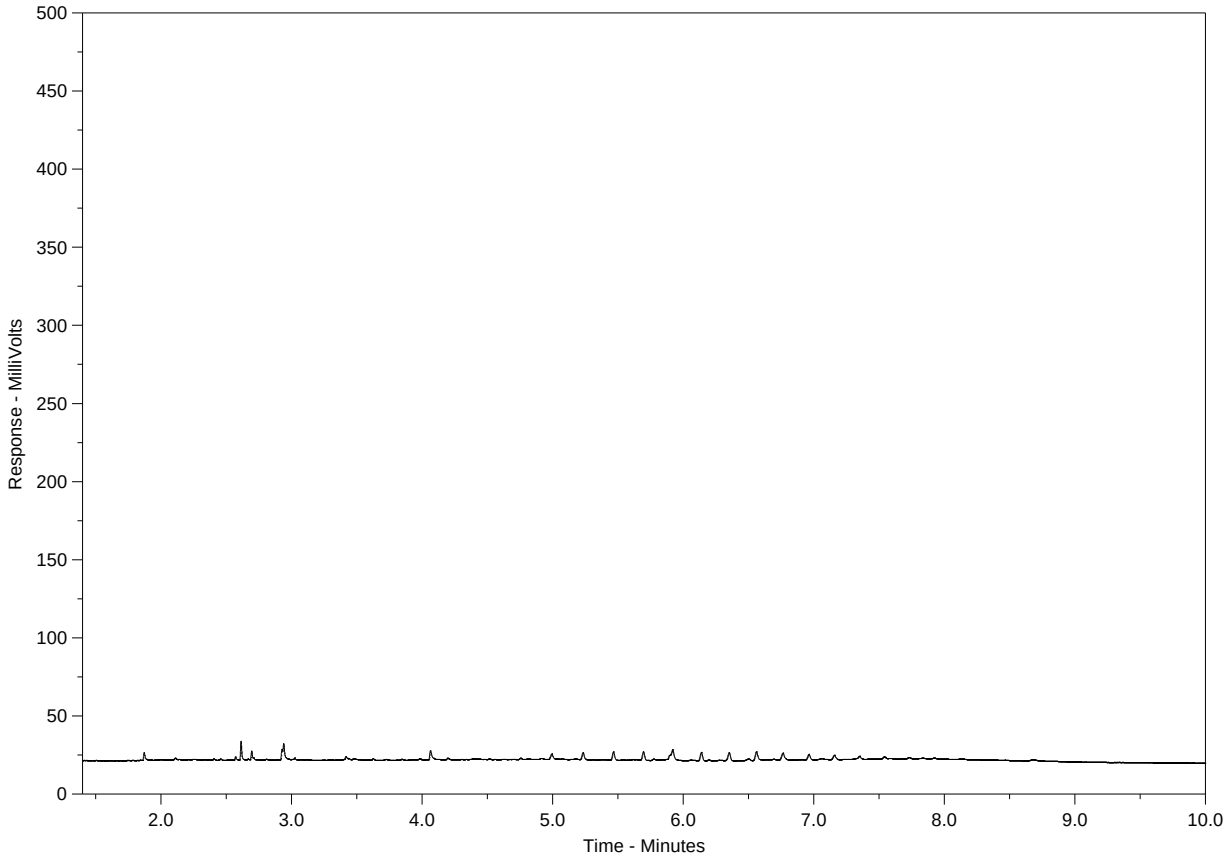
Hydrocarbon Distribution Report

ALS Sample ID: L1323011-10
Client Sample ID: MW-4 DUPLICATE



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

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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.

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L1323011-COFC

10-268417

ALS Environm

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To	**Report Format / Distribution**	**Service Request:** (Rush subject to availability - Contact ALS to confirm TAT)
Company: Morrison Hershfield	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: Josie Gilson	Select: PDF ✓ Excel ✓ Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 310-4321 Still Creek Drive Burnaby BC	Email 1: jgilson@morrisonhershfield.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Phone: 604-459-0402 Fax:	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Invoice To Same as Report ? (circle) Yes or (No) (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: 5104016	(Indicate Filtered or Preserved, F/P)
Company: Resort Municipality of Whistler	PO / AFE:	
Contact: Andrew Tucker	LSD:	
Address: 1135 Cheakamus Lk Rd		
Phone: 604-935-8386 Fax:	Quote #:	
Lab Work Order # (lab use only) L1323011	**ALS Contact:** Sclam Worku	**Sampler:** E. Toole

Sample #	Sample Identification (This description will appear on the	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Physical parameters	F/P	ORGANICS (Hexane/Hexane)	F/P	COD/TKN/NH3	F/P	VOC's (Btex)	F/P	Metals Dissolved	F/P	Metals Total	F/P	Number of Containers
	MW-2D	25/6/13		GW	✓		✓		-		✓		-				6
	MW-2S	25/6/13		GW	✓		-		-		-		-				6
	MW-4 Duplicate	25/6/13		GW	✓		-		-		-		-				6
	MW-3	25/6/13		GW	✓		-		-		-		✓				6
	MW-6	25/6/13		GW	-		-		-		✓		-				6
	SFC-2	25/6/13		SW	-		-		✓						✓		4
	SFC-3	25/6/13		SW	-		-		✓						✓		4
	SFC-11	25/6/13		SW	-		-		✓						✓		4
	SFC-4B	25/6/13		SW	-		-		✓						✓		4

Short Holding Time
Rush Processing

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

VOC's - Pls include Acetone, dibromomethane, bromomethane, 1-3 butadiene, MIBK, MEK.

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 add SIF
Toole	June 26/13	10am	TN	June 26	12:50	7 °C				

MORRISON HERSHFIELD GROUP INC.
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 19-JUL-13
Report Date: 31-JUL-13 14:15 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L1335464

Project P.O. #: NOT SUBMITTED
Job Reference: LANDFILL
C of C Numbers:
Legal Site Desc:

Selam Worku
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1335464-1				
	Description	surface water				
	Sampled Date	18-JUL-13				
	Sampled Time	13:30				
	Client ID	SFC 2-B SUB				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	364				
	Hardness (as CaCO3) (mg/L)	148				
	pH (pH)	7.75				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	120				
	Ammonia, Total (as N) (mg/L)	0.157				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	21.4				
	Fluoride (F) (mg/L)	0.047				
	Nitrate (as N) (mg/L)	0.0166				
	Nitrite (as N) (mg/L)	0.0013				
	Total Kjeldahl Nitrogen (mg/L)	0.877				
	Total Nitrogen (mg/L)	0.895				
	Phosphorus (P)-Total (mg/L)	0.291				
	Sulfate (SO4) (mg/L)	37.7				
Total Metals	Aluminum (Al)-Total (mg/L)	1.74				
	Antimony (Sb)-Total (mg/L)	<0.00050				
	Arsenic (As)-Total (mg/L)	<0.0010				
	Barium (Ba)-Total (mg/L)	0.173				
	Beryllium (Be)-Total (mg/L)	<0.0050				
	Bismuth (Bi)-Total (mg/L)	<0.20				
	Boron (B)-Total (mg/L)	<0.10				
	Cadmium (Cd)-Total (mg/L)	0.00259				
	Calcium (Ca)-Total (mg/L)	52.0				
	Chromium (Cr)-Total (mg/L)	0.00082				
	Cobalt (Co)-Total (mg/L)	0.0480				
	Copper (Cu)-Total (mg/L)	0.0125				
	Iron (Fe)-Total (mg/L)	29.5				
	Lead (Pb)-Total (mg/L)	<0.0010				
	Lithium (Li)-Total (mg/L)	<0.050				
	Magnesium (Mg)-Total (mg/L)	4.51				
	Manganese (Mn)-Total (mg/L)	4.09				
	Mercury (Hg)-Total (mg/L)	<0.00020				
	Molybdenum (Mo)-Total (mg/L)	0.0029				
	Nickel (Ni)-Total (mg/L)	<0.0050				
	Phosphorus (P)-Total (mg/L)	<0.30				
	Potassium (K)-Total (mg/L)	5.3				
	Selenium (Se)-Total (mg/L)	<0.0010				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1335464-1				
	Description	surface water				
	Sampled Date	18-JUL-13				
	Sampled Time	13:30				
	Client ID	SFC 2-B SUB				
Grouping	**Analyte**					
WATER						
Total Metals	Silicon (Si)-Total (mg/L)	8.02				
	Silver (Ag)-Total (mg/L)	<0.000050				
	Sodium (Na)-Total (mg/L)	19.7				
	Strontium (Sr)-Total (mg/L)	0.270				
	Thallium (Tl)-Total (mg/L)	<0.00020				
	Tin (Sn)-Total (mg/L)	<0.030				
	Titanium (Ti)-Total (mg/L)	0.082				
	Uranium (U)-Total (mg/L)	<0.00020				
	Vanadium (V)-Total (mg/L)	<0.030				
	Zinc (Zn)-Total (mg/L)	0.0177				
Aggregate Organics	COD (mg/L)	<20				

* 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	Aluminum (Al)-Total	MS-B	L1335464-1
Matrix Spike	Cadmium (Cd)-Total	MS-B	L1335464-1
Matrix Spike	Copper (Cu)-Total	MS-B	L1335464-1
Matrix Spike	Lead (Pb)-Total	MS-B	L1335464-1

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**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or

Reference Information

microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia in Water 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.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

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.

TN-CALC-VA Water Total Nitrogen (Calculation) BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

** 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
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 Environmental

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 for routine analysis subject to availability)
Company:	Morrison Hershfield			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Josie Gilson			☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	#310-4321 Still Creek Dr			Email 1:	jgilson@morrisonhershfield.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby, BC			Email 2:				○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-459-0402	Fax:		Email 3:				
Invoice To	Same as Report ?	☐ Yes	☑ No	Client / Project Information				Analysis Request
Hardcopy of Invoice with Report?		☑ Yes	☐ No	Job #:	Landfill			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	RMOW			PO / AFE:				
Contact:	Andrew Tucker			LSD:				
Address:	1135 Cheakamus Lk Rd, Whistler, BC V0N1T0							
Phone:	604-935-8380	Fax:		Quote #:				
Lab Work Order # (lab use only)	[redacted]			ALS Contact:		Sampler:	Trish Browning	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Physical Parameters	COD/ TKN/ NH3	Total Metals		Preserved							Number of Containers
[redacted]	SFC 2-B Sub	18-Jul-13	13:30	Surface Water	X	X	X		X							3

Short Holding Time

Rush Processing

L1335464-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / 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 provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Trish Browning	18-Jul-13	15:30	TW	July 19	12:25	20 °C				

MORRISON HERSHFIELD GROUP INC.
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 10-OCT-13
Report Date: 01-NOV-13 12:34 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L1376365

Project P.O. #:	NOT SUBMITTED
Job Reference:	5104016
C of C Numbers:	10-346413
Legal Site Desc:	

Comments: Please note that low surrogate recovery was encountered upon extracting sample #13 for PAH analysis and no back-up bottle was submitted. Data is not reported as per request.

Selam Worku
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-1	L1376365-2	L1376365-3	L1376365-4	L1376365-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1280	562	347	199	539
	Hardness (as CaCO3) (mg/L)	568	209	124	48.1	106
	pH (pH)	7.03	7.04	6.90	6.67	6.48
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	227	130	95.7	31.8	36.5
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	227	130	95.7	31.8	36.5
	Ammonia, Total (as N) (mg/L)	15.9	6.44	1.29	0.205	0.0483
	Bromide (Br) (mg/L)	<0.50 DLM	0.055	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	47.1	23.0	20.1	16.2	54.1
	Fluoride (F) (mg/L)	<0.20 DLM	<0.10 DLM	<0.10 DLM	0.029	0.103
	Nitrate (as N) (mg/L)	<0.050 DLM	<0.0050	<0.0050	0.0053	0.0737
	Nitrite (as N) (mg/L)	<0.010 DLM	<0.0010	0.0010	<0.0010	0.0012
	Total Kjeldahl Nitrogen (mg/L)	18.3	7.65	1.70	0.301	1.19
	Total Nitrogen (mg/L)	16.5	6.51	1.46	0.221	0.92 DLA
	Phosphorus (P)-Total (mg/L)	0.161	0.119	0.437	0.0026	3.60
	Sulfate (SO4) (mg/L)	418	113	46.8	34.4	135
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-6	L1376365-7	L1376365-8	L1376365-9	L1376365-10
	Description	GW	GW	GW	GW	GW
	Sampled Date	10-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	L1	LM (DUPLICATE)	SFC-2	SFC-2B	SFC-3
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	2690	827	137	837	280
	Hardness (as CaCO3) (mg/L)	525	329	39.4	325	65.3
	pH (pH)	7.66	6.72	7.63	6.90	7.33
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	994	127	25.2	130	28.8
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	994	127	25.2	130	28.8
	Ammonia, Total (as N) (mg/L)	105	1.21	<0.0050	1.54	0.0207
	Bromide (Br) (mg/L)	<1.0 DLM	<0.50 DLM	<0.050	<0.50 DLM	<0.050
	Chloride (Cl) (mg/L)	203	49.9	11.8	58.9	36.0
	Fluoride (F) (mg/L)	<0.40 DLM	0.21	0.046	0.26	0.047
	Nitrate (as N) (mg/L)	1.70	<0.050 DLM	0.274	<0.050 DLM	0.200
	Nitrite (as N) (mg/L)	0.053	<0.010 DLM	<0.0010	0.010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	96.5	1.61	0.068	2.55	0.102
	Total Nitrogen (mg/L)	98.3	1.43	0.293	2.26	0.276
	Phosphorus (P)-Total (mg/L)	0.715	0.0155	0.0082	0.0030	0.0050
	Sulfate (SO4) (mg/L)	125	236	20.2	220	47.2
Total Metals	Aluminum (Al)-Total (mg/L)	0.101		0.229	0.030	0.636
	Antimony (Sb)-Total (mg/L)	<0.00050		<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	0.0030		<0.0010	<0.0010	<0.0010
	Barium (Ba)-Total (mg/L)	0.245		<0.020	0.097	0.033
	Beryllium (Be)-Total (mg/L)	<0.0050		<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Total (mg/L)	<0.20		<0.20	<0.20	<0.20
	Boron (B)-Total (mg/L)	2.44		<0.10	0.22	<0.10
	Cadmium (Cd)-Total (mg/L)	0.000086		<0.000050	<0.000050	0.000073
	Calcium (Ca)-Total (mg/L)	162		12.5	110	21.8
	Chromium (Cr)-Total (mg/L)	0.00355		<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Total (mg/L)	0.00741		0.00072	0.00495	0.00355
	Copper (Cu)-Total (mg/L)	0.0080		0.0042	0.0011	0.0155
	Iron (Fe)-Total (mg/L)	62.8		0.153	31.6	0.448
	Lead (Pb)-Total (mg/L)	<0.0010		<0.0010	<0.0010	<0.0010
	Lithium (Li)-Total (mg/L)	<0.050		<0.050	<0.050	<0.050
	Magnesium (Mg)-Total (mg/L)	29.0		1.98	12.1	2.62
	Manganese (Mn)-Total (mg/L)	4.12		0.035	3.90	0.153
	Mercury (Hg)-Total (mg/L)	<0.00020		<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Total (mg/L)	0.0021		<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Total (mg/L)	0.0089		<0.0050	<0.0050	<0.0050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1376365-11 GW 09-OCT-13 SFC-11	L1376365-12 GW 10-OCT-13 SFC-4B	L1376365-13 GW LM	L1376365-14 GW TRAVEL BLANK	
Sample ID		L1376365-11	L1376365-12	L1376365-13	L1376365-14	
Description		GW	GW	GW	GW	
Sampled Date		09-OCT-13	10-OCT-13			
Sampled Time						
Client ID		SFC-11	SFC-4B	LM	TRAVEL BLANK	
WATER						
Physical Tests	Conductivity (uS/cm)	100	294	838	<2.0	
	Hardness (as CaCO3) (mg/L)	32.4	106	326	<0.50	
	pH (pH)	7.58	7.80	6.78	5.46	
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	25.7	44.4	129	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	25.7	44.4	129	<1.0	
	Ammonia, Total (as N) (mg/L)	<0.0050	0.156	1.41	0.0096 RRV	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.50 DLM	<0.050	
	Chloride (Cl) (mg/L)	5.31	20.1	49.9	<0.50	
	Fluoride (F) (mg/L)	0.048	0.052	0.21	<0.020	
	Nitrate (as N) (mg/L)	0.292	0.502	<0.050 DLM	<0.0050	
	Nitrite (as N) (mg/L)	<0.0010	0.0028	<0.010 DLM	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.082	0.362	1.60	<0.050	
	Total Nitrogen (mg/L)	0.312	0.708	1.46	<0.050	
	Phosphorus (P)-Total (mg/L)	0.0070	0.0047	0.0140	<0.0020	
	Sulfate (SO4) (mg/L)	13.3	64.1	236	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.165	0.231		<0.010	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050		<0.00050	
	Arsenic (As)-Total (mg/L)	<0.0010	<0.0010		<0.0010	
	Barium (Ba)-Total (mg/L)	<0.020	0.032		<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0050		<0.0050	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20		<0.20	
	Boron (B)-Total (mg/L)	<0.10	<0.10		<0.10	
	Cadmium (Cd)-Total (mg/L)	<0.000050	<0.000050		<0.000050	
	Calcium (Ca)-Total (mg/L)	10.0	36.0		<0.10	
	Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050		<0.00050	
	Cobalt (Co)-Total (mg/L)	<0.00050	0.00235		<0.00050	
	Copper (Cu)-Total (mg/L)	0.0014	0.0054		<0.0010	
	Iron (Fe)-Total (mg/L)	0.092	0.649		<0.030	
	Lead (Pb)-Total (mg/L)	<0.0010	<0.0010		<0.0010	
	Lithium (Li)-Total (mg/L)	<0.050	<0.050		<0.050	
	Magnesium (Mg)-Total (mg/L)	1.77	3.92		<0.10	
	Manganese (Mn)-Total (mg/L)	<0.010	0.449		<0.010	
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020		<0.00020	
	Molybdenum (Mo)-Total (mg/L)	<0.0010	<0.0010		<0.0010	
	Nickel (Ni)-Total (mg/L)	<0.0050	<0.0050		<0.0050	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-1	L1376365-2	L1376365-3	L1376365-4	L1376365-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	<0.010	0.015	0.074
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	0.0150	0.0075	0.0031	<0.0010	<0.0010
	Barium (Ba)-Dissolved (mg/L)	0.032	0.131	0.130	0.062	0.034
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	0.37	0.18	<0.10	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	0.000455	0.000225	0.000189
	Calcium (Ca)-Dissolved (mg/L)	190	66.7	38.9	14.8	34.8
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	0.0153	0.00296	0.0313	0.00588	0.0118
	Copper (Cu)-Dissolved (mg/L)	<0.0010	<0.0010	0.0019	0.0022	0.0030
	Iron (Fe)-Dissolved (mg/L)	63.9	51.7	33.3	0.576	1.52
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Magnesium (Mg)-Dissolved (mg/L)	22.7	10.2	6.40	2.67	4.59
	Manganese (Mn)-Dissolved (mg/L)	2.69	3.01	2.63	1.67	0.922
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)	0.0168	0.0046	0.0123	0.0010	<0.0010
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	23.1	11.7	5.4	2.9	3.4

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1376365-6 GW 10-OCT-13 L1	L1376365-7 GW 09-OCT-13 LM (DUPLICATE)	L1376365-8 GW 09-OCT-13 SFC-2	L1376365-9 GW 09-OCT-13 SFC-2B	L1376365-10 GW 09-OCT-13 SFC-3
Sample ID		L1376365-6	L1376365-7	L1376365-8	L1376365-9	L1376365-10
Description		GW	GW	GW	GW	GW
Sampled Date		10-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
Sampled Time						
Client ID		L1	LM (DUPLICATE)	SFC-2	SFC-2B	SFC-3
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	0.39		<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	95.8		<2.0	7.4	2.3
	Selenium (Se)-Total (mg/L)	<0.0010		<0.0010	<0.0010	<0.0010
	Silicon (Si)-Total (mg/L)	9.74		8.52	8.94	8.14
	Silver (Ag)-Total (mg/L)	<0.000050		<0.000050	<0.000050	<0.000050
	Sodium (Na)-Total (mg/L)	236		11.7	42.8	28.8
	Strontium (Sr)-Total (mg/L)	0.971		0.138	0.774	0.183
	Thallium (Tl)-Total (mg/L)	<0.00020		<0.00020	<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)	<0.030		<0.030	<0.030	<0.030
	Titanium (Ti)-Total (mg/L)	<0.050		<0.050	<0.050	<0.050
	Uranium (U)-Total (mg/L)	0.00025		<0.00020	<0.00020	<0.00020
	Vanadium (V)-Total (mg/L)	<0.030		<0.030	<0.030	<0.030
	Zinc (Zn)-Total (mg/L)	0.0867		<0.0050	0.0123	0.0088
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD			
	Dissolved Metals Filtration Location		LAB			
	Aluminum (Al)-Dissolved (mg/L)		<0.010			
	Antimony (Sb)-Dissolved (mg/L)		<0.00050			
	Arsenic (As)-Dissolved (mg/L)		<0.0010			
	Barium (Ba)-Dissolved (mg/L)		0.088			
	Beryllium (Be)-Dissolved (mg/L)		<0.0050			
	Bismuth (Bi)-Dissolved (mg/L)		<0.20			
	Boron (B)-Dissolved (mg/L)		0.20			
	Cadmium (Cd)-Dissolved (mg/L)		<0.000050			
	Calcium (Ca)-Dissolved (mg/L)		112			
	Chromium (Cr)-Dissolved (mg/L)		<0.00050			
	Cobalt (Co)-Dissolved (mg/L)		0.00470			
	Copper (Cu)-Dissolved (mg/L)		<0.0010			
	Iron (Fe)-Dissolved (mg/L)		0.067			
	Lead (Pb)-Dissolved (mg/L)		<0.0010			
	Lithium (Li)-Dissolved (mg/L)		<0.050			
	Magnesium (Mg)-Dissolved (mg/L)		12.1			
	Manganese (Mn)-Dissolved (mg/L)		3.52			
	Mercury (Hg)-Dissolved (mg/L)		<0.00020			
	Molybdenum (Mo)-Dissolved (mg/L)		<0.0010			
	Nickel (Ni)-Dissolved (mg/L)		<0.0050			
	Phosphorus (P)-Dissolved (mg/L)		<0.30			
	Potassium (K)-Dissolved (mg/L)		7.1			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1376365-11 GW 09-OCT-13 SFC-11	L1376365-12 GW 10-OCT-13 SFC-4B	L1376365-13 GW LM	L1376365-14 GW TRAVEL BLANK	
	Sample ID	L1376365-11	L1376365-12	L1376365-13	L1376365-14	
	Description	GW	GW	GW	GW	
	Sampled Date	09-OCT-13	10-OCT-13			
	Sampled Time					
	Client ID	SFC-11	SFC-4B	LM	TRAVEL BLANK	
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.30	<0.30		<0.30	
	Potassium (K)-Total (mg/L)	<2.0	2.7		<2.0	
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010		<0.0010	
	Silicon (Si)-Total (mg/L)	8.63	6.91		<0.050	
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000050		<0.000050	
	Sodium (Na)-Total (mg/L)	6.9	15.9		<2.0	
	Strontium (Sr)-Total (mg/L)	0.120	0.285		<0.0050	
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00020		<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.030		<0.030	
	Titanium (Ti)-Total (mg/L)	<0.050	<0.050		<0.050	
	Uranium (U)-Total (mg/L)	<0.00020	<0.00020		<0.00020	
	Vanadium (V)-Total (mg/L)	<0.030	<0.030		<0.030	
	Zinc (Zn)-Total (mg/L)	<0.0050	0.0077		<0.0050	
Dissolved Metals	Dissolved Mercury Filtration Location			FIELD		
	Dissolved Metals Filtration Location			LAB		
	Aluminum (Al)-Dissolved (mg/L)			<0.010		
	Antimony (Sb)-Dissolved (mg/L)			<0.00050		
	Arsenic (As)-Dissolved (mg/L)			<0.0010		
	Barium (Ba)-Dissolved (mg/L)			0.088		
	Beryllium (Be)-Dissolved (mg/L)			<0.0050		
	Bismuth (Bi)-Dissolved (mg/L)			<0.20		
	Boron (B)-Dissolved (mg/L)			0.21		
	Cadmium (Cd)-Dissolved (mg/L)			<0.000050		
	Calcium (Ca)-Dissolved (mg/L)			111		
	Chromium (Cr)-Dissolved (mg/L)			<0.00050		
	Cobalt (Co)-Dissolved (mg/L)			0.00600		
	Copper (Cu)-Dissolved (mg/L)			<0.0010		
	Iron (Fe)-Dissolved (mg/L)			<0.030		
	Lead (Pb)-Dissolved (mg/L)			<0.0010		
	Lithium (Li)-Dissolved (mg/L)			<0.050		
	Magnesium (Mg)-Dissolved (mg/L)			11.9		
	Manganese (Mn)-Dissolved (mg/L)			3.56		
	Mercury (Hg)-Dissolved (mg/L)			<0.00020		
	Molybdenum (Mo)-Dissolved (mg/L)			<0.0010		
	Nickel (Ni)-Dissolved (mg/L)			<0.0050		
	Phosphorus (P)-Dissolved (mg/L)			<0.30		
	Potassium (K)-Dissolved (mg/L)			6.8		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1376365-1	L1376365-2	L1376365-3	L1376365-4	L1376365-5
Description	GW	GW	GW	GW	GW
Sampled Date	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
Sampled Time					
Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping / **Analyte**					
WATER					
Dissolved Metals Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved (mg/L)	13.8	9.95	9.94	7.59	8.75
Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved (mg/L)	34.0	17.7	16.8	13.3	74.0
Strontium (Sr)-Dissolved (mg/L)	0.703	0.336	0.226	0.125	0.320
Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved (mg/L)	0.00023	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	0.0067	<0.0050	<0.0050
Aggregate Organics COD (mg/L)	26	21	35	<20	87
Volatile Organic Compounds Acetone (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Butadiene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene (mg/L)	0.0013	<0.0010	<0.0010	<0.0010	<0.0010
Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dibromomethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1376365-6	L1376365-7	L1376365-8	L1376365-9	L1376365-10
Description	GW	GW	GW	GW	GW
Sampled Date	10-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
Sampled Time					
Client ID	L1	LM (DUPLICATE)	SFC-2	SFC-2B	SFC-3
Grouping / **Analyte**					
WATER					
Dissolved Metals					
Selenium (Se)-Dissolved (mg/L)		<0.0010			
Silicon (Si)-Dissolved (mg/L)		7.91			
Silver (Ag)-Dissolved (mg/L)		<0.000050			
Sodium (Na)-Dissolved (mg/L)		38.6			
Strontium (Sr)-Dissolved (mg/L)		0.732			
Thallium (Tl)-Dissolved (mg/L)		<0.00020			
Tin (Sn)-Dissolved (mg/L)		<0.030			
Titanium (Ti)-Dissolved (mg/L)		<0.050			
Uranium (U)-Dissolved (mg/L)		<0.00020			
Vanadium (V)-Dissolved (mg/L)		<0.030			
Zinc (Zn)-Dissolved (mg/L)		0.0393			
Aggregate Organics					
COD (mg/L)	180	<20	<20	77	<20
Volatile Organic Compounds					
Acetone (mg/L)	0.018	<0.010			
Benzene (mg/L)	<0.00050	<0.00050			
Bromodichloromethane (mg/L)	<0.0010	<0.0010			
Bromoform (mg/L)	<0.0010	<0.0010			
Bromomethane (mg/L)	<0.0010	<0.0010			
1,3-Butadiene (mg/L)	<0.0010	<0.0010			
Carbon Tetrachloride (mg/L)	<0.00050	<0.00050			
Chlorobenzene (mg/L)	<0.0010	<0.0010			
Dibromochloromethane (mg/L)	<0.0010	<0.0010			
Chloroethane (mg/L)	<0.0010	<0.0010			
Chloroform (mg/L)	<0.0010	<0.0010			
Chloromethane (mg/L)	<0.0050	<0.0050			
Dibromomethane (mg/L)	<0.0010	<0.0010			
1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070			
1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010			
1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010			
1,1-Dichloroethane (mg/L)	<0.0010	<0.0010			
1,2-Dichloroethane (mg/L)	<0.0010	<0.0010			
1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010			
cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010			
trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010			
1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014			
Dichloromethane (mg/L)	<0.0050	<0.0050			
1,2-Dichloropropane (mg/L)	<0.0010	<0.0010			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1376365-11	L1376365-12	L1376365-13	L1376365-14	
Description	GW	GW	GW	GW	
Sampled Date	09-OCT-13	10-OCT-13			
Sampled Time					
Client ID	SFC-11	SFC-4B	LM	TRAVEL BLANK	
Grouping / **Analyte**					
WATER					
Dissolved Metals					
Selenium (Se)-Dissolved (mg/L)			<0.0010		
Silicon (Si)-Dissolved (mg/L)			7.89		
Silver (Ag)-Dissolved (mg/L)			<0.000050		
Sodium (Na)-Dissolved (mg/L)			38.6		
Strontium (Sr)-Dissolved (mg/L)			0.730		
Thallium (Tl)-Dissolved (mg/L)			<0.00020		
Tin (Sn)-Dissolved (mg/L)			<0.030		
Titanium (Ti)-Dissolved (mg/L)			<0.050		
Uranium (U)-Dissolved (mg/L)			<0.00020		
Vanadium (V)-Dissolved (mg/L)			<0.030		
Zinc (Zn)-Dissolved (mg/L)			0.0502		
Aggregate Organics					
COD (mg/L)	<20	<20	<20	<20	
Volatile Organic Compounds					
Acetone (mg/L)			<0.010	<0.010	
Benzene (mg/L)			<0.00050	<0.00050	
Bromodichloromethane (mg/L)			<0.0010	<0.0010	
Bromoform (mg/L)			<0.0010	<0.0010	
Bromomethane (mg/L)			<0.0010	<0.0010	
1,3-Butadiene (mg/L)			<0.0010	<0.0010	
Carbon Tetrachloride (mg/L)			<0.00050	<0.00050	
Chlorobenzene (mg/L)			<0.0010	<0.0010	
Dibromochloromethane (mg/L)			<0.0010	<0.0010	
Chloroethane (mg/L)			<0.0010	<0.0010	
Chloroform (mg/L)			<0.0010	<0.0010	
Chloromethane (mg/L)			<0.0050	<0.0050	
Dibromomethane (mg/L)			<0.0010	<0.0010	
1,2-Dichlorobenzene (mg/L)			<0.00070	<0.00070	
1,3-Dichlorobenzene (mg/L)			<0.0010	<0.0010	
1,4-Dichlorobenzene (mg/L)			<0.0010	<0.0010	
1,1-Dichloroethane (mg/L)			<0.0010	<0.0010	
1,2-Dichloroethane (mg/L)			<0.0010	<0.0010	
1,1-Dichloroethylene (mg/L)			<0.0010	<0.0010	
cis-1,2-Dichloroethylene (mg/L)			<0.0010	<0.0010	
trans-1,2-Dichloroethylene (mg/L)			<0.0010	<0.0010	
1,3-Dichloropropene (cis & trans) (mg/L)			<0.0014	<0.0014	
Dichloromethane (mg/L)			<0.0050	<0.0050	
1,2-Dichloropropane (mg/L)			<0.0010	<0.0010	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-1	L1376365-2	L1376365-3	L1376365-4	L1376365-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl ethyl ketone (MEK) (mg/L)	<0.0010	0.396	<0.0010	<0.0010	<0.0010
	Methyl isobutyl ketone (MIBK) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Toluene (mg/L)	<0.00050	0.00167	<0.00050	<0.00050	<0.00050
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	92.9	97.2	93.1	96.3	94.6
	Surrogate: 1,4-Difluorobenzene (SS) (%)	100.0	100.5	99.2	100.1	99.9
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	86.1	105.7	93.9	99.5	98.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-6	L1376365-7	L1376365-8	L1376365-9	L1376365-10
	Description	GW	GW	GW	GW	GW
	Sampled Date	10-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	L1	LM (DUPLICATE)	SFC-2	SFC-2B	SFC-3
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010			
	trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010			
	Ethylbenzene (mg/L)	<0.00050	<0.00050			
	Methyl ethyl ketone (MEK) (mg/L)	<0.010	<0.010			
	Methyl isobutyl ketone (MIBK) (mg/L)	<0.0010	<0.0010			
	Methyl t-butyl ether (MTBE) (mg/L)	0.00067	<0.00050			
	Styrene (mg/L)	<0.00050	<0.00050			
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010			
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010			
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010			
	Toluene (mg/L)	<0.00050	<0.00050			
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010			
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010			
	Trichloroethylene (mg/L)	<0.0010	<0.0010			
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010			
	Vinyl Chloride (mg/L)	<0.0010	<0.0010			
	ortho-Xylene (mg/L)	<0.00050	<0.00050			
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050			
	Xylenes (mg/L)	<0.00075	<0.00075			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	90.7	93.6			
	Surrogate: 1,4-Difluorobenzene (SS) (%)	100.5	99.9			
Hydrocarbons	EPH10-19 (mg/L)	0.62	<0.25	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	0.43	<0.25	<0.25	<0.25	<0.25
	LEPH (mg/L)	0.62	<0.25	<0.25	<0.25	<0.25
	HEPH (mg/L)	0.43	<0.25	<0.25	<0.25	<0.25
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10			
	VPH (C6-C10) (mg/L)	<0.10	<0.10			
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	70.1	92.8			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	0.000759	<0.000050	0.000549	<0.000050
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-11	L1376365-12	L1376365-13	L1376365-14	
	Description	GW	GW	GW	GW	
	Sampled Date	09-OCT-13	10-OCT-13			
	Sampled Time					
	Client ID	SFC-11	SFC-4B	LM	TRAVEL BLANK	
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	cis-1,3-Dichloropropylene (mg/L)			<0.0010	<0.0010	
	trans-1,3-Dichloropropylene (mg/L)			<0.0010	<0.0010	
	Ethylbenzene (mg/L)			<0.00050	<0.00050	
	Methyl ethyl ketone (MEK) (mg/L)			<0.010	<0.010	
	Methyl isobutyl ketone (MIBK) (mg/L)			<0.0010	<0.0010	
	Methyl t-butyl ether (MTBE) (mg/L)			<0.00050	<0.00050	
	Styrene (mg/L)			<0.00050	<0.00050	
	1,1,1,2-Tetrachloroethane (mg/L)			<0.0010	<0.0010	
	1,1,2,2-Tetrachloroethane (mg/L)			<0.0010	<0.0010	
	Tetrachloroethylene (mg/L)			<0.0010	<0.0010	
	Toluene (mg/L)			<0.00050	<0.00050	
	1,1,1-Trichloroethane (mg/L)			<0.0010	<0.0010	
	1,1,2-Trichloroethane (mg/L)			<0.0010	<0.0010	
	Trichloroethylene (mg/L)			<0.0010	<0.0010	
	Trichlorofluoromethane (mg/L)			<0.0010	<0.0010	
	Vinyl Chloride (mg/L)			<0.0010	<0.0010	
	ortho-Xylene (mg/L)			<0.00050	<0.00050	
	meta- & para-Xylene (mg/L)			<0.00050	<0.00050	
	Xylenes (mg/L)			<0.00075	<0.00075	
	Surrogate: 4-Bromofluorobenzene (SS) (%)			91.4	95.0	
	Surrogate: 1,4-Difluorobenzene (SS) (%)			100.5	100.3	
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	
	EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	
	LEPH (mg/L)	<0.25	<0.25		<0.25	
	HEPH (mg/L)	<0.25	<0.25		<0.25	
	Volatile Hydrocarbons (VH6-10) (mg/L)			<0.10	<0.10	
	VPH (C6-C10) (mg/L)			<0.10	<0.10	
	Surrogate: 3,4-Dichlorotoluene (SS) (%)			83.2	103.8	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050		<0.000050	
	Acenaphthylene (mg/L)	<0.000050	<0.000050		<0.000050	
	Acridine (mg/L)	<0.000050	<0.000050		<0.000050	
	Anthracene (mg/L)	<0.000050	<0.000050		<0.000050	
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050		<0.000050	
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010		<0.000010	
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050		<0.000050	
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050		<0.000050	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-1	L1376365-2	L1376365-3	L1376365-4	L1376365-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	MW-2D	MW-2S	MW-4	MW-3	MW-6
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	92.2	87.0	89.2	87.2	85.3
	Surrogate: Acridine d9 (%)	87.4	81.3	80.7	77.5	80.4
	Surrogate: Chrysene d12 (%)	89.0	81.2	84.7	80.9	87.0
	Surrogate: Naphthalene d8 (%)	90.4	86.1	89.5	86.8	82.9
	Surrogate: Phenanthrene d10 (%)	92.8	85.2	89.8	87.3	86.1

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-6	L1376365-7	L1376365-8	L1376365-9	L1376365-10
	Description	GW	GW	GW	GW	GW
	Sampled Date	10-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13	09-OCT-13
	Sampled Time					
	Client ID	L1	LM (DUPLICATE)	SFC-2	SFC-2B	SFC-3
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluoranthene (mg/L)	<0.000050	0.000152	<0.000050	0.000110	<0.000050
	Fluorene (mg/L)	<0.000050	0.000310	<0.000050	0.000206	<0.000050
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	0.000080	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	0.000078	<0.000050	0.000054	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	88.7	87.7	92.1	87.1	85.8
	Surrogate: Acridine d9 (%)	86.1	83.9	85.4	79.3	79.0
	Surrogate: Chrysene d12 (%)	84.3	83.1	83.1	82.8	82.0
	Surrogate: Naphthalene d8 (%)	89.2	88.5	92.5	85.5	87.0
	Surrogate: Phenanthrene d10 (%)	88.7	90.4	91.3	86.9	84.9

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1376365-11	L1376365-12	L1376365-13	L1376365-14	
	Description	GW	GW	GW	GW	
	Sampled Date	09-OCT-13	10-OCT-13			
	Sampled Time					
	Client ID	SFC-11	SFC-4B	LM	TRAVEL BLANK	
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050		<0.000050	
	Chrysene (mg/L)	<0.000050	<0.000050		<0.000050	
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050		<0.000050	
	Fluoranthene (mg/L)	<0.000050	<0.000050		<0.000050	
	Fluorene (mg/L)	<0.000050	<0.000050		<0.000050	
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050		<0.000050	
	Naphthalene (mg/L)	<0.000050	<0.000050		<0.000050	
	Phenanthrene (mg/L)	<0.000050	<0.000050		<0.000050	
	Pyrene (mg/L)	<0.000050	<0.000050		<0.000050	
	Quinoline (mg/L)	<0.000050	<0.000050		<0.000050	
	Surrogate: Acenaphthene d10 (%)	90.4	62.1		87.6	
	Surrogate: Acridine d9 (%)	82.8	66.1		78.3	
	Surrogate: Chrysene d12 (%)	85.2	62.0		82.4	
	Surrogate: Naphthalene d8 (%)	91.0	62.0		86.9	
	Surrogate: Phenanthrene d10 (%)	92.7	61.5		85.3	

* 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	Aluminum (Al)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Chromium (Cr)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Cobalt (Co)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Lead (Pb)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Silver (Ag)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Thallium (Tl)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Aluminum (Al)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Chromium (Cr)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Lead (Pb)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Selenium (Se)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Silver (Ag)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Thallium (Tl)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Aluminum (Al)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Lead (Pb)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Selenium (Se)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Silver (Ag)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Thallium (Tl)-Dissolved	DLA	L1376365-1, -2, -3, -4, -5
Duplicate	Bromide (Br)	DLM	L1376365-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1376365-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1376365-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLM	L1376365-2, -3
Laboratory Control Sample	1,3-Butadiene	LCS-ND	L1376365-1, -2, -3, -4, -5, -6
Laboratory Control Sample	1,3-Butadiene	LCS-ND	L1376365-13, -14, -6, -7
Matrix Spike	Phosphorus (P)-Total	MS-B	L1376365-1, -10, -11, -12, -14, -2, -3, -4, -5, -6, -8
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1376365-1, -2, -3, -4, -5
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1376365-1, -2, -3, -4, -5
Matrix Spike	Fluoride (F)	MS-B	L1376365-2, -3
Matrix Spike	Total Nitrogen	MS-B	L1376365-1, -10, -11, -12, -13, -14, -2, -3, -4, -6, -7, -8, -9
Matrix Spike	Total Nitrogen	MS-B	L1376365-5
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1376365-1, -2, -3, -4, -5
Matrix Spike	Total Kjeldahl Nitrogen	MSTN	L1376365-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
MSTN	TKN Matrix Spike recovery was low due to interference from high nitrate, which causes negative bias on TKN.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. 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.

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity

Reference Information

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.

ANIONS-BR-IC-VA Water Bromide by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA Water Chloride by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA Water Fluoride by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA Water Nitrite in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA Water Nitrate in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA Water Sulfate by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

COD-COL-VA Water Chemical Oxygen Demand by Colorimetric APHA 5220 D. CHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EPH-SF-FID-VA Water EPH in Water by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Water by GC/FID", v2.1, July 1999. Whole water samples are extracted with DCM 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).

FUELS-HSMS-VA Water VOCs in water by Headspace GCMS EPA8260B, 5035A, 5021, BC MELP

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

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-DIS-CVAFS-VA Water Dissolved Mercury in Water by CVAFS EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-CVAFS-VA Water Total Mercury in Water by CVAFS EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

LEPH/HEPH-CALC-VA Water LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in water. 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 Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, 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 Water by GC/FID" (Version 2.1, July 20, 1999).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-T-COL-VA Water Total Nitrogen in water by Colour USGS - 03 - 4174 / NEMI 5735

This analysis is carried out using procedures adapted from the US Geological Survey (USGS) Method 03-4174 " Evaluation of Alkaline persulfate digestion as an alternative to kjeldahl digestion for determination of total and dissolved nitrogen and phosphorus in water." and National Environmental Methods Index Nemi method 5735. Nitrate via manual vanadium (III) reduction.

NH3-F-VA Water Ammonia in Water 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.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PAH-SF-MS-VA Water PAH in Water by GCMS EPA 3510, 8270

The entire water sample is extracted with dichloromethane, prior to analysis by gas chromatography with mass spectrometric detection (GC/MS). Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PAH-SURR-MS-VA Water PAH Surrogates for Waters EPA 3510, 8270

Analysed as per the corresponding PAH test method. Known quantities of surrogate compounds are added prior to analysis to each sample to demonstrate analytical accuracy.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

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.

VH-HSFID-VA Water VH in Water by Headspace GCFID B.C. MIN. OF ENV. LAB. MAN. (2009)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA Water VH Surrogates for Waters B.C. MIN. OF ENV. LAB. MAN. (2009)

VOC-HSMS-VA Water VOCs in water by Headspace GCMS EPA8260B, 5021

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.

VOC-M-HSMS-VA Water Volatile Organic Compounds - GC-MS EPA 8260B, 5012A

Reference Information

Water samples, with reagents, are heated and an aliquot of the headspace at equilibrium is analysed by GC-MS.

VOC-M2-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA8260B, 5035A, 5021, BC MELP

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA8260B, 5021

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Water	VOC7 and/or VOC Surrogates for Waters	EPA8260B, 5021
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water". The concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and, in solids, Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10).

XYLENES-CALC-VA	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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-346413

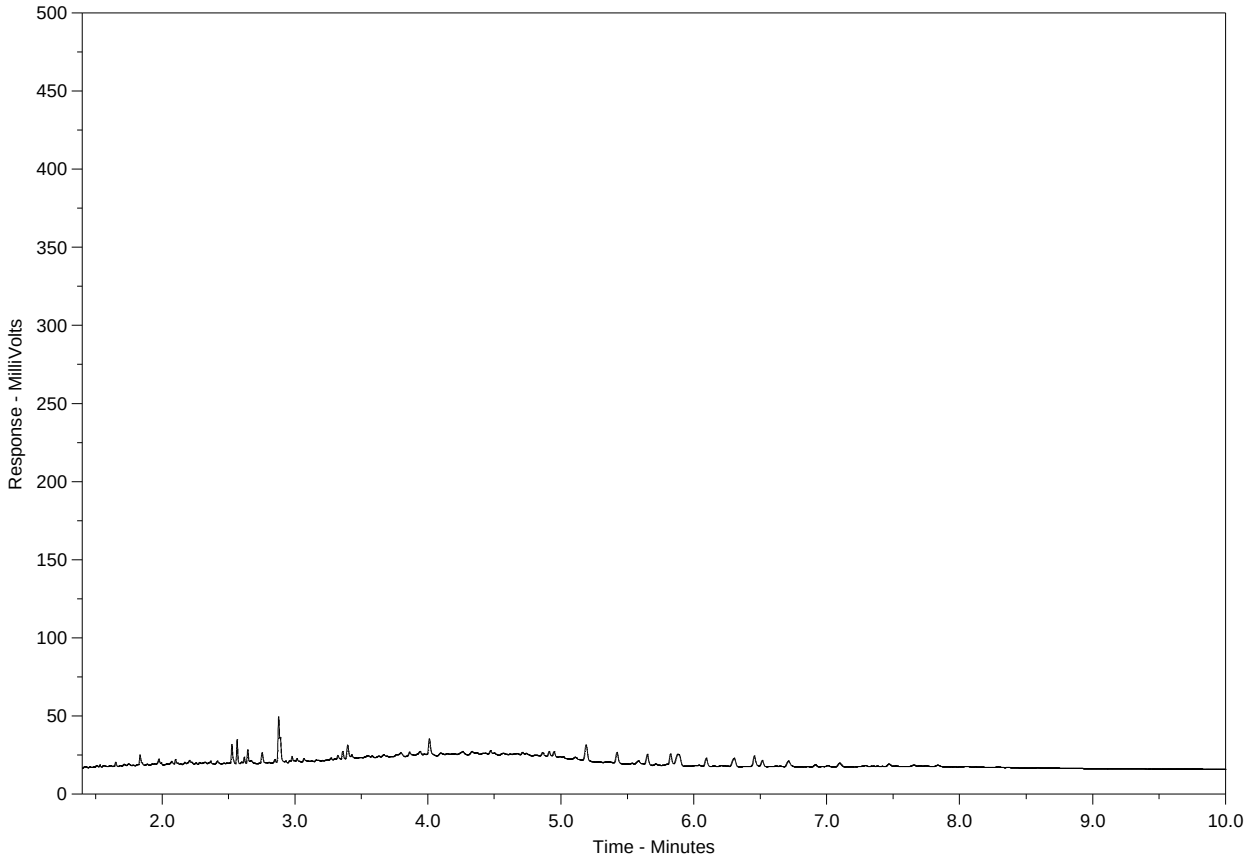
GLOSSARY OF REPORT TERMS

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.

Hydrocarbon Distribution Report

ALS Sample ID: L1376365-1
Client Sample ID: MW-2D



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 or upon request.

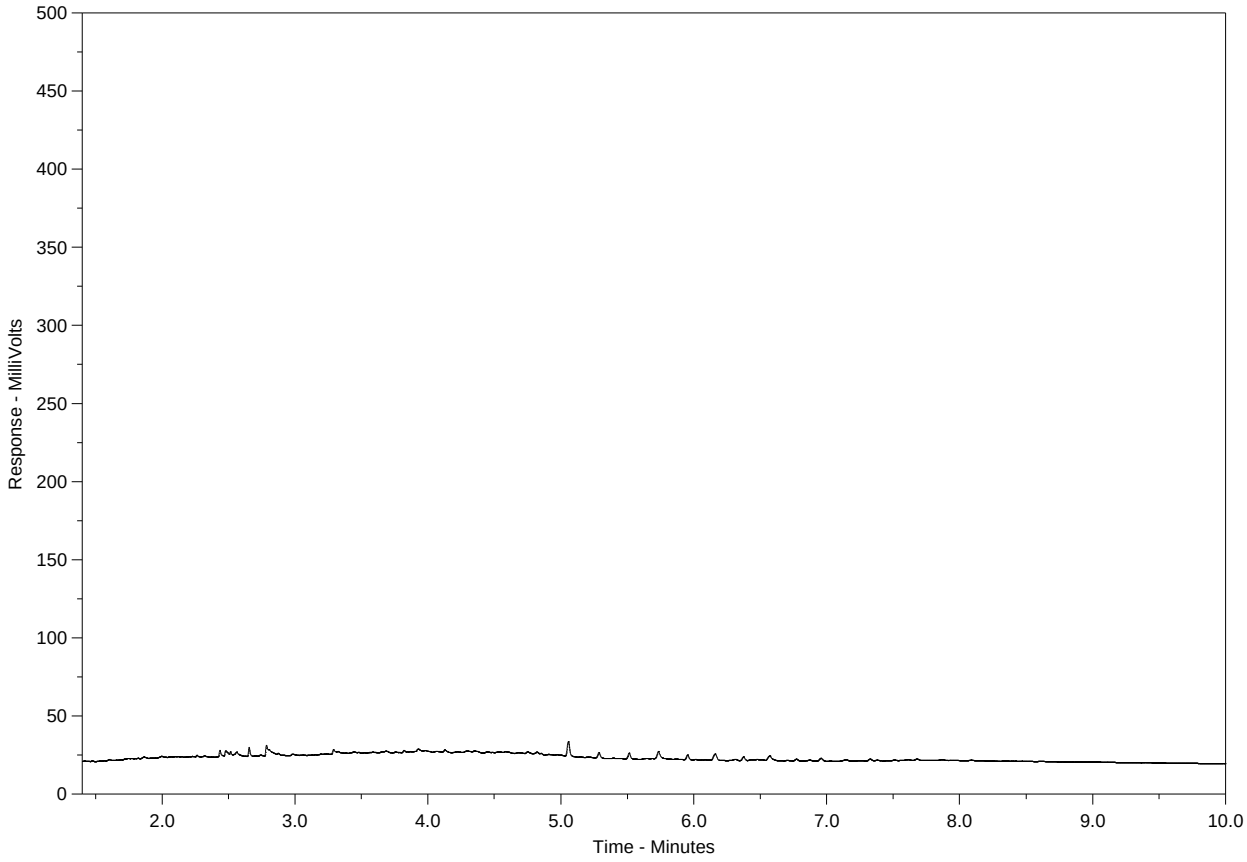
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-2
Client Sample ID: MW-2S



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 or upon request.

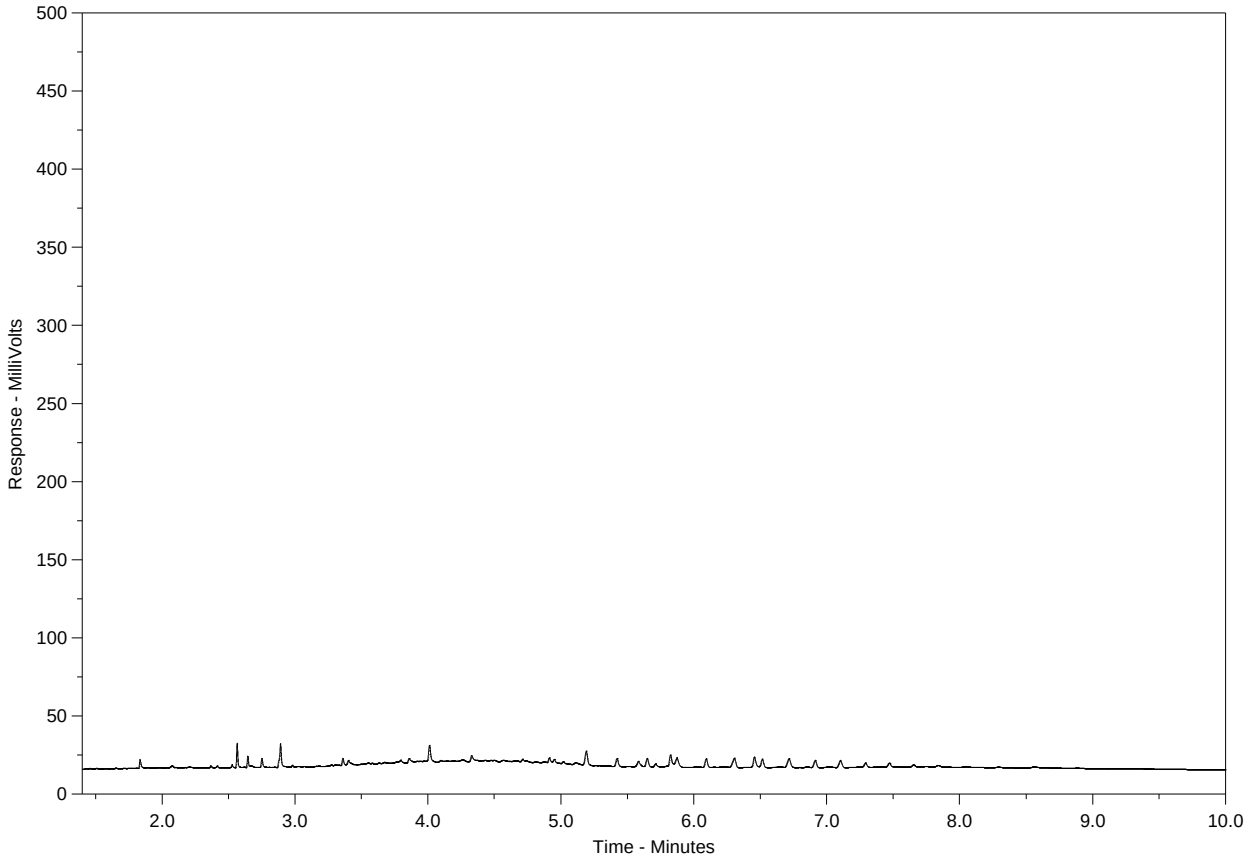
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-3
Client Sample ID: MW-4



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 or upon request.

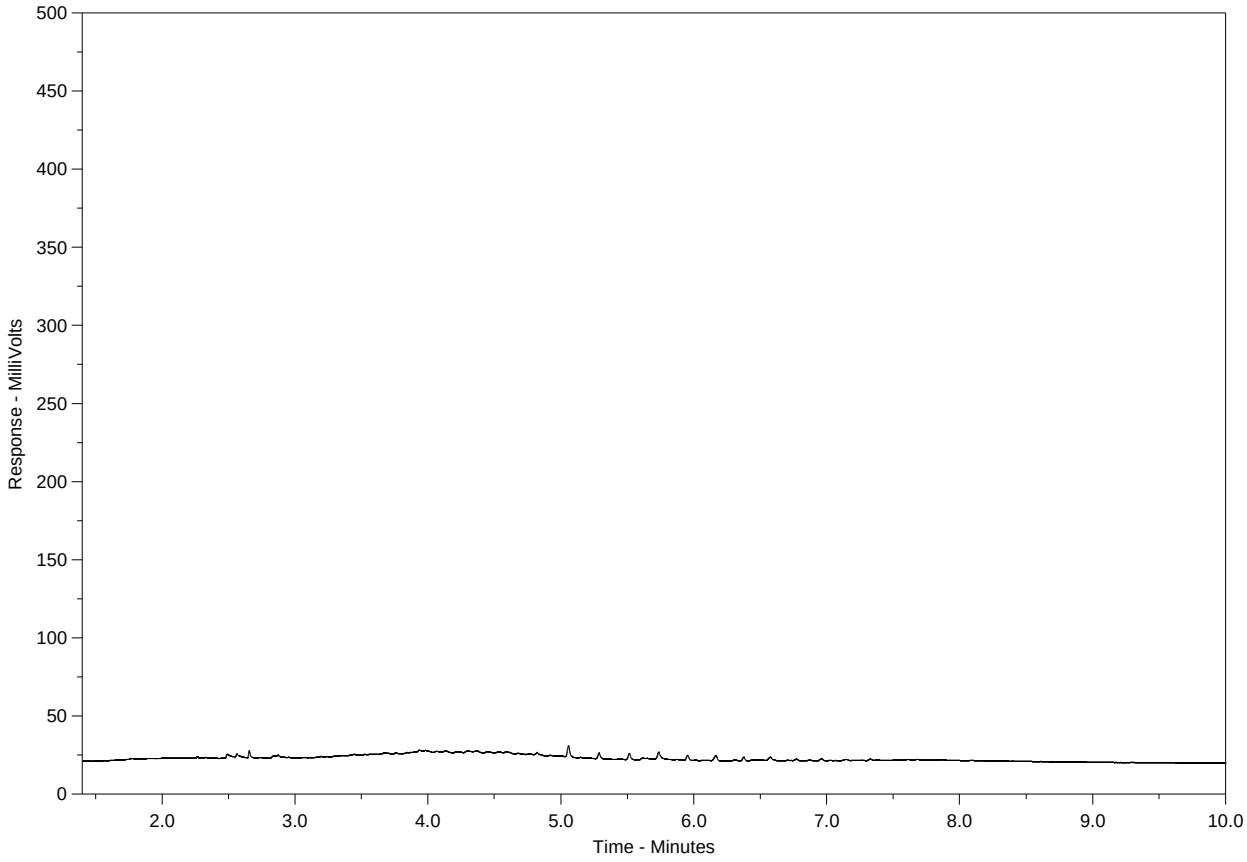
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-4
Client Sample ID: MW-3



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 or upon request.

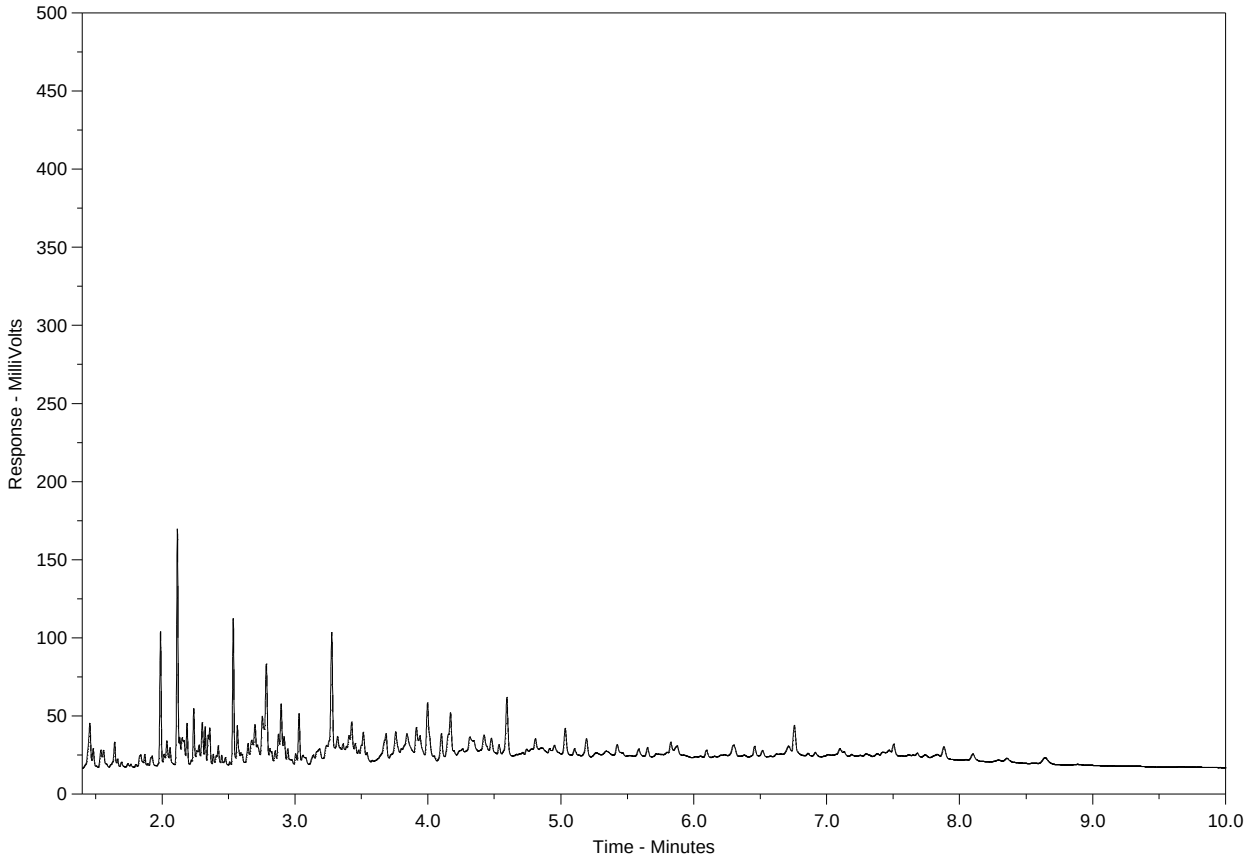
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-5
Client Sample ID: MW-6



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 or upon request.

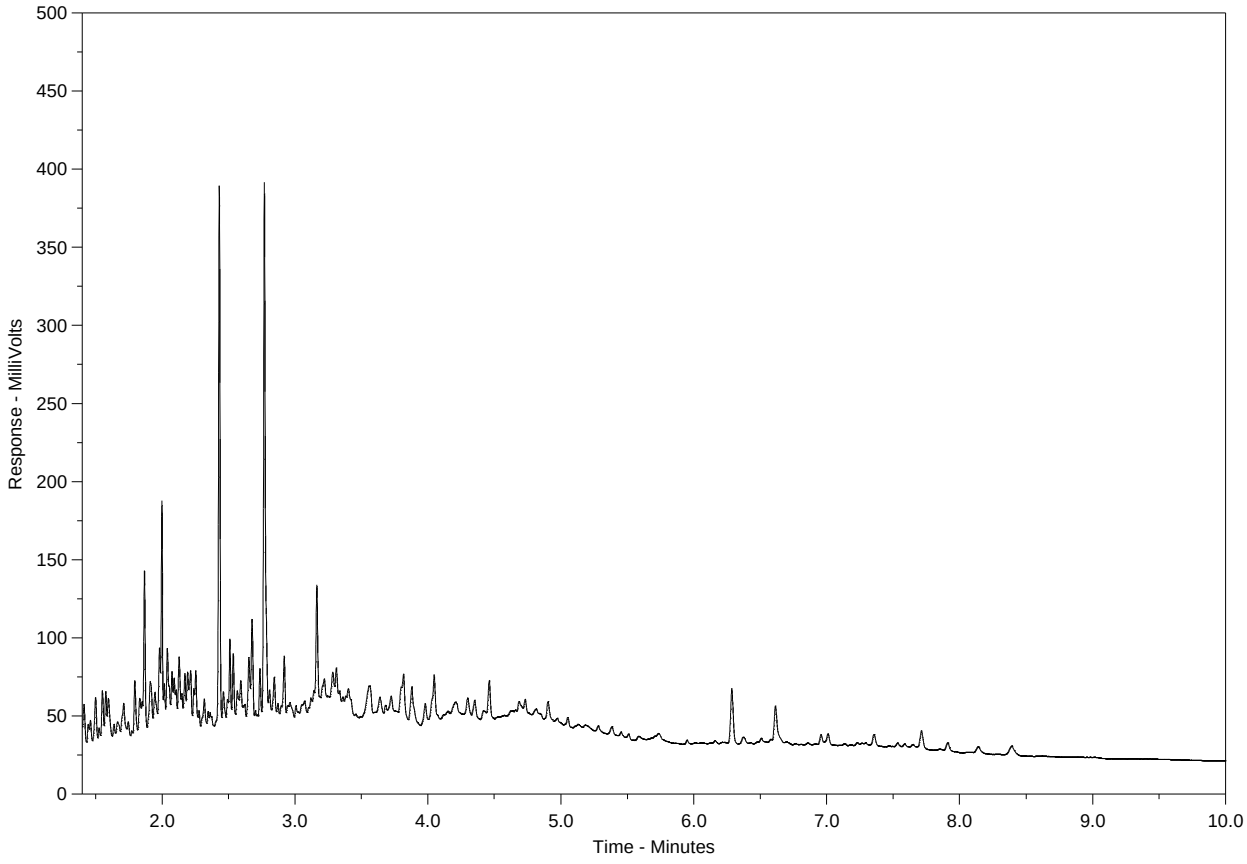
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-6
Client Sample ID: L1



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 or upon request.

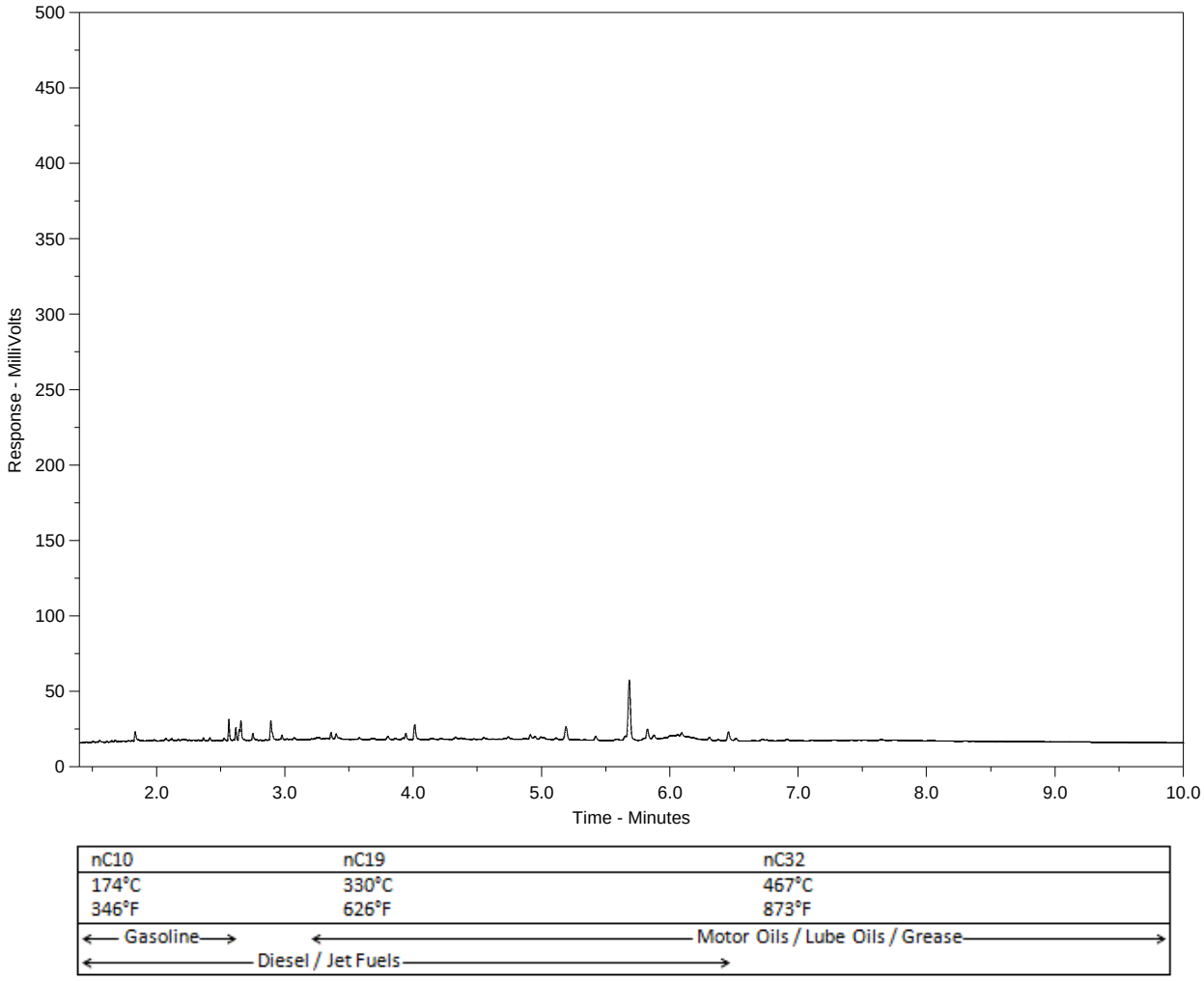
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-7
Client Sample ID: LM (DUPLICATE)



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 or upon request.

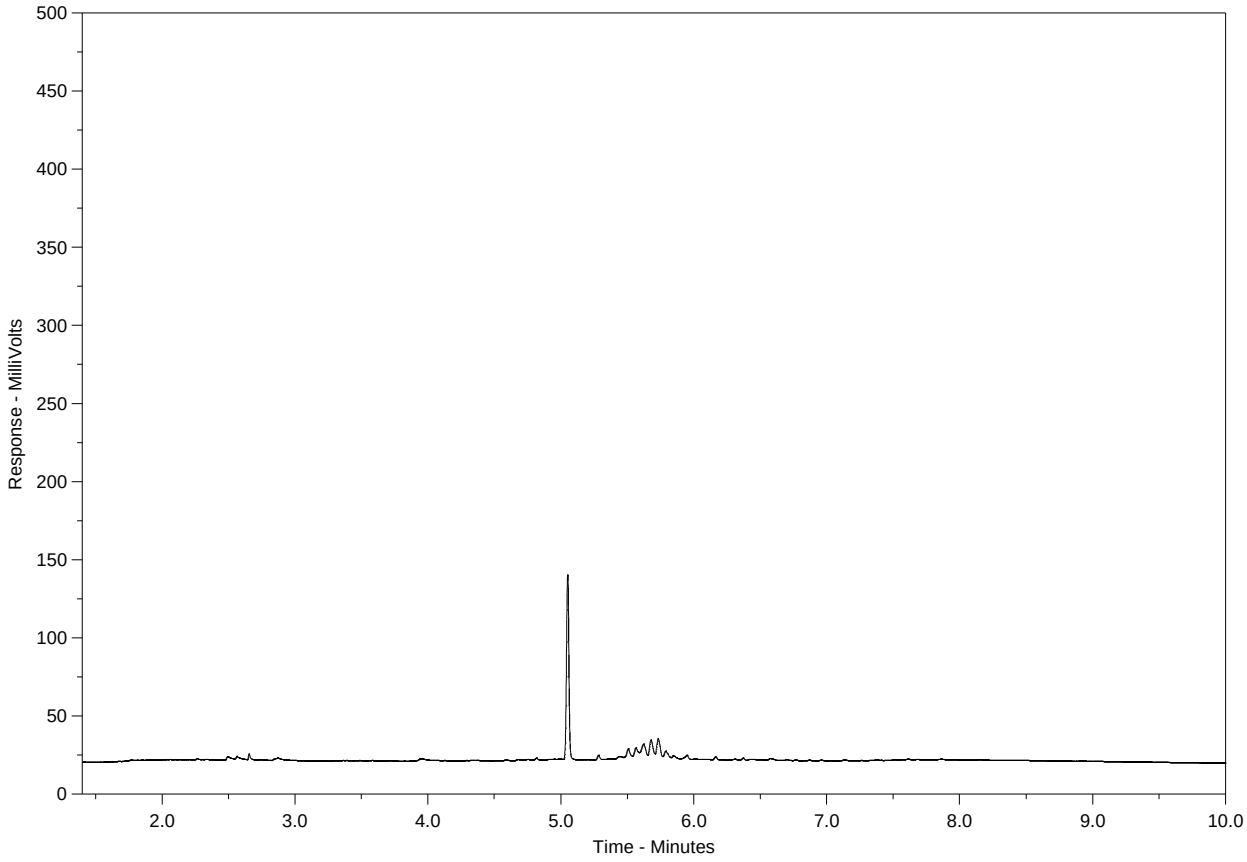
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-8
Client Sample ID: SFC-2



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 or upon request.

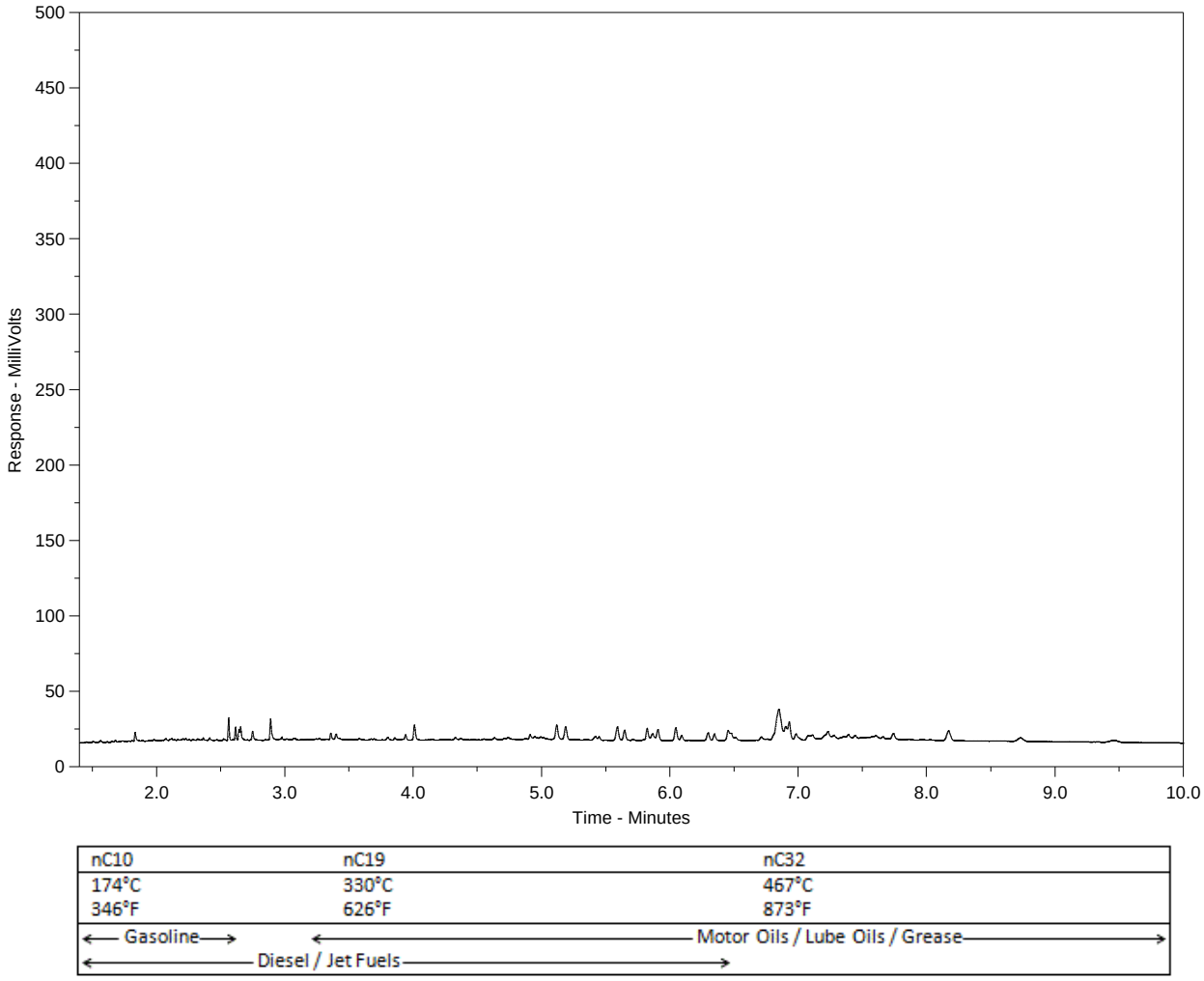
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-9
Client Sample ID: SFC-2B



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 or upon request.

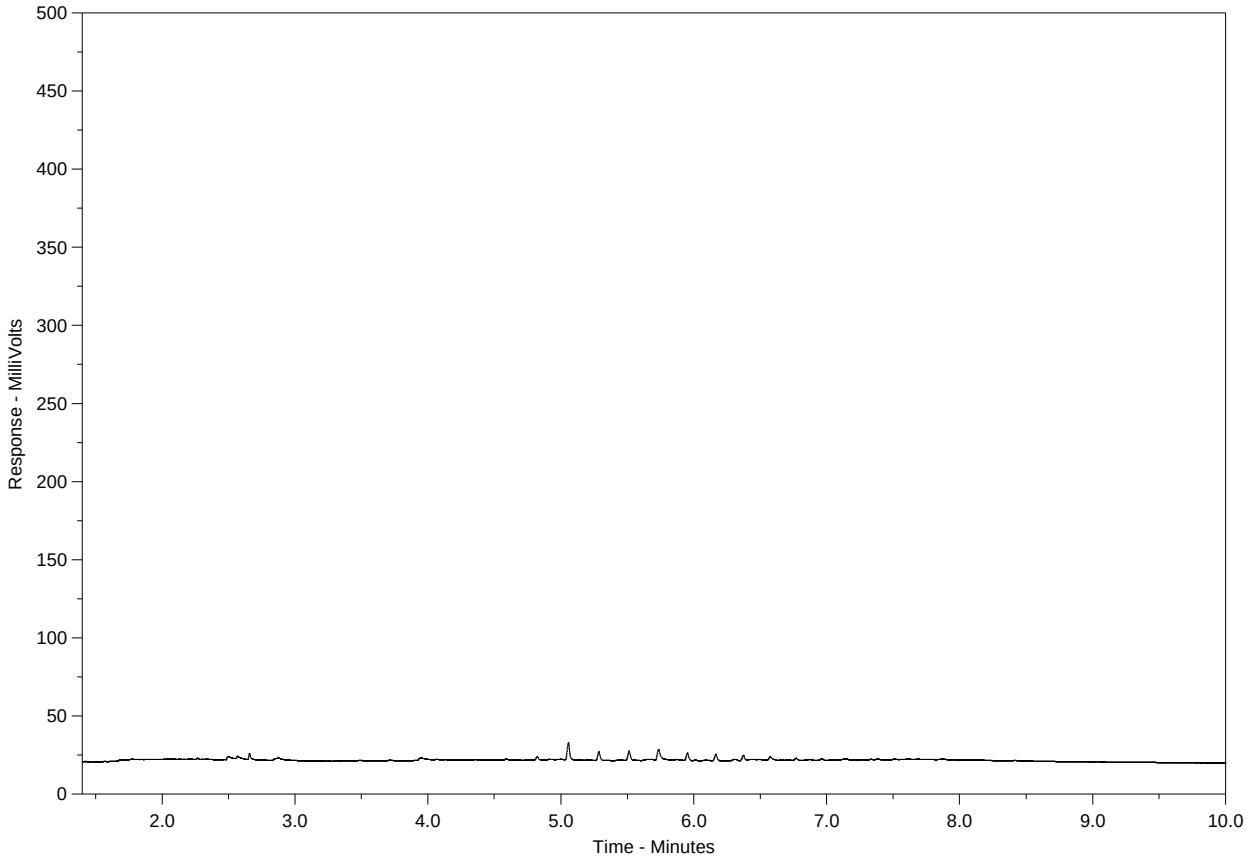
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-10
Client Sample ID: SFC-3



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 or upon request.

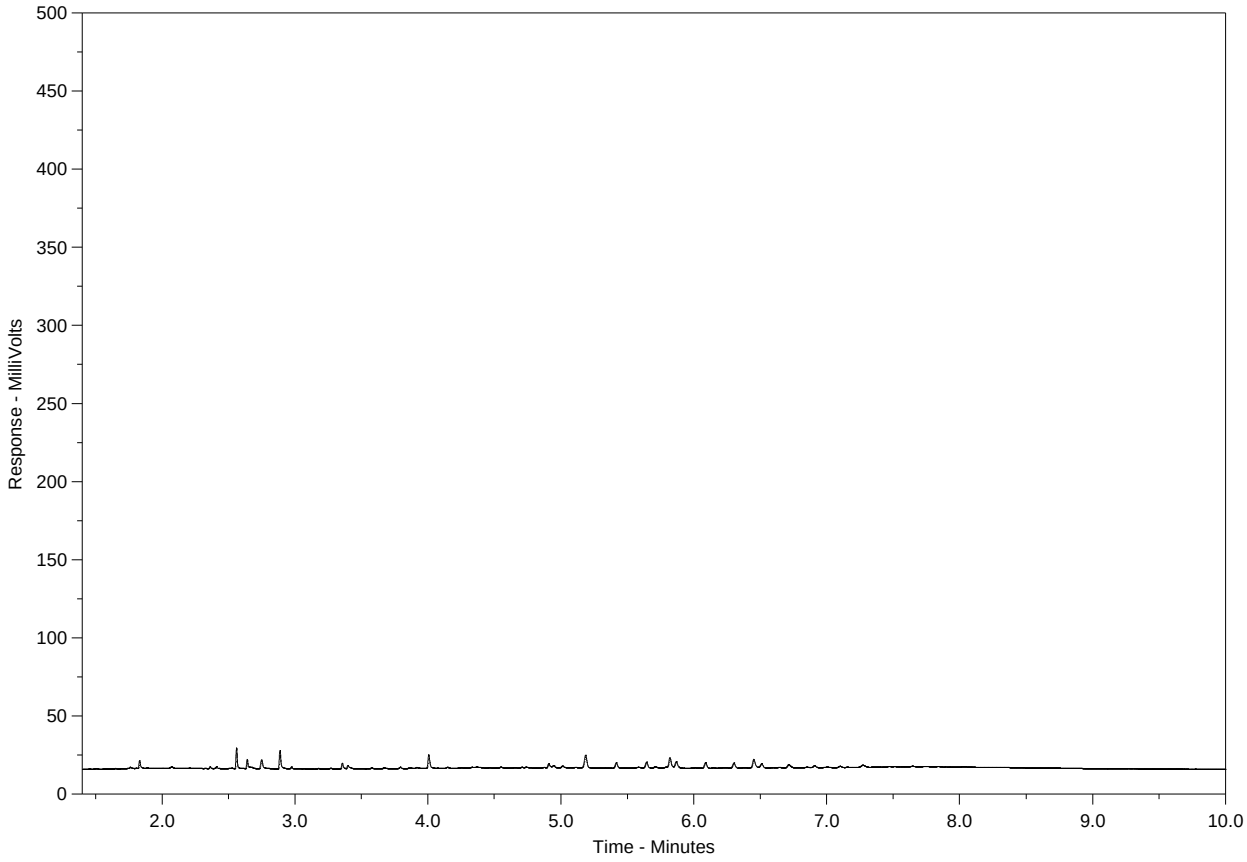
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-11
Client Sample ID: SFC-11



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 or upon request.

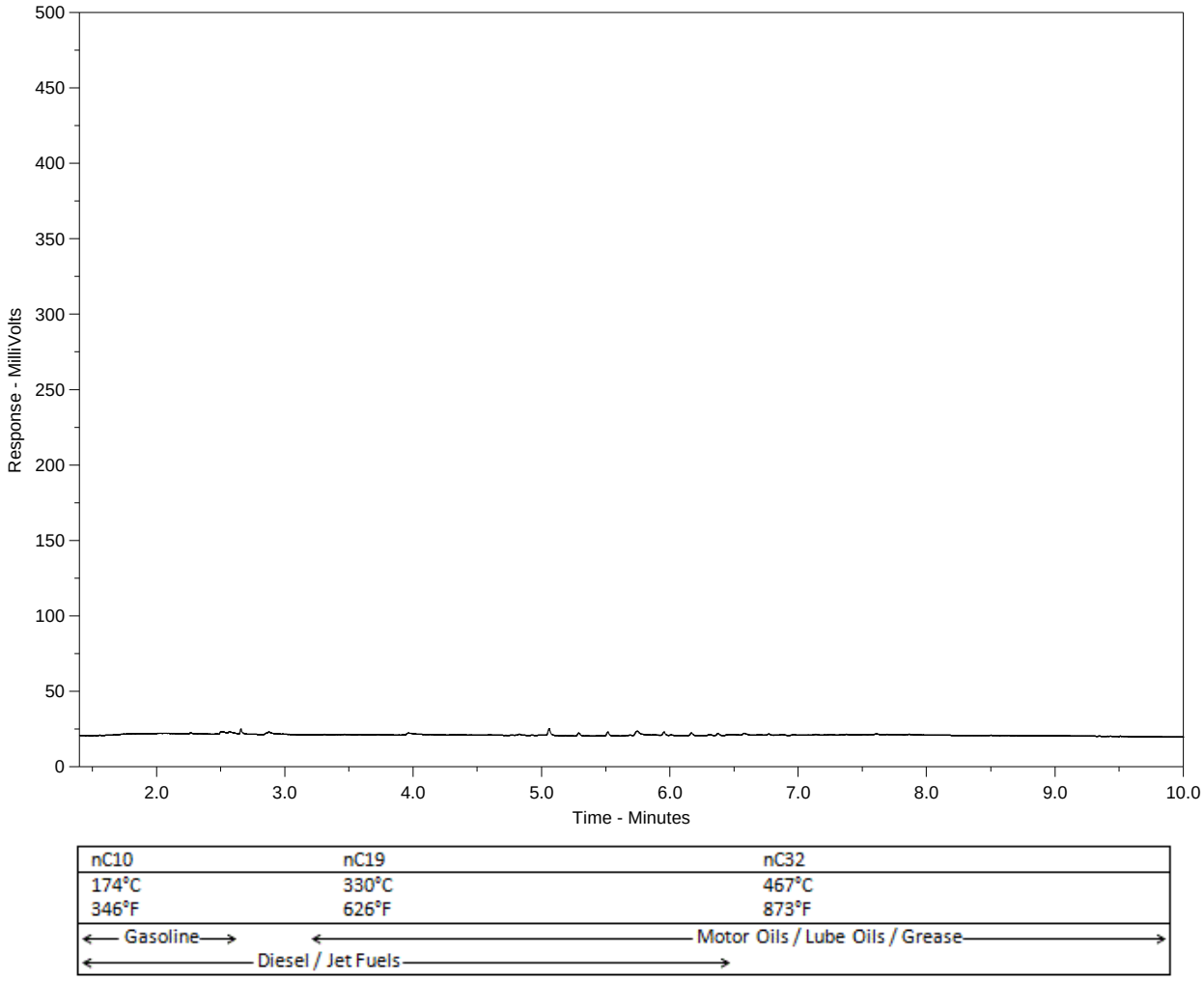
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-12
Client Sample ID: SFC-4B



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 or upon request.

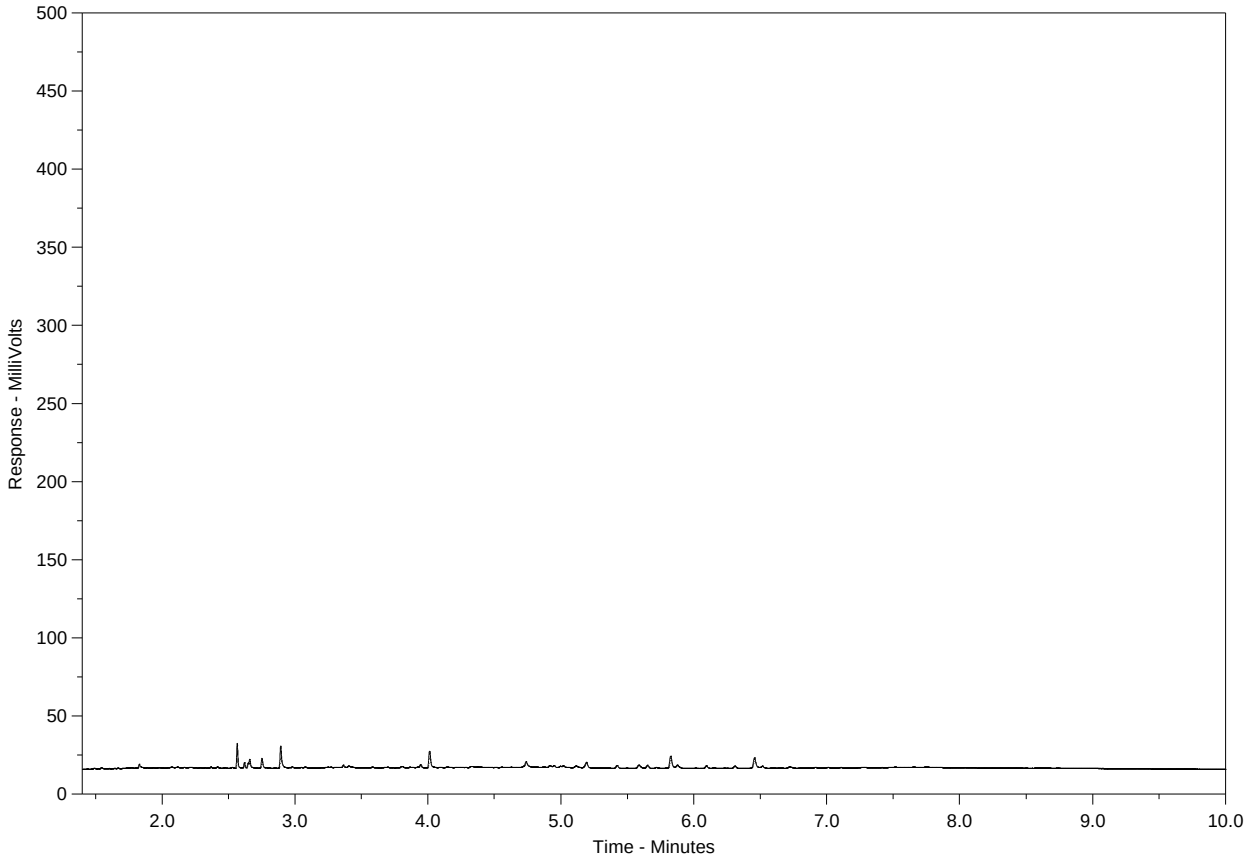
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-13
Client Sample ID: LM



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 or upon request.

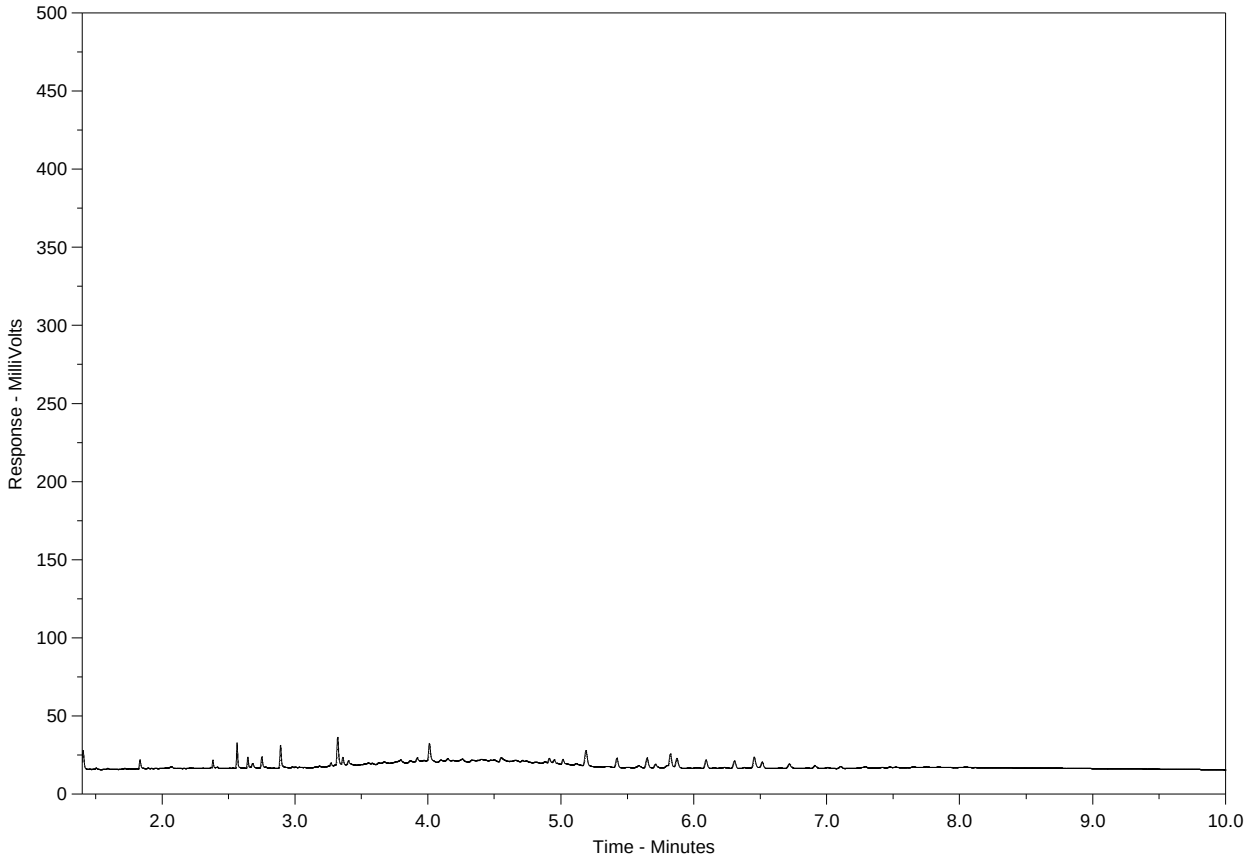
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1376365-14
Client Sample ID: TRAVEL BLANK



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 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.

10- 346413

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Page ____ of ____

Report To	Morrison Hershfield
Company:	
Contact:	Josie Gilson
Address:	310 - 4321 Still Creek Drive, Burnaby BC
Phone:	604 - 459 - 0402 Fax:

Report Format / Distribution	
Standard: ✓	Other (specify):
Select: PDF ✓ Excel ✓ Digital Fax	
Email 1:	jgilson@morrisonhershfield.com
Email 2:	

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
✓	Regular (Standard Turnaround Times - Business Days)
	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Same Day or Weekend Emergency - Contact ALS to confirm TAT

Invoice To	Same as Report ? (circle) Yes or (No) (if No, provide details)
	Copy of Invoice with Report? (circle) (Yes) or No
Company:	Resort Municipality of Whistler
Contact:	Andrew Tucker
Address:	1135 Cheakamus Lk Rd
Phone:	604-935-8386 Fax:

Client / Project Information	
Job #:	5104016
PO / AFE:	
LSD:	
Quote #:	
ALS	Selam Worku
Sampler:	E. Toole

Lab Work Order # (lab use only)

L1376365-COFC

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Physical Param	Organics (hEPH/LEPH)	COD TKN/NH3	VOC's (Btex)	Metals Dissolved	Metals Total	Mercury						Number of Containers
	MW-2D	9/10/13		GW	✓	✓	✓	✓	✓		✓						
	MW-2S	9/10/13		GW	✓	✓	✓	✓	✓		✓						
	MW-4	9/10/13		GW	✓	✓	✓	✓	✓		✓						
	MW-3	9/10/13		GW	✓	✓	✓	✓	✓		✓						
	MW-6	9/10/13		GW	✓	✓	✓	✓	✓		✓						
	L1	10/10/13		GW	✓	✓	✓	✓		✓	✓						
	LM (Duplicate)	9/10/13		GW	✓	✓	✓	✓	✓		✓						
	SFC-2	9/10/13		SW	✓	✓	✓			✓	✓						
	SFC-2B	9/10/13		SW	✓	✓	✓			✓	✓						
	SFC-3	9/10/13		SW	✓	✓	✓			✓	✓						
	SFC-11	9/10/13		SW	✓	✓	✓			✓	✓						
	SFC-4B	10/10/13		SW	✓	✓	✓			✓	✓						

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

VOC's - Pls include Acetone, dibromomethane, bromomethane, 1-3 butadiene, MIBK, MEK. * LM metals + merc not filtered not preserved; L1 merc not filtered not preserved

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: E Toole	Date: Oct 10/13	Time: 10am	Received by: Doren	Date: Oct 10	Time: 1245	Temperature: 7.8 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

MORRISON HERSHFIELD GROUP INC.
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 20-DEC-13
Report Date: 03-JAN-14 17:28 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L1405812

Project P.O. #: NOT SUBMITTED
Job Reference: 5104016
C of C Numbers: 10-371732
Legal Site Desc:

Selam Worku
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-1	L1405812-2	L1405812-3	L1405812-4	L1405812-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13
	Sampled Time					
	Client ID	MW2S	MW2D	MW3	MW4	MW6
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	532	1330	232	411	549
	Hardness (as CaCO3) (mg/L)	179	567	58.4	145	127
	pH (pH)	6.85	6.89	6.72	6.70	6.59
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	134	262	34.2	115	33.1
	Ammonia, Total (as N) (mg/L)	5.30	17.6	0.287	0.66	0.0437
	Bromide (Br) (mg/L)	0.066	<0.50 DLM	0.099	0.106	<0.050
	Chloride (Cl) (mg/L)	18.6	48.7	20.5	25.5	45.3
	Fluoride (F) (mg/L)	0.145	0.36	0.039	0.097	0.101
	Nitrate (as N) (mg/L)	<0.0050	<0.050 DLM	0.0188	<0.0050	0.0436
	Nitrite (as N) (mg/L)	<0.0010	0.012	<0.0010	0.0015	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	5.48	19.2	0.380	1.07	1.5
	Total Nitrogen (mg/L)	5.48	19.2	0.399	1.07	1.5
	Phosphorus (P)-Total (mg/L)	0.509	0.203	0.0126	0.381	3.26
	Sulfate (SO4) (mg/L)	105	424	43.3	50.5	157
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-6	L1405812-7	L1405812-8	L1405812-9	L1405812-10
	Description	SW	SW	SW	SW	SW
	Sampled Date	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13
	Sampled Time					
	Client ID	SFC-2	SFC2B	SFC3	SFC3-REP	SFC 11
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	364	681	195	194	96.4
	Hardness (as CaCO3) (mg/L)	141	281	47.3	47.6	30.7
	pH (pH)	7.19	5.90	7.14	7.25	7.34
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	68.1	15.3	27.5	27.5	23.5
	Ammonia, Total (as N) (mg/L)	0.609	2.58	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.25 DLM	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	12.6	16.1	21.2	21.2	5.92
	Fluoride (F) (mg/L)	0.075	0.27	0.046	0.046	0.048
	Nitrate (as N) (mg/L)	1.20	6.95	0.260	0.258	0.354
	Nitrite (as N) (mg/L)	0.0058	0.0422	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.701	3.13	0.085	0.074	0.072
	Total Nitrogen (mg/L)	1.90	10.1	0.345	0.332	0.426
	Phosphorus (P)-Total (mg/L)	0.0164	0.139	0.0058	0.0040	0.0050
	Sulfate (SO4) (mg/L)	92.2	287	31.0	31.0	12.7
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-11	L1405812-12			
	Description	SW	SW			
	Sampled Date	19-DEC-13				
	Sampled Time					
	Client ID	SFC 4B	TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	231	<2.0			
	Hardness (as CaCO3) (mg/L)	80.1	<0.50			
	pH (pH)	7.34	5.75			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	35.4	<2.0			
	Ammonia, Total (as N) (mg/L)	0.116	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	17.2	<0.50			
	Fluoride (F) (mg/L)	0.054	<0.020			
	Nitrate (as N) (mg/L)	0.590	<0.0050			
	Nitrite (as N) (mg/L)	0.0014	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.224	<0.050			
	Total Nitrogen (mg/L)	0.815	<0.050			
	Phosphorus (P)-Total (mg/L)	0.0031	<0.0020			
	Sulfate (SO4) (mg/L)	48.9	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)		<0.010			
	Antimony (Sb)-Total (mg/L)		<0.00050			
	Arsenic (As)-Total (mg/L)		<0.0010			
	Barium (Ba)-Total (mg/L)		<0.020			
	Beryllium (Be)-Total (mg/L)		<0.0050			
	Bismuth (Bi)-Total (mg/L)		<0.20			
	Boron (B)-Total (mg/L)		<0.10			
	Cadmium (Cd)-Total (mg/L)		<0.000050			
	Calcium (Ca)-Total (mg/L)		<0.10			
	Chromium (Cr)-Total (mg/L)		<0.00050			
	Cobalt (Co)-Total (mg/L)		<0.00050			
	Copper (Cu)-Total (mg/L)		<0.0010			
	Iron (Fe)-Total (mg/L)		<0.030			
	Lead (Pb)-Total (mg/L)		<0.0010			
	Lithium (Li)-Total (mg/L)		<0.050			
	Magnesium (Mg)-Total (mg/L)		<0.10			
	Manganese (Mn)-Total (mg/L)		<0.010			
	Mercury (Hg)-Total (mg/L)		<0.00020			
	Molybdenum (Mo)-Total (mg/L)		<0.0010			
	Nickel (Ni)-Total (mg/L)		<0.0050			
	Phosphorus (P)-Total (mg/L)		<0.30			
	Potassium (K)-Total (mg/L)		<2.0			
	Selenium (Se)-Total (mg/L)		<0.0010			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1405812-1 GW 19-DEC-13 MW2S	L1405812-2 GW 19-DEC-13 MW2D	L1405812-3 GW 19-DEC-13 MW3	L1405812-4 GW 19-DEC-13 MW4	L1405812-5 GW 19-DEC-13 MW6
	Sample ID	L1405812-1	L1405812-2	L1405812-3	L1405812-4	L1405812-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13
	Sampled Time					
	Client ID	MW2S	MW2D	MW3	MW4	MW6
WATER						
Total Metals	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	0.020	<0.010	0.075
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	0.0054	0.0148	<0.0010	0.0021	<0.0010
	Barium (Ba)-Dissolved (mg/L)	0.116	0.033	0.073	0.149	0.039
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	0.16	0.37	<0.10	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	0.000416	0.000326	0.000307
	Calcium (Ca)-Dissolved (mg/L)	56.8	189	17.9	45.8	41.4
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	0.00359	0.0160	0.0118	0.0330	0.00825
	Copper (Cu)-Dissolved (mg/L)	<0.0010	<0.0010	0.0034	0.0022	0.0034
	Iron (Fe)-Dissolved (mg/L)	51.5	66.7	1.11	28.9	3.18
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Magnesium (Mg)-Dissolved (mg/L)	9.08	22.9	3.33	7.41	5.67
	Manganese (Mn)-Dissolved (mg/L)	2.50	2.71	2.38	2.78	0.745
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)	0.0053	0.0169	<0.0010	0.0057	<0.0010
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	10.3	22.6	3.2	5.3	3.3
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)	9.17	13.9	7.79	10.8	8.59
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-6	L1405812-7	L1405812-8	L1405812-9	L1405812-10
	Description	SW	SW	SW	SW	SW
	Sampled Date	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13
	Sampled Time					
	Client ID	SFC-2	SFC2B	SFC3	SFC3-REP	SFC 11
Grouping	**Analyte**					
WATER						
Total Metals	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	LAB	LAB
	Dissolved Metals Filtration Location	LAB	LAB	LAB	LAB	LAB
	Aluminum (Al)-Dissolved (mg/L)	<0.010	0.641	0.021	0.029	0.036
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Barium (Ba)-Dissolved (mg/L)	0.053	0.064	0.021	0.021	<0.020
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	0.000085	0.000490	<0.000050	<0.000050	<0.000050
	Calcium (Ca)-Dissolved (mg/L)	48.6	90.1	15.5	15.6	9.60
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	0.00998	0.0501	0.00105	0.00108	<0.00050
	Copper (Cu)-Dissolved (mg/L)	0.0074	0.127	0.0032	0.0031	<0.0010
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Magnesium (Mg)-Dissolved (mg/L)	4.88	13.6	2.07	2.08	1.64
	Manganese (Mn)-Dissolved (mg/L)	1.09	4.25	0.040	0.041	<0.010
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)	0.0020	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0233	<0.0050	<0.0050	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	4.3	7.3	<2.0	<2.0	<2.0
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)	4.21	8.49	7.24	7.28	8.05
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-11	L1405812-12			
	Description	SW	SW			
	Sampled Date	19-DEC-13				
	Sampled Time					
	Client ID	SFC 4B	TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Total Metals	Silicon (Si)-Total (mg/L)		<0.050			
	Silver (Ag)-Total (mg/L)		<0.000050			
	Sodium (Na)-Total (mg/L)		<2.0			
	Strontium (Sr)-Total (mg/L)		<0.0050			
	Thallium (Tl)-Total (mg/L)		<0.00020			
	Tin (Sn)-Total (mg/L)		<0.030			
	Titanium (Ti)-Total (mg/L)		<0.050			
	Uranium (U)-Total (mg/L)		<0.00020			
	Vanadium (V)-Total (mg/L)		<0.030			
	Zinc (Zn)-Total (mg/L)		<0.0050			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB				
	Dissolved Metals Filtration Location	LAB				
	Aluminum (Al)-Dissolved (mg/L)	0.030				
	Antimony (Sb)-Dissolved (mg/L)	<0.00050				
	Arsenic (As)-Dissolved (mg/L)	<0.0010				
	Barium (Ba)-Dissolved (mg/L)	0.022				
	Beryllium (Be)-Dissolved (mg/L)	<0.0050				
	Bismuth (Bi)-Dissolved (mg/L)	<0.20				
	Boron (B)-Dissolved (mg/L)	<0.10				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050				
	Calcium (Ca)-Dissolved (mg/L)	27.0				
	Chromium (Cr)-Dissolved (mg/L)	<0.00050				
	Cobalt (Co)-Dissolved (mg/L)	0.00175				
	Copper (Cu)-Dissolved (mg/L)	0.0026				
	Iron (Fe)-Dissolved (mg/L)	<0.030				
	Lead (Pb)-Dissolved (mg/L)	<0.0010				
	Lithium (Li)-Dissolved (mg/L)	<0.050				
	Magnesium (Mg)-Dissolved (mg/L)	3.10				
	Manganese (Mn)-Dissolved (mg/L)	0.302				
	Mercury (Hg)-Dissolved (mg/L)	<0.00020				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010				
	Nickel (Ni)-Dissolved (mg/L)	<0.0050				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	2.0				
	Selenium (Se)-Dissolved (mg/L)	<0.0010				
	Silicon (Si)-Dissolved (mg/L)	6.20				
	Silver (Ag)-Dissolved (mg/L)	<0.000050				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-1	L1405812-2	L1405812-3	L1405812-4	L1405812-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13
	Sampled Time					
	Client ID	MW2S	MW2D	MW3	MW4	MW6
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	15.3	33.8	18.0	14.9	65.0
	Strontium (Sr)-Dissolved (mg/L)	0.298	0.719	0.144	0.261	0.375
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Uranium (U)-Dissolved (mg/L)	<0.00020	0.00028	<0.00020	<0.00020	<0.00020
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	0.0118	0.0143	0.0221

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-6	L1405812-7	L1405812-8	L1405812-9	L1405812-10
	Description	SW	SW	SW	SW	SW
	Sampled Date	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13	19-DEC-13
	Sampled Time					
	Client ID	SFC-2	SFC2B	SFC3	SFC3-REP	SFC 11
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	14.1	17.4	18.2	18.5	6.1
	Strontium (Sr)-Dissolved (mg/L)	0.266	0.391	0.135	0.136	0.113
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Uranium (U)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)	0.0108	0.0644	<0.0050	<0.0050	<0.0050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1405812-11	L1405812-12			
	Description	SW	SW			
	Sampled Date	19-DEC-13				
	Sampled Time					
	Client ID	SFC 4B	TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	12.1				
	Strontium (Sr)-Dissolved (mg/L)	0.227				
	Thallium (Tl)-Dissolved (mg/L)	<0.00020				
	Tin (Sn)-Dissolved (mg/L)	<0.030				
	Titanium (Ti)-Dissolved (mg/L)	<0.050				
	Uranium (U)-Dissolved (mg/L)	<0.00020				
	Vanadium (V)-Dissolved (mg/L)	<0.030				
	Zinc (Zn)-Dissolved (mg/L)	<0.0050				

* 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	Sulfate (SO4)	MS-B	L1405812-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1405812-10, -11, -6, -7, -8, -9
Duplicate	Total Kjeldahl Nitrogen	TKND	L1405812-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKND	TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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-DIS-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Water	Ammonia in Water 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.

P-T-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

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.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

** 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-371732

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.

L1405812-COFC

10- 371732

ALS Environmental

ody / Analytical Request Form
Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To		**Report Format / Distribution**		**Service Request:** (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Morrison Hershfield	Standard: ✓	Other (specify):	X	Regular (Standard Turnaround Times - Business Days)
Contact:	Josie Gilson	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	4321 Still Creek Drive, Unit 310	Email 1:	jgilson@morrisonhershfield.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Burnaby, BC V5C 6S7	Email 2:	~~Kcoulter~~ Kcoulter@morrisonhershfield.com.		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	604-454-0402 Fax: 604-454-0403			**Analysis Request**	
Invoice To	Same as Report ? (circle) (Yes) or No (If No, provide details)	**Client / Project Information**		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) (Yes) or No	Job #:	5104016		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)	L1405812	**ALS Contact:**	Sedam Worku	**Sampler:**	J. Gilson + K. Coulter

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Physical	Nutrients + Anions	Dissolved Metals	Number of Containers
	MW2S	19-DEC-13		GW	X	X	X	4
	MW2D				X	X	X	4
	MW3				X	X	X	4
	MW4				X	X	X	4
	MW6				X	X	X	4
	SFC-2			SW	X	X	X	4
	SFC2B				X	X	X	4
	SFC3				X	X	X	4
	SFC3-Rep				X	X	X	4
	SFC11				X	X	X	4
	SFC4B				X	X	X	4

Short Holding Time

Rush Processing

Special Instructions / Regulation with respect to land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

~~GW samples for Dissolved Metals were filtered + preserved.~~ SW for Dissolved Metals NOT Filtered or Preserved.

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 add SIF
	Dec 20/13	~~8:40~~ am	Paige	Dec. 20	8:40	4 °C				

APPENDIX D: Laboratory Results for Leachate Quality Monitoring Compared to Standards and Guidelines

Q1 - 2013 Leachate Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	L1
Analyte	**Units**			**3/19/2013**
Physical Parameters				
Conductivity	uS/cm	-	-	2120
Hardness (as CaCO3)	mg/L	-	-	491
pH	pH	-	9	7.17
Nutrient & Anions				
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	804
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	804
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	**66.2**
Bromide (Br)	mg/L	-	-	<1.0
Chloride (Cl)	mg/L	1500	150	137
Fluoride (F)	mg/L	2	0.4	<0.40
Nitrate (as N)	mg/L	400	3	8.54
Nitrite (as N)	mg/L	0.2	0.02	**0.243**
Total Kjeldahl Nitrogen	mg/L	-	-	76
Total Nitrogen	mg/L	-	-	84.7
Phosphorus (P)-Total	mg/L	-	-	0.429
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	140
Dissolved Metals				
Aluminum (Al)-Dissolved	mg/L	-	Maximum 0.05 (pH ≥ 6.5)	<0.010
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	<0.00050
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	<0.0010
Barium (Ba)-Dissolved	mg/L	10	1	0.093
Beryllium (Be)-Dissolved	mg/L	0.053	-	<0.0050
Bismuth (Bi)-Dissolved	mg/L	-	-	<0.20
Boron (B)-Dissolved	mg/L	50	1.2	2.26
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050
Calcium (Ca)-Dissolved	mg/L	-	-	154
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	0.00182
Cobalt (Co)-Dissolved	mg/L	0.04	0.004 (for total metals)	0.00663
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 150 - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.094(H) + 2 (in µg/L) (for total metals)	0.0077
Iron (Fe)-Dissolved	mg/L	-	0.35	0.101
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010
Lithium (Li)-Dissolved	mg/L	-	0.014	<0.050
Magnesium (Mg)-Dissolved	mg/L	-	-	25.8
Manganese (Mn)-Dissolved	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	3.55
Mercury (Hg)-Dissolved	mg/L	0.001	-	<0.00020
Molybdenum (Mo)-Dissolved	mg/L	10	1	0.0023
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 (H 0-60) 0.065 (H = 60-120) 0.110 (H = 120 - 180) 0.15 (H = >180) (total metals)	0.0079
Phosphorus (P)-Dissolved	mg/L	-	-	<0.30
Potassium (K)-Dissolved	mg/L	-	373	88
Selenium (Se)-Dissolved	mg/L	0.01	0.002	<0.0010
Silicon (Si)-Dissolved	mg/L	-	-	8.04
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.0005 @ H ≤ 100 0.015 @ H > 100	<0.000050
Sodium (Na)-Dissolved	mg/L	-	-	159
Strontium (Sr)-Dissolved	mg/L	-	-	0.853
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	<0.00020
Tin (Sn)-Dissolved	mg/L	-	-	<0.030
Titanium (Ti)-Dissolved	mg/L	1	2	<0.050
Uranium (U)-Dissolved	mg/L	3	0.3	0.00026
Vanadium (V)-Dissolved	mg/L	-	0.02	<0.030

Q1 - 2013 Leachate Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	L1
Analyte	**Units**			**3/19/2013**
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	0.09

Q1 - 2013 Leachate Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	L1
Analyte	**Units**			**3/19/2013**
Aggregate Organics				
COD	mg/L	-	-	160
VOCs				
Acetone	mg/L	-	-	-
Benzene	mg/L	4	0.37	-
Bromodichloromethane	mg/L	-	-	-
Bromoform	mg/L	-	-	-
Bromomethane	mg/L	-	-	-
1,3-Butadiene	mg/L	-	-	-
Carbon Tetrachloride	mg/L	0.13	0.0133	-
Chlorobenzene	mg/L	0.013	0.0013	-
Dibromochloromethane	mg/L	-	-	-
Chloroethane	mg/L	-	-	-
Chloroform	mg/L	0.02	0.0018	-
Chloromethane	mg/L	-	-	-
Dibromomethane	mg/L	-	-	-
1,2-Dichlorobenzene	mg/L	0.007	0.0007	-
1,3-Dichlorobenzene	mg/L	1.5	0.15	-
1,4-Dichlorobenzene	mg/L	0.26	-	-
1,1-Dichloroethane	mg/L	-	-	-
1,2-Dichloroethane	mg/L	1	0.1	-
1,1-Dichloroethylene	mg/L	-	-	-
cis-1,2-Dichloroethylene	mg/L	-	-	-
trans-1,2-Dichloroethylene	mg/L	-	-	-
1,3-Dichloropropene (cis & trans)	mg/L	-	-	-
Dichloromethane	mg/L	0.98	0.0981	-
1,2-Dichloropropane	mg/L	-	-	-
cis-1,3-Dichloropropylene	mg/L	-	-	-
trans-1,3-Dichloropropylene	mg/L	-	-	-
Ethylbenzene	mg/L	2	0.2	-
Methyl ethyl ketone (MEK)	mg/L	-	-	-
Methyl isobutyl ketone (MIBK)	mg/L	-	-	-
Methyl t-butyl ether (MTBE)	mg/L	34	3.4	-
Styrene	mg/L	0.72	0.072	-
1,1,1,2-Tetrachloroethane	mg/L	-	-	-
1,1,2,2-Tetrachloroethane	mg/L	-	-	-
Tetrachloroethylene	mg/L	1.1	0.111	-
Toluene	mg/L	0.39	0.0005	-
1,1,1-Trichloroethane	mg/L	-	11.1	-
1,1,2-Trichloroethane	mg/L	-	-	-
Trichloroethylene	mg/L	0.2	0.021	-
Trichlorofluoromethane	mg/L	-	-	-
Vinyl Chloride	mg/L	-	-	-
ortho-Xylene	mg/L	-	0.03	-
meta- & para-Xylene	mg/L	-	0.03	-
Xylenes	mg/L	-	0.03	-
Hydrocarbons				
EPH10-19	mg/L	5	-	0.58
EPH19-32	mg/L	-	-	0.4
LEPH	mg/L	0.5	-	**0.58**
HEPH	mg/L	-	-	0.4
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	-
VPH (C6-C10)	mg/L	1.5	-	-
PAHs				
Acenaphthene	mg/L	0.06	0.006	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050
Chrysene	mg/L	0.001	-	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050
Naphthalene	mg/L	0.01	0.001	0.000158
Phenanthrene	mg/L	0.003	0.0003	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050
Quinoline	mg/L	0.034	0.0034	<0.00010

Note: Cells exceed the standards are **bold.**
Cells that exceed the guidelines are underlined.
Cells that exceed both the standard and the gudielines are in **bold and underlined**.
* represents values that are below the detection threshold but may be higher than the guidelines

Q3 - 2013 Leachate Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	L1
Analyte	Units			10/10/2013
Physical Parameters				
Conductivity	uS/cm	-	-	2690
Hardness (as CaCO3)	mg/L	-	-	525
pH	pH	-	9	7.66
Nutrients & Anions				
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	994
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	994
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	**105**
Bromide (Br)	mg/L	-	-	<1.0
Chloride (Cl)	mg/L	1500	150	203
Fluoride (F)	mg/L	2	0.4	<0.40
Nitrate (as N)	mg/L	400	3	1.7
Nitrite (as N)	mg/L	0.2	0.02	0.053
Total Kjeldahl Nitrogen	mg/L	-	-	96.5
Total Nitrogen	mg/L	-	-	98.3
Phosphorus (P)-Total	mg/L	-	-	0.715
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309(H=76-180) 429 (H=181-250)	125
Dissolved Metals				
Aluminum (Al)-Dissolved	mg/L	-	0.05	-
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	-
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	-
Barium (Ba)-Dissolved	mg/L	10	1	-
Beryllium (Be)-Dissolved	mg/L	0.053	-	-
Bismuth (Bi)-Dissolved	mg/L	-	-	-
Boron (B)-Dissolved	mg/L	50	1.2	-
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	-
Calcium (Ca)-Dissolved	mg/L	-	-	-
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	-
Cobalt (Co)-Dissolved	mg/L	0.04	0.004	-
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H <50) 0.00004 (H>50)	-
Iron (Fe)-Dissolved	mg/L	-	0.35	-
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	-
Lithium (Li)-Dissolved	mg/L	-	0.014	-
Magnesium (Mg)-Dissolved	mg/L	-	-	-
Manganese (Mn)-Dissolved	mg/L	-	0.7(H = 25) 0.8(H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	-
Mercury (Hg)-Dissolved	mg/L	0.001	-	-
Molybdenum (Mo)-Dissolved	mg/L	10	1	-
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180 (total metals)	-
Phosphorus (P)-Dissolved	mg/L	-	-	-
Potassium (K)-Dissolved	mg/L	-	373	-
Selenium (Se)-Dissolved	mg/L	0.01	0.002	-
Silicon (Si)-Dissolved	mg/L	-	-	-
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	-
Sodium (Na)-Dissolved	mg/L	-	-	-
Strontium (Sr)-Dissolved	mg/L	-	-	-
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	-
Tin (Sn)-Dissolved	mg/L	-	-	-
Titanium (Ti)-Dissolved	mg/L	1	2	-
Uranium (U)-Dissolved	mg/L	3	0.3	-
Vanadium (V)-Dissolved	mg/L	-	0.02	-
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	-

Q3 - 2013 Leachate Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	L1
Analyte	**Units**			**10/10/2013**
Aggregate Organics				
COD	mg/L	-	-	180
VOCs				
Acetone	mg/L	-	-	0.018
Benzene	mg/L	4	0.04	<0.00050
Bromodichloromethane	mg/L	-	-	<0.0010
Bromoform	mg/L	-	-	<0.0010
Bromomethane	mg/L	-	-	<0.0010
1,3-Butadiene	mg/L	-	-	<0.0010
Carbon Tetrachloride	mg/L	0.13	0.0133	<0.00050
Chlorobenzene	mg/L	0.013	0.0013	<0.0010
Dibromochloromethane	mg/L	-	-	<0.0010
Chloroethane	mg/L	-	-	<0.0010
Chloroform	mg/L	0.02	0.0018	<0.0010
Chloromethane	mg/L	-	-	<0.0050
Dibromomethane	mg/L	-	-	<0.0010
1,2-Dichlorobenzene	mg/L	0.007	0.0007	<0.00070
1,3-Dichlorobenzene	mg/L	1.5	0.15	<0.0010
1,4-Dichlorobenzene	mg/L	0.26	-	<0.0010
1,1-Dichloroethane	mg/L	-	-	<0.0010
1,2-Dichloroethane	mg/L	1	0.1	<0.0010
1,1-Dichloroethylene	mg/L	-	-	<0.0010
cis-1,2-Dichloroethylene	mg/L	-	-	<0.0010
trans-1,2-Dichloroethylene	mg/L	-	-	<0.0010
1,3-Dichloropropene (cis & trans)	mg/L	-	-	<0.0014
Dichloromethane	mg/L	0.98	0.0981	<0.0050
1,2-Dichloropropane	mg/L	-	-	<0.0010
cis-1,3-Dichloropropylene	mg/L	-	-	<0.0010
trans-1,3-Dichloropropylene	mg/L	-	-	<0.0010
Ethylbenzene	mg/L	2	0.2	<0.00050
Methyl ethyl ketone (MEK)	mg/L	-	-	<0.010
Methyl isobutyl ketone (MIBK)	mg/L	-	-	<0.0010
Methyl t-butyl ether (MTBE)	mg/L	34	3.4	0.00067
Styrene	mg/L	0.72	0.072	<0.00050
1,1,1,2-Tetrachloroethane	mg/L	-	-	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	-	-	<0.0010
Tetrachloroethylene	mg/L	1.1	0.111	<0.0010
Toluene	mg/L	0.39	0.0005	<0.00050
1,1,1-Trichloroethane	mg/L	-	11.1	<0.0010
1,1,2-Trichloroethane	mg/L	-	-	<0.0010
Trichloroethylene	mg/L	0.2	0.021	<0.0010
Trichlorofluoromethane	mg/L	-	-	<0.0010
Vinyl Chloride	mg/L	-	-	<0.0010
ortho-Xylene	mg/L	-	0.03	<0.00050
meta- & para-Xylene	mg/L	-	0.03	<0.00050
Xylenes	mg/L	-	0.03	<0.00075
Hydrocarbons				
EPH10-19	mg/L	5	-	0.62
EPH19-32	mg/L	-	-	0.43
LEPH	mg/L	0.5	-	**0.62**
HEPH	mg/L	-	-	0.43
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	<0.10
VPH (C6-C10)	mg/L	1.5	-	<0.10
PAHs				
Acenaphthene	mg/L	0.06	0.006	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050
Chrysene	mg/L	0.001	-	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050
Quinoline	mg/L	0.034	0.0034	<0.000050

Note: Cells exceed the standards are **bold.**

Cells that exceed the guidelines are underlined.

Cells that exceed both the standard and the gudielines are in **bold and underlined**.

* represents values that are below the detection threshold but may be higher than the guidelines

APPENDIX E: Laboratory Results for Groundwater Quality Monitoring Data Compared to Standards and Guidelines

Q1 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality	MW2S	MW2D	MW3	MW4	MW6	MW6 DUP
Analyte	Units		Guidelines	3/19/2013	3/19/2013	3/19/2013	3/19/2013	3/19/2013	3/19/2013
Physical Parameters									
Conductivity	uS/cm	-	-	715	1520	233	500	578	573
Hardness (as CaCO3)	mg/L	-	-	212	658	63.2	184	121	121
pH	pH	-	9	6.78	6.78	6.47	6.64	6.26	6.21
Nutrient & Anions				-	-	-	-	-	-
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	164	266	36.9	156	21.8	16.1
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	164	266	36.9	156	21.8	16.1
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	10.4	17.6	0.273	1.66	0.0155	0.0168
Bromide (Br)	mg/L	-	-	<0.25	<0.50	0.14	0.13	<0.050	<0.050
Chloride (Cl)	mg/L	1500	150	39	57	28.6	33.5	79	78
Fluoride (F)	mg/L	2	0.4	0.22	0.37	0.038	<0.10	0.072	0.068
Nitrate (as N)	mg/L	400	3	<0.025	<0.050	0.119	0.0079	0.0638	0.0656
Nitrite (as N)	mg/L	0.2	0.02	0.0052	<0.010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	-	-	11.4	19.1	0.303	1.68	2.81	2.75
Total Nitrogen	mg/L	-	-	11.4	19.1	0.422	1.69	2.87	2.82
Phosphorus (P)-Total	mg/L	-	-	0.075	0.584	0.0026	0.408	18.6	13
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	153	539	32.9	61.6	135	133
Dissolved Metals									
Aluminum (Al)-Dissolved	mg/L	-	0.05	<0.010	<0.010	0.031	<0.010	0.076	0.074
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	0.0026	0.0159	<0.0010	0.0025	<0.0010	<0.0010
Barium (Ba)-Dissolved	mg/L	10	1	0.17	0.038	0.08	0.191	0.044	0.045
Beryllium (Be)-Dissolved	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Dissolved	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Dissolved	mg/L	50	1.2	0.18	0.35	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	0.000052	<0.000050	0.000264	0.000373	0.00025	0.000261
Calcium (Ca)-Dissolved	mg/L	-	-	69.3	215	19.4	58.7	39.1	39.3
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.04	0.004	0.00287	0.0193	0.0102	**0.0422**	0.00156	0.00159
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 150 - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	<0.0010	<0.0010	0.0042	<0.0010	0.0022	0.0021
Iron (Fe)-Dissolved	mg/L	-	0.35	38.5	76.7	0.922	33.2	<0.030	<0.030
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Dissolved	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Dissolved	mg/L	-	-	9.47	29.4	3.59	8.99	5.6	5.61
Manganese (Mn)-Dissolved	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	2.78	3.02	2.12	4.2	0.604	0.597
Mercury (Hg)-Dissolved	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Dissolved	mg/L	10	1	0.003	0.017	<0.0010	0.005	<0.0010	<0.0010
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050	<0.0050	0.0059	<0.0050	<0.0050
Phosphorus (P)-Dissolved	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	mg/L	-	373	14.5	28.5	3.6	7.2	3.6	3.6
Selenium (Se)-Dissolved	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved	mg/L	-	-	8.01	14	7.24	11.2	8.06	8.06
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	-	-	14.4	33.3	17.1	14.7	64.4	63.1
Strontium (Sr)-Dissolved	mg/L	-	-	0.358	0.825	0.148	0.326	0.551	0.556
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved	mg/L	3	0.3	<0.00020	0.00033	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	<0.0050	<0.0050	0.0102	<0.0050	<0.0050

Q1 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality	MW2S	MW2D	MW3	MW4	MW6	MW6 DUP
Analyte	Units		Guidelines	3/19/2013	3/19/2013	3/19/2013	3/19/2013	3/19/2013	3/19/2013
Aggregate Organics									
COD	mg/L	-	-	33	52	<20	29	50	86
VOCs									
Acetone	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzene	mg/L	4	0.04	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bromodichloromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Butadiene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	0.13	0.0133	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.013	0.0013	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Dibromochloromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	0.02	0.0018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/L	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dibromomethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/L	0.007	0.0007	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
1,3-Dichlorobenzene	mg/L	1.5	0.15	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/L	0.26	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane	mg/L	1	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,2-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,2-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene (cis & trans)	mg/L	-	-	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
Dichloromethane	mg/L	0.98	0.0981	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloropropane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	2	0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl ethyl ketone (MEK)	mg/L	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Methyl isobutyl ketone (MIBK)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Methyl t-butyl ether (MTBE)	mg/L	34	3.4	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.72	0.072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1,2-Tetrachloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethylene	mg/L	1.1	0.111	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/L	0.39	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1-Trichloroethane	mg/L	-	11.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethylene	mg/L	0.2	0.021	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Vinyl Chloride	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
ortho-Xylene	mg/L	-	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	mg/L	-	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	-	0.03	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Hydrocarbons									
EPH10-19	mg/L	5	-	<0.25	<0.25	<0.25	<0.25	0.96	0.59
EPH19-32	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	1.2	0.67
LEPH	mg/L	0.5	-	<0.25	<0.25	<0.25	<0.25	**0.96**	**0.59**
HEPH	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	1.2	0.67
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
VPH (C6-C10)	mg/L	1.5	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PAHs									
Acenaphthene	mg/L	0.06	0.006	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010 *	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050*	<0.000050*	<0.000050*	<0.000050*	<0.000050*	<0.000050*
Quinoline	mg/L	0.034	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Note: Cells exceed the standards are **bold.**
Cells that exceed the guidelines are underlined.
Cells that exceed both the standard and the gudielines are in **bold and underlined**.
* represents values that are below the detection threshold but may be higher than the guidelines

Q2 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	MW-2S	MW-2D	MW-3	MW4	MW6
Analyte	Units			6/25/2013	6/25/2013	6/25/2013	6/25/2013	6/25/2013
Physical Parameters								
Conductivity	uS/cm	-	-	528	1410	169	433	713
Hardness (as CaCO3)	mg/L	-	-	195	622	47.8	148	145
pH	pH	-	9	6.99	6.95	6.85	7	6.48
Nutrient & Anions								
Alkalinity, Total (as CaCO3)	mg/L	-	-	138	238	35.7	136	21.7
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	7.76	1.47	0.0256	3.27	0.0492
Bromide (Br)	mg/L	-		0.063	<0.50 *	<0.050	0.074	<0.25 *
Chloride (Cl)	mg/L	1500	150	16.3	52.8	15.4	25.1	117
Fluoride (F)	mg/L	2	0.4	<0.10 *	0.28	0.022	<0.10 *	0.1
Nitrate (as N)	mg/L	400	3	0.0155	<0.050 *	0.112	<0.0050	0.031
Nitrite (as N)	mg/L	0.2	0.02	<0.0010	0.012	<0.0010	<0.0010	0.005
Total Kjeldahl Nitrogen	mg/L	-	-	7.96	17.7	0.093	3.04	1.22
Total Nitrogen	mg/L	-	-	7.97	17.8	0.205	3.04	1.25
Phosphorus (P)-Total	mg/L	-	-	0.618	0.153	<0.0020	0.171	7.7
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	107	482	21.1	56.1	134
Dissolved Metals								
Aluminum (Al)-Dissolved	mg/L	-	0.05	<0.010	<0.010	<0.010	<0.010	0.086
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	0.0064	0.0141	<0.0010	0.0047	<0.0010
Barium (Ba)-Dissolved	mg/L	10	1	0.125	0.035	0.055	0.186	0.044
Beryllium (Be)-Dissolved	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Dissolved	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Dissolved	mg/L	50	1.2	0.19	0.37	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050	<0.000050	0.000109	0.000059	0.000268
Calcium (Ca)-Dissolved	mg/L	-	-	63.3	207	13.9	47.9	47.7
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.04	0.004	0.00196	0.018	0.0333	0.0333	0.0171
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	<0.0010	<0.0010	0.0018	<0.0010	0.0031
Iron (Fe)-Dissolved	mg/L	-	0.35	43.7	72.2	<0.030	56.7	1.84
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Dissolved	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Dissolved	mg/L	-	-	8.94	25.8	2.31	6.89	6.33
Manganese (Mn)-Dissolved	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	2.7	2.87	1.11	3.1	1.21
Mercury (Hg)-Dissolved	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Dissolved	mg/L	10	1	0.004	0.016	<0.0010	0.0167	<0.0010
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050	0.0129	0.011	<0.0050
Phosphorus (P)-Dissolved	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	mg/L	-	373	12.7	26.2	2.8	7.3	4.1
Selenium (Se)-Dissolved	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved	mg/L	-	-	9.31	13.5	7.36	10	8.11
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	-	-	15.7	37.7	11.2	21.4	84.6
Strontium (Sr)-Dissolved	mg/L	-	-	0.32	0.793	0.124	0.286	0.443
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved	mg/L	3	0.3	<0.00020	0.00031	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Q2 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	MW-2S	MW-2D	MW-3	MW4	MW6
Analyte	**Units**			**6/25/2013**	**6/25/2013**	**6/25/2013**	**6/25/2013**	**6/25/2013**
Aggregate Organics								
COD	mg/L	-	-	36	114	<20	145	163
VOCs								
Acetone	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzene	mg/L	4	0.04	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bromodichloromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Butadiene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	0.13	0.0133	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.013	0.0013	<0.0010	0.0012	<0.0010	<0.0010	<0.0010
Dibromochloromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	0.02	0.0018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/L	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dibromomethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/L	0.007	0.0007	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
1,3-Dichlorobenzene	mg/L	1.5	0.15	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/L	0.26	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane	mg/L	1	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,2-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,2-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene (cis & trans)	mg/L	-	-	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
Dichloromethane	mg/L	0.98	0.0981	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloropropane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	2	0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl ethyl ketone (MEK)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Methyl isobutyl ketone (MIBK)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Methyl t-butyl ether (MTBE)	mg/L	34	3.4	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.72	0.072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1,2-Tetrachloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethylene	mg/L	1.1	0.111	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/L	0.39	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1-Trichloroethane	mg/L	-	11.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethylene	mg/L	0.2	0.021	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Vinyl Chloride	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
ortho-Xylene	mg/L	-	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	mg/L	-	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	-	0.03	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Hydrocarbons								
EPH10-19	mg/L	5	-	<0.25	<0.25	<0.25	<0.25	<0.25
EPH19-32	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
LEPH	mg/L	0.5	-	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	<0.10	<0.10	<0.10	<0.10	<0.10
VPH (C6-C10)	mg/L	1.5	-	<0.10	<0.10	<0.10	<0.10	<0.10
PAHs								
Acenaphthene	mg/L	0.06	0.006	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050*	<0.000050*	<0.000050*	<0.000050*	<0.000050*
Quinoline	mg/L	0.034	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Note: Cells exceed the standards are **bold.**

Cells that exceed the guidelines are underlined.

Cells that exceed both the standard and the gudielines are in **bold and underlined**.

* represents values that are below the detection threshold but may be higher than the guidelines

Q3 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water	MW-2S	MW-2D	MW-3	MW-4	MW-6
Analyte	Units		Quality Guidelines	10/9/2013	10/9/2013	10/9/2013	10/9/2013	10/9/2013
Physical parameters								
Conductivity	uS/cm	-	-	562	1280	199	347	539
Hardness (as CaCO3)	mg/L	-	-	209	568	48.1	124	106
pH	pH	-	9	7.04	7.03	6.67	6.9	6.48
Nutrients & Anions								
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	130	227	31.8	95.7	36.5
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	130	227	31.8	95.7	36.5
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	6.44	15.9	0.205	1.29	0.0483
Bromide (Br)	mg/L	-	-	0.055	<0.50 *	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	1500	150	23	47.1	16.2	20.1	54.1
Fluoride (F)	mg/L	2	0.4	<0.10 *	<0.20 *	0.029	<0.10 *	0.103
Nitrate (as N)	mg/L	400	3	<0.0050	<0.050 *	0.0053	<0.0050	0.0737
Nitrite (as N)	mg/L	0.2	0.02	<0.0010	<0.010 *	<0.0010	0.001	0.0012
Total Kjeldahl Nitrogen	mg/L	-	-	7.65	18.3	0.301	1.7	1.19
Total Nitrogen	mg/L	-	-	6.51	16.5	0.221	1.46	0.92 *
Phosphorus (P)-Total	mg/L	-	-	0.119	0.161	0.0026	0.437	3.6
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	113	418	34.4	46.8	135
Dissolved Metals								
Aluminum (Al)-Dissolved	mg/L	-	0.05	<0.010	<0.010	0.015	<0.010	0.074
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	0.0075	0.015	<0.0010	0.0031	<0.0010
Barium (Ba)-Dissolved	mg/L	10	1	0.131	0.032	0.062	0.13	0.034
Beryllium (Be)-Dissolved	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Dissolved	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Dissolved	mg/L	50	1.2	0.18	0.37	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050	<0.000050	0.000225	0.000455	0.000189
Calcium (Ca)-Dissolved	mg/L	-	-	66.7	190	14.8	38.9	34.8
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.04	0.004	0.00296	0.0153	0.00588	0.0313	0.0118
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	<0.0010	<0.0010	0.0022	0.0019	0.003
Iron (Fe)-Dissolved	mg/L	-	0.35	51.7	63.9	0.576	33.3	1.52
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Dissolved	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Dissolved	mg/L	-	-	10.2	22.7	2.67	6.4	4.59
Manganese (Mn)-Dissolved	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	3.01	2.69	1.67	2.63	0.922
Mercury (Hg)-Dissolved	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Dissolved	mg/L	10	1	0.0046	0.0168	0.001	0.0123	<0.0010
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phosphorus (P)-Dissolved	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	mg/L	-	373	11.7	23.1	2.9	5.4	3.4
Selenium (Se)-Dissolved	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved	mg/L	-	-	9.95	13.8	7.59	9.94	8.75
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	-	-	17.7	34	13.3	16.8	74
Strontium (Sr)-Dissolved	mg/L	-	-	0.336	0.703	0.125	0.226	0.32
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved	mg/L	3	0.3	<0.00020	0.00023	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	<0.0050	<0.0050	0.0067	<0.0050

Q3 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water	MW-2S	MW-2D	MW-3	MW-4	MW-6
Analyte	Units		Quality Guidelines	10/9/2013	10/9/2013	10/9/2013	10/9/2013	10/9/2013
Aggregate Organics								
COD	mg/L	-	-	21	26	<20	35	87
VOCs								
Acetone	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzene	mg/L	4	0.04	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bromodichloromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Butadiene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	0.13	0.0133	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.013	0.0013	<0.0010	0.0013	<0.0010	<0.0010	<0.0010
Dibromochloromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	0.02	0.0018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/L	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dibromomethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/L	0.007	0.0007	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
1,3-Dichlorobenzene	mg/L	1.5	0.15	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/L	0.26	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane	mg/L	1	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,2-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,2-Dichloroethylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene (cis & trans)	mg/L	-	-	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
Dichloromethane	mg/L	0.98	0.0981	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloropropane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropylene	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	2	0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl ethyl ketone (MEK)	mg/L	-	-	0.396	<0.0010	<0.0010	<0.0010	<0.0010
Methyl isobutyl ketone (MIBK)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Methyl t-butyl ether (MTBE)	mg/L	34	3.4	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.72	0.072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1,2-Tetrachloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethylene	mg/L	1.1	0.111	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/L	0.39	0.0005	0.00167	<0.00050	<0.00050	<0.00050	<0.00050
1,1,1-Trichloroethane	mg/L	-	11.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethylene	mg/L	0.2	0.021	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Vinyl Chloride	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
ortho-Xylene	mg/L	-	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	mg/L	-	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	-	0.03	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Hydrocarbons								
EPH10-19	mg/L	5	-	<0.25	<0.25	<0.25	<0.25	<0.25
EPH19-32	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
LEPH	mg/L	0.5	-	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	<0.10	<0.10	<0.10	<0.10	<0.10
VPH (C6-C10)	mg/L	1.5	-	<0.10	<0.10	<0.10	<0.10	<0.10
PAHs								
Acenaphthene	mg/L	0.06	0.006	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050*	<0.000050*	<0.000050*	<0.000050*	<0.000050*
Quinoline	mg/L	0.034	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Note: Cells exceed the standards are **bold.**

Cells that exceed the guidelines are underlined.

Cells that exceed both the standard and the gudielines are in **bold and underlined**.

* represents values that are below the detection threshold but may be higher than the guidelines

Q4 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	MW-2S	MW-2D	MW-3	MW-4	MW-6
Analyte	Units			12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013
Nutrients & Anions								
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	-	-		-
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	mg/L	-	-	134	262	34.2	115	33.1
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	5.3	17.6	0.287	0.66	0.0437
Bromide (Br)	mg/L	-	-	0.066	<0.50 *	0.099	0.106	<0.050
Chloride (Cl)	mg/L	1500	150	18.6	48.7	20.5	25.5	45.3
Fluoride (F)	mg/L	2	0.4	0.145	0.36	0.039	0.097	0.101
Nitrate (as N)	mg/L	400	3	<0.0050	<0.050 *	0.0188	<0.0050	0.0436
Nitrite (as N)	mg/L	0.2	0.02	<0.0010	0.012	<0.0010	0.0015	<0.0010
Total Kjeldahl Nitrogen	mg/L	-	-	5.48	19.2	0.38	1.07	1.5
Total Nitrogen	mg/L	-	-	5.48	19.2	0.399	1.07	1.5
Phosphorus (P)-Total	mg/L	-	-	0.509	0.203	0.0126	0.381	3.26
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	105	424	43.3	50.5	157
Dissolved Metals								
Aluminum (Al)-Dissolved	mg/L	-	0.05	<0.010	<0.010	0.02	<0.010	0.075
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	0.0054	0.0148	<0.0010	0.0021	<0.0010
Barium (Ba)-Dissolved	mg/L	10	1	0.116	0.033	0.073	0.149	0.039
Beryllium (Be)-Dissolved	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Dissolved	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Dissolved	mg/L	50	1.2	0.16	0.37	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050	<0.000050	0.000416	0.000326	0.000307
Calcium (Ca)-Dissolved	mg/L	-	-	56.8	189	17.9	45.8	41.4
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.04	0.004	0.00359	0.016	0.0118	0.033	0.00825
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	<0.0010	<0.0010	0.0034	0.0022	0.0034
Iron (Fe)-Dissolved	mg/L	-	0.35	51.5	66.7	1.11	28.9	3.18
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Dissolved	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Dissolved	mg/L	-	-	9.08	22.9	3.33	7.41	5.67
Manganese (Mn)-Dissolved	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	2.5	2.71	2.38	2.78	0.745
Mercury (Hg)-Dissolved	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Dissolved	mg/L	10	1	0.0053	0.0169	<0.0010	0.0057	<0.0010
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phosphorus (P)-Dissolved	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	mg/L	-	373	10.3	22.6	3.2	5.3	3.3
Selenium (Se)-Dissolved	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved	mg/L	-	-	9.17	13.9	7.79	10.8	8.59
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	-	-	15.3	33.8	18	14.9	65
Strontium (Sr)-Dissolved	mg/L	-	-	0.298	0.719	0.144	0.261	0.375
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved	mg/L	3	0.3	<0.00020	0.00028	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	<0.0050	0.0118	0.0143	0.0221
Aggregate Organics								
COD	mg/L	-	-	-	-	-	-	-

Q4 - 2013 Groundwater Results		BCCSR-S6-WATER-FAL	BC Ambient Water	MW-2S	MW-2D	MW-3	MW-4	MW-6
Analyte	Units		Quality Guidelines	12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013
VOCs								
Acetone	mg/L	-	-	-	-	-	-	-
Benzene	mg/L	-	-	-	-	-	-	-
Bromodichloromethane	mg/L	-	-	-	-	-	-	-
Bromoform	mg/L	-	-	-	-	-	-	-
Bromomethane	mg/L	-	-	-	-	-	-	-
1,3-Butadiene	mg/L	-	-	-	-	-	-	-
Carbon Disulfide	mg/L	-	-	-	-	-	-	-
Carbon Tetrachloride	mg/L	-	-	-	-	-	-	-
Chlorobenzene	mg/L	-	-	-	-	-	-	-
Dibromochloromethane	mg/L	-	-	-	-	-	-	-
Chloroethane	mg/L	-	-	-	-	-	-	-
Chloroform	mg/L	-	-	-	-	-	-	-
Chloromethane	mg/L	-	-	-	-	-	-	-
2-Chlorotoluene	mg/L	-	-	-	-	-	-	-
4-Chlorotoluene	mg/L	-	-	-	-	-	-	-
Decane (nC10)	mg/L	-	-	-	-	-	-	-
1,2-Dibromoethane	mg/L	-	-	-	-	-	-	-
Dibromomethane	mg/L	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/L	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/L	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/L	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/L	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/L	-	-	-	-	-	-	-
1,1-Dichloroethylene	mg/L	-	-	-	-	-	-	-
cis-1,2-Dichloroethylene	mg/L	-	-	-	-	-	-	-
trans-1,2-Dichloroethylene	mg/L	-	-	-	-	-	-	-
1,3-Dichloropropene (cis & trans)	mg/L	-	-	-	-	-	-	-
Dichloromethane	mg/L	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/L	-	-	-	-	-	-	-
cis-1,3-Dichloropropylene	mg/L	-	-	-	-	-	-	-
trans-1,3-Dichloropropylene	mg/L	-	-	-	-	-	-	-
Ethylbenzene	mg/L	-	-	-	-	-	-	-
n-Heptane (nC7)	mg/L	-	-	-	-	-	-	-
n-Hexane (nC6)	mg/L	-	-	-	-	-	-	-
2-Hexanone	mg/L	-	-	-	-	-	-	-
Isopropylbenzene	mg/L	-	-	-	-	-	-	-
4-Isopropyltoluene	mg/L	-	-	-	-	-	-	-
Methyl ethyl ketone (MEK)	mg/L	-	-	-	-	-	-	-
Methyl isobutyl ketone (MIBK)	mg/L	-	-	-	-	-	-	-
Methylcyclohexane	mg/L	-	-	-	-	-	-	-
Methyl t-butyl ether (MTBE)	mg/L	-	-	-	-	-	-	-
Naphthalene	mg/L	-	-	-	-	-	-	-
n-Octane (nC8)	mg/L	-	-	-	-	-	-	-
n-Propylbenzene	mg/L	-	-	-	-	-	-	-
Styrene	mg/L	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/L	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/L	-	-	-	-	-	-	-
Tetrachloroethylene	mg/L	-	-	-	-	-	-	-
Toluene	mg/L	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/L	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/L	-	-	-	-	-	-	-
Trichloroethylene	mg/L	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/L	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/L	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	mg/L	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/L	-	-	-	-	-	-	-
Vinyl Chloride	mg/L	-	-	-	-	-	-	-
ortho-Xylene	mg/L	-	-	-	-	-	-	-
meta- & para-Xylene	mg/L	-	-	-	-	-	-	-
Xylenes	mg/L	-	-	-	-	-	-	-
Hydrocarbons								
EPH10-19	mg/L	-	-	-	-	-	-	-
EPH19-32	mg/L	-	-	-	-	-	-	-
LEPH	mg/L	-	-	-	-	-	-	-
HEPH	mg/L	-	-	-	-	-	-	-
Volatile Hydrocarbons (VH6-10)	mg/L	-	-	-	-	-	-	-
VPH (C6-C10)	mg/L	-	-	-	-	-	-	-
PAHs		-	-	-	-	-	-	-
Acenaphthene	mg/L	-	-	-	-	-	-	-
Acenaphthylene	mg/L	-	-	-	-	-	-	-
Acridine	mg/L	-	-	-	-	-	-	-
Anthracene	mg/L	-	-	-	-	-	-	-
Benz(a)anthracene	mg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/L	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/L	-	-	-	-	-	-	-
Chrysene	mg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/L	-	-	-	-	-	-	-
Fluoranthene	mg/L	-	-	-	-	-	-	-
Fluorene	mg/L	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	-	-	-	-	-
Naphthalene	mg/L	-	-	-	-	-	-	-
Phenanthrene	mg/L	-	-	-	-	-	-	-
Pyrene	mg/L	-	-	-	-	-	-	-
Quinoline	mg/L	-	-	-	-	-	-	-

Note: Cells exceed the standards are **bold.**
Cells that exceed the guidelines are underlined.
Cells that exceed both the standard and the gudielines are in **bold and underlined**.
* represents values that are below the detection threshold but may be higher than the guidelines

APPENDIX F: Laboratory Results for Surface Water Quality Monitoring Compared to Standards and Guidelines

Q1- 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	SFC 2	SFC-2B	SFC 3	SFC 11	SFC-4B
Analyte	Units			3/19/2013	3/19/2013	3/19/2013	3/19/2013	3/19/2013
Physical Parameters								
Conductivity	uS/cm	-	-	129	1210	332	77.6	261
Hardness (as CaCO3)	mg/L	-	-	35.6	561	82.8	25.3	94.5
pH	pH	8.5	9	7.19	6.81	7.24	7.26	7.39
Nutrient & Anions								
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	24.2	127	41.4	21.4	33.1
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	24.2	127	41.4	21.4	33.1
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	<0.0050	1.57	0.0118	<0.0050	0.167
Bromide (Br)	mg/L	-	-	<0.050	<0.50 *	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	1500	150	12.6	70	45.6	3.87	18.8
Fluoride (F)	mg/L	2	0.4	0.051	0.21	0.038	0.056	0.053
Nitrate (as N)	mg/L	400	3	0.331	<0.050 *	0.302	0.331	0.592
Nitrite (as N)	mg/L	0.2	0.02	<0.0010	<0.010 *	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	-	-	<0.050	1.67	0.075	<0.050	0.24
Total Nitrogen	mg/L	-	-	0.331	1.67	0.377	0.331	0.833
Phosphorus (P)-Total	mg/L	-	-	0.0093	0.0052	0.0061	0.011	0.0107
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	18.3	452	47.3	10.7	60.1
Total Metals								
Aluminum (Al)-Total	mg/L	-	0.05	0.29	0.022	0.116	0.348	0.659
Antimony (Sb)-Total	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	0.05	0.005 (for total metals)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Barium (Ba)-Total	mg/L	10	1	<0.020	0.142	0.037	<0.020	0.029
Beryllium (Be)-Total	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Total	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Total	mg/L	50	1.2	<0.10	0.32	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Calcium (Ca)-Total	mg/L	-	-	11.6	192	28.6	7.71	31.9
Chromium (Cr)-Total	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	mg/L	0.04	0.004	<0.00050	0.00991	0.00059	<0.00050	0.003
Copper (Cu)-Total	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	0.0033	0.0011	0.0058	0.0029	0.0105
Iron (Fe)-Total	mg/L	-	0.35	0.171	21.3	0.106	0.215	1.41
Lead (Pb)-Total	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Total	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Total	mg/L	-	-	1.64	19.7	2.75	1.46	3.58
Manganese (Mn)-Total	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	<0.010	4.4	0.028	<0.010	0.414
Mercury (Hg)-Total	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Total	mg/L	10	1	<0.0010	<0.0010	0.0027	<0.0010	0.0012
Nickel (Ni)-Total	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050 *	<0.0050 *	<0.0050	<0.0050 *
Phosphorus (P)-Total	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total	mg/L	-	373	<2.0	9	3.2	<2.0	2.7
Selenium (Se)-Total	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	6.38	9.94	5.06	7.11	6.14
Silver (Ag)-Total	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Total	mg/L	-	-	10.8	41.6	29.5	6.2	14.4
Strontium (Sr)-Total	mg/L	-	-	0.0985	1.14	0.178	0.0817	0.216
Thallium (Tl)-Total	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Total	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Total	mg/L	3	0.3	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Total	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	0.0497	0.0084	<0.0050	0.0117

Q1- 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	SFC 2	SFC-2B	SFC 3	SFC 11	SFC-4B
Analyte	**Units**			**3/19/2013**	**3/19/2013**	**3/19/2013**	**3/19/2013**	**3/19/2013**
Aggregate Organics								
COD	mg/L	-	-	<20	32	<20	<20	<20
Hydrocarbons								
EPH10-19	mg/L	5	-	<0.25	<0.25	<0.25	<0.25	<0.25
EPH19-32	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
LEPH	mg/L	0.5	-	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
PAHs								
Acenaphthene	mg/L	0.06	0.006	<0.000050	0.000375	<0.000050	<0.000050	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050	0.000089	<0.000050	<0.000050	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050	0.000167	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050	<0.000050	0.000073	<0.000050	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050*	<0.000050*	<0.000050*	<0.000050*	<0.000050*
Quinoline	mg/L	0.034	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Note: Cells exceed the standards are **bold.**
Cells that exceed the guidelines are underlined.
Cells that exceed both the standard and the gudielines are in **bold and underlined**.
* represents values that are below the detection threshold but may be higher than the guidelines

Q2 - 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water	SFC-2	SFC-2B	SFC-3	SFC-11	SFC-4B
Analyte	Units		Quality Guidelines	6/25/2013	6/25/2013	6/25/2013	6/25/2013	6/25/2013
Physical Parameters								
Conductivity	uS/cm	-	-	136	364	184	119	223
Hardness (as CaCO3)	mg/L	-	-	40.7	148	48.9	39.2	74.5
pH	pH	-	9	7.66	7.75	7.55	7.53	7.7
Nutrients & Anions								
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	mg/L	-	-	28.9	120	34.4	27.9	34.7
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	<0.0050	0.157	0.0079	<0.0050	0.0194
Bromide (Br)	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	1500	150	12.9	21.4	18.6	10.6	22.9
Fluoride (F)	mg/L	2	0.4	0.042	0.047	0.045	0.043	0.046
Nitrate (as N)	mg/L	400	3	0.0998	0.0166	0.0924	0.105	0.263
Nitrite (as N)	mg/L	0.2	0.02	<0.0010	0.0013	<0.0010	<0.0010	0.0015
Total Kjeldahl Nitrogen	mg/L	-	-	0.058	0.877	0.102	0.067	0.159
Total Nitrogen	mg/L	-	-	0.158	0.895	0.195	0.172	0.424
Phosphorus (P)-Total	mg/L	-	-	0.0058	0.291	0.48	0.0047	0.0418
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	15.5	37.7	24.3	12.4	34.5
Total Metals								
Aluminum (Al)-Total	mg/L	-	0.05	0.044	1.74	0.06	0.046	0.15
Antimony (Sb)-Total	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	0.05	0.005 (for total metals)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Barium (Ba)-Total	mg/L	10	1	<0.020	0.173	0.022	<0.020	0.02
Beryllium (Be)-Total	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Total	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Total	mg/L	50	1.2	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050	**0.00259**	<0.000050	<0.000050	<0.000050
Calcium (Ca)-Total	mg/L	-	-	13	52	16.1	12.4	25.1
Chromium (Cr)-Total	mg/L	0.01	0.001	<0.00050	0.00082	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	mg/L	0.04	0.004	<0.00050	**0.048**	<0.00050	<0.00050	<0.00050
Copper (Cu)-Total	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	<0.0010	0.0125	0.0023	<0.0010	0.0028
Iron (Fe)-Total	mg/L	-	0.35	0.085	29.5	0.389	0.058	0.365
Lead (Pb)-Total	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Total	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Total	mg/L	-	-	1.99	4.51	2.09	2.03	2.89
Manganese (Mn)-Total	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	0.012	4.09	0.027	0.012	0.122
Mercury (Hg)-Total	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Total	mg/L	10	1	<0.0010	0.0029	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phosphorus (P)-Total	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total	mg/L	-	373	<2.0	5.3	<2.0	<2.0	2
Selenium (Se)-Total	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	8.23	8.02	6.96	8.78	6.48
Silver (Ag)-Total	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Total	mg/L	-	-	9.8	19.7	19.2	7.5	12.6
Strontium (Sr)-Total	mg/L	-	-	0.155	0.27	0.145	0.158	0.264
Thallium (Tl)-Total	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Total	mg/L	1	2	<0.050	0.082	<0.050	<0.050	<0.050
Uranium (U)-Total	mg/L	3	0.3	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Total	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	0.0177	<0.0050	<0.0050	<0.0050

Q2 - 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water	SFC-2	SFC-2B	SFC-3	SFC-11	SFC-4B
Analyte	**Units**		**Quality Guidelines**	**6/25/2013**	**6/25/2013**	**6/25/2013**	**6/25/2013**	**6/25/2013**
Aggregate Organics								
COD	mg/L	-	-	<20	20	<20	<20	<20
Hydrocarbons								
EPH10-19	mg/L	5	-	<0.25	<0.25	<0.25	<0.25	<0.25
EPH19-32	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
LEPH	mg/L	0.5	-	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	-	-	-	-	<0.10
VPH (C6-C10)	mg/L	1.5	-	-	-	-	-	<0.10
PAHs								
Acenaphthene	mg/L	0.06	0.006	<0.000050	-	<0.000050	<0.000050	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050	-	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050	-	<0.000050	<0.000050	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050	-	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010	-	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Chrysene	mg/L	0.001	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050	-	<0.000050	<0.000050	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050	-	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050	-	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050	-	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050	-	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050*	-	<0.000050*	<0.000050*	<0.000050*
Quinoline	mg/L	0.034	0.0034	<0.000050	-	<0.000050	<0.000050	<0.000050

Note: Cells exceed the standards are **bold.**
Cells that exceed the guidelines are underlined.
Cells that exceed both the standard and the gudielines are in **bold and underlined**.
* represents values that are below the detection threshold but may be higher than the guidelines

Q3 - 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	SFC2	SFC-2B	SFC3	SFC11	SFC-4B
Analyte	Units			10/9/2013	10/9/2013	10/9/2013	10/9/2013	10/9/2013
Physical Parameters								
Conductivity	uS/cm	-	-	137	837	280	100	294
Hardness (as CaCO3)	mg/L	-	-	39.4	325	65.3	32.4	106
pH	pH	-	9	7.63	6.9	7.33	7.58	7.8
Nutrient & Anions								
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	25.2	130	28.8	25.7	44.4
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	-	-	25.2	130	28.8	25.7	44.4
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	<0.0050	1.54	0.0207	<0.0050	0.156
Bromide (Br)	mg/L	-		<0.050	<0.50 *	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	1500	150	11.8	58.9	36	5.31	20.1
Fluoride (F)	mg/L	2	0.4	0.046	0.26	0.047	0.048	0.052
Nitrate (as N)	mg/L	400	3	0.274	<0.050 *	0.2	0.292	0.502
Nitrite (as N)	mg/L	0.2	0.02	<0.0010	0.01	<0.0010	<0.0010	0.0028
Total Kjeldahl Nitrogen	mg/L	-	-	0.068	2.55	0.102	0.082	0.362
Total Nitrogen	mg/L	-	-	0.293	2.26	0.276	0.312	0.708
Phosphorus (P)-Total	mg/L	-	-	0.0082	0.003	0.005	0.007	0.0047
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	20.2	220	47.2	13.3	64.1
Total Metals								
Aluminum (Al)-Total	mg/L	-	0.05	0.229	0.03	0.636	0.165	0.231
Antimony (Sb)-Total	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	0.05	0.005 (for total metals)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Barium (Ba)-Total	mg/L	10	1	<0.020	0.097	0.033	<0.020	0.032
Beryllium (Be)-Total	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Total	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Total	mg/L	50	1.2	<0.10	0.22	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	<0.000050*	<0.000050*	0.000073*	<0.000050*	<0.000050*
Calcium (Ca)-Total	mg/L	-	-	12.5	110	21.8	10	36
Chromium (Cr)-Total	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Total	mg/L	0.04	0.004	0.00072	0.00495	0.00355	<0.00050	0.00235
Copper (Cu)-Total	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 15- - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	0.0042	0.0011	0.0155	0.0014	0.0054
Iron (Fe)-Total	mg/L	-	0.35	0.153	31.6	0.448	0.092	0.649
Lead (Pb)-Total	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Total	mg/L	-	0.014	<0.050*	<0.050*	<0.050*	<0.050*	<0.050*
Magnesium (Mg)-Total	mg/L	-	-	1.98	12.1	2.62	1.77	3.92
Manganese (Mn)-Total	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	0.035	3.9	0.153	<0.010	0.449
Mercury (Hg)-Total	mg/L	0.001	-	<0.00020*	<0.00020*	<0.00020*	<0.00020*	<0.00020*
Molybdenum (Mo)-Total	mg/L	10	1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phosphorus (P)-Total	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total	mg/L	-	373	<2.0	7.4	2.3	<2.0	2.7
Selenium (Se)-Total	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	8.52	8.94	8.14	8.63	6.91
Silver (Ag)-Total	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Total	mg/L	-	-	11.7	42.8	28.8	6.9	15.9
Strontium (Sr)-Total	mg/L	-	-	0.138	0.774	0.183	0.12	0.285
Thallium (Tl)-Total	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Total	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Total	mg/L	3	0.3	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	-	0.02	<0.030*	<0.030*	<0.030*	<0.030*	<0.030*
Zinc (Zn)-Total	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	<0.0050	0.0123	0.0088	<0.0050	0.0077

Q3 - 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water Quality Guidelines	SFC2	SFC-2B	SFC3	SFC11	SFC-4B
Analyte	Units			10/9/2013	10/9/2013	10/9/2013	10/9/2013	10/9/2013
Aggregate Organics								
COD	mg/L	-	-	<20	77	<20	<20	<20
Hydrocarbons								
EPH10-19	mg/L	5	-	<0.25	<0.25	<0.25	<0.25	<0.25
EPH19-32	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
LEPH	mg/L	0.5	-	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH	mg/L	-	-	<0.25	<0.25	<0.25	<0.25	<0.25
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	-	-	-	-	-
VPH (C6-C10)	mg/L	1.5	-	-	-	-	-	-
PAHs								
Acenaphthene	mg/L	0.06	0.006	<0.000050	0.000549	<0.000050	<0.000050	<0.000050
Acenaphthylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine	mg/L	0.0005	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benz(a)anthracene	mg/L	0.001	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(a)pyrene	mg/L	0.0001	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(g,h,i)perylene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Benzo(k)fluoranthene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Chrysene	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Dibenz(a,h)anthracene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Fluoranthene	mg/L	0.002	0.0002	<0.000050	0.00011	<0.000050	<0.000050	<0.000050
Fluorene	mg/L	0.12	0.012	<0.000050	0.000206	<0.000050	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.01	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.003	0.0003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Pyrene	mg/L	0.0002	0.00002	<0.000050*	0.000054*	<0.000050*	<0.000050*	<0.000050*
Quinoline	mg/L	0.034	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Note: Cells exceed the standards are **bold.**

Cells that exceed the guidelines are underlined.

Cells that exceed both the standard and the gudielines are in **bold and underlined**.

* represents values that are below the detection threshold but may be higher than the guidelines

Q4 - 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water	SFC-2	SFC-2B	SFC-3	SFC-3 (Rep)	SFC-11	SFC-4B
Analyte	Units		Quality Guidelines	12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013
Physical Parameters									
Conductivity	uS/cm	-	-	364	681	195	194	96.4	231
Hardness (as CaCO3)	mg/L	-	-	141	281	47.3	47.6	30.7	80.1
pH	pH	-	9	7.19	5.9	7.14	7.25	7.34	7.34
Nutrients & Anions									
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	-	-	-
Alkalinity, Total (as CaCO3)	mg/L	-	-	68.1	15.3	27.5	27.5	23.5	35.4
Ammonia, Total (as N)	mg/L	1.31 @ pH ≥ 8.5 3.7 @ pH 8.0 - < 8.5 11.3 @ pH 7.5 - < 8.0 18.5 @ pH 7.0 - < 7.5 18.4 @ pH < 7.0	Function of temperature and pH - refer to guidelines.	0.609	2.58	<0.0050	<0.0050	<0.0050	0.116
Bromide (Br)	mg/L	-	-	<0.050	<0.25 *	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	1500	150	12.6	16.1	21.2	21.2	5.92	17.2
Fluoride (F)	mg/L	2	0.4	0.075	0.27	0.046	0.046	0.048	0.054
Nitrate (as N)	mg/L	400	3	1.2	6.95	0.26	0.258	0.354	0.59
Nitrite (as N)	mg/L	0.2	0.02	0.0058	0.0422	<0.0010	<0.0010	<0.0010	0.0014
Total Kjeldahl Nitrogen	mg/L	-	-	0.701	3.13	0.085	0.074	0.072	0.224
Total Nitrogen	mg/L	-	-	1.9	10.1	0.345	0.332	0.426	0.815
Phosphorus (P)-Total	mg/L	-	-	0.0164	0.139	0.0058	0.004	0.005	0.0031
Sulfate (SO4)	mg/L	1000	128 (H=0-30) 218 (H=31-75) 309 (H=76-180) 429 (H=181-250)	92.2	287	31	31	12.7	48.9
Dissolved Metals									
Aluminum (Al)-Dissolved	mg/L	-	0.05	<0.010	0.641	0.021	0.029	0.036	0.03
Antimony (Sb)-Dissolved	mg/L	0.2	0.02	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Dissolved	mg/L	0.05	0.005 (for total metals)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Barium (Ba)-Dissolved	mg/L	10	1	0.053	0.064	0.021	0.021	<0.020	0.022
Beryllium (Be)-Dissolved	mg/L	0.053	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Dissolved	mg/L	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Dissolved	mg/L	50	1.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved	mg/L	0.0001 @ H ≤ 30 0.0003 @ H = 30 - < 90 0.0005 @ H = 90 - < 150 0.0006 @ H = 150 - < 210	0.01 (H = 30) 0.02 (H= 60) 0.03 (H = 90) 0.04 (H = 120) 0.05 (H = 150) 0.06 (H= 210) (for total metals)	0.000085	0.00049	<0.000050	<0.000050	<0.000050	<0.000050
Calcium (Ca)-Dissolved	mg/L	-	-	48.6	90.1	15.5	15.6	9.6	27
Chromium (Cr)-Dissolved	mg/L	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.04	0.004	0.00998	0.0501	0.00105	0.00108	<0.00050	0.00175
Copper (Cu)-Dissolved	mg/L	0.02 @ H < 50 0.03 @ H = 50 - < 75 0.04 @ H = 75 - < 100 0.05 @ H = 100 - < 125 0.06 @ H = 125 - < 150 0.07 @ H = 150 - < 175 0.08 @ H = 175 - < 200 0.09 @ H ≥ 200	0.002 (H<50) 0.00004(H>50)	0.0074	**0.127**	0.0032	0.0031	<0.0010	0.0026
Iron (Fe)-Dissolved	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)-Dissolved	mg/L	0.04 @ H < 50 0.05 @ H = 50 - < 100 0.06 @ H = 100 - < 200 0.11 @ H = 200 - < 300 0.16 @ H ≥ 300	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium (Li)-Dissolved	mg/L	-	0.014	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)-Dissolved	mg/L	-	-	4.88	13.6	2.07	2.08	1.64	3.1
Manganese (Mn)-Dissolved	mg/L	-	0.7 (H = 25) 0.8 (H = 50) 1.0 (H = 100) 1.3 (H = 150) 1.9 (H = 300) (for total metals)	1.09	4.25	0.04	0.041	<0.010	0.302
Mercury (Hg)-Dissolved	mg/L	0.001	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum (Mo)-Dissolved	mg/L	10	1	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Dissolved	mg/L	0.25 @ H < 60 0.65 @ H = 60 - < 120 1.1 @ H = 120 - < 180 1.5 @ H ≥ 180	0.025 @ H < 60 0.065 @ H = 60 - < 120 0.11 @ H = 120 - < 180 0.15 @ H ≥ 180	<0.0050	0.0233	<0.0050	<0.0050	<0.0050	<0.0050
Phosphorus (P)-Dissolved	mg/L	-	-	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	mg/L	-	373	4.3	7.3	<2.0	<2.0	<2.0	2
Selenium (Se)-Dissolved	mg/L	0.01	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved	mg/L	-	-	4.21	8.49	7.24	7.28	8.05	6.2
Silver (Ag)-Dissolved	mg/L	0.0005 @ H ≤ 100 0.015 @ H > 100	0.005 (H<100) 0.015 (H>100)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	-	-	14.1	17.4	18.2	18.5	6.1	12.1
Strontium (Sr)-Dissolved	mg/L	-	-	0.266	0.391	0.135	0.136	0.113	0.227
Thallium (Tl)-Dissolved	mg/L	0.003	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Dissolved	mg/L	-	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved	mg/L	1	2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Dissolved	mg/L	3	0.3	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Dissolved	mg/L	-	0.02	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc (Zn)-Dissolved	mg/L	0.075 @ H ≤ 90 0.15 @ H = 90 - < 100 0.9 @ H = 100 - < 200 1.65 @ H = 100 - < 200 2.4 @ H = 300 - < 400	7.5 + 0.75 (H - 90) (for total metals)	0.0108	0.0644	<0.0050	<0.0050	<0.0050	<0.0050

Q4 - 2013 Surface Water Results		BCCSR-S6-WATER-FAL	BC Ambient Water	SFC-2	SFC-2B	SFC-3	SFC-3 (Rep)	SFC-11	SFC-4B
Analyte	Units		Quality Guidelines	12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013
Aggregate Organics									
COD	mg/L	-	-	-	-	-	-	-	-
Hydrocarbons									
EPH10-19	mg/L	5	-	-	-	-	-	-	-
EPH19-32	mg/L	-	-	-	-	-	-	-	-
LEPH	mg/L	0.5	-	-	-	-	-	-	-
HEPH	mg/L	-	-	-	-	-	-	-	-
Volatile Hydrocarbons (VH6-10)	mg/L	15	-	-	-	-	-	-	-
VPH (C6-C10)	mg/L	1.5	-	-	-	-	-	-	-
PAHs									
Acenaphthene	mg/L	0.06	0.006	-	-	-	-	-	-
Acenaphthylene	mg/L	-	-	-	-	-	-	-	-
Acridine	mg/L	0.0005	0.00005	-	-	-	-	-	-
Anthracene	mg/L	0.001	0.0001	-	-	-	-	-	-
Benz(a)anthracene	mg/L	0.001	0.0001	-	-	-	-	-	-
Benzo(a)pyrene	mg/L	0.0001	0.00001	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/L	-	-	-	-	-	-	-	-
Chrysene	mg/L	0.001	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/L	-	-	-	-	-	-	-	-
Fluoranthene	mg/L	0.002	0.0002	-	-	-	-	-	-
Fluorene	mg/L	0.12	0.012	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/L	-	-	-	-	-	-	-	-
Naphthalene	mg/L	0.01	0.001	-	-	-	-	-	-
Phenanthrene	mg/L	0.003	0.0003	-	-	-	-	-	-
Pyrene	mg/L	0.0002	0.00002	-	-	-	-	-	-
Quinoline	mg/L	0.034	0.0034	-	-	-	-	-	-

Note: Cells exceed the standards are **bold.**
Cells that exceed the guidelines are underlined.
Cells that exceed both the standard and the gudielines are in **bold and underlined**.
* represents values that are below the detection threshold but may be higher than the guidelines

APPENDIX G: Field Data Collection Results for Leachate, Groundwater, and Surface Water Monitoring

		Groundwater Levels					Water Quality					
Well ID	Date	Ground Surface elevation	Top of Well Riser Elevation	Depth to Water	Static Water Level Elevation		Temp	Conductivity	D.O.	pH	ORP	Comments
		mASML	mASML	m below top of well riser	mASL		C	uS/cm	mg/l			
MW2D	19-Mar-13	603.84	604.9	5.717	599.183		7.17	1678	13.64	6.33	49	
MW2S	19-Mar-13	603.84	604.94	5.748	599.192		6.68	822	12.12	6.42	30.4	
MW3	19-Mar-13	600.61	601.47	1.34	600.13		7.08	243	13.73	5.87	64.9	
MW4	19-Mar-13	596.54	677.54	3.846	673.694		7.1	572	14.33	6.06	75.8	
MW6	19-Mar-13	610.88	610.88	3.719	607.161		4.62	576	30	4.98	238	Duplicate, scooped some of the expanded bentonite out.
SFC2	19-Mar-13						3.49	122	23.29	6.49	55.6	
SFC2B	19-Mar-13						8.19	1300	12.58	6.12	58.5	
SFC3	19-Mar-13						3.57	349	26.6	6.8	38.2	
SFC11	19-Mar-13						3.44	60	21.21	6.75	28.8	
SFC4B	20-Mar-13						2.5	270	7.87	27.03	9.4	
L1	19-Mar-13						8.72	2359	17.51	6.62	109.1	
LM	19-Mar-13						7.89	1273	14.73	6.07	69.4	
MW2D	25-Jun-13	603.84	604.9	6.58	598.32		7.67	1544	6.97	5.88	-35.7	
MW2S	25-Jun-13	603.84	604.94	6.6	598.34		7.64	619	10.74	5.57	65.1	Lower PVC of stand pipe broke again, was protected before sampling. Need drill company to fix. Watera and foot valve replaced.
MW3	25-Jun-13	600.61	601.47	1.58	599.89		7.92	167	5.44	4.51	192	
MW4	25-Jun-13	596.54		3.98			7.33	561	11.29	4.26	80.5	Duplicate. Watera and foot valve replaced.
MW6	25-Jun-13	610.88	610.88	5.28	605.6		6.79	723	7.06	4.88	168.1	Watera and foot valve replaced.
SFC2	25-Jun-13						7.46	95	13.6	6.1	122.4	
SFC2B	25-Jun-13						9.24	786	5.8	6.12	8.4	Water Quality parameters taken from small runoff pond. There was no water in tributary to sample. Please see photos.
SFC3	25-Jun-13						8.49	143	11.7	5.79	101.9	
SFC11	25-Jun-13						6.88	118	11.88	4.12	206.4	
SFC4B	25-Jun-13						9.06	224	11.5	6.94	11.5	
L1	No Sample											
LM	No Sample											
MW2D	9-Oct-13	603.84	604.9	6.43	598.47		7.85	1507	15.09	5.46	73.4	
MW2S	9-Oct-13	603.84	604.94	6.37	598.57		7.68	727	16.7	5.08	109	
MW3	9-Oct-13	600.61	601.47	1.5	599.97		9.87	210	4.94	6.09	78.2	
MW4	9-Oct-13	596.54		4.11			7.64	457	7.72	5.8	60	
MW6	9-Oct-13	610.88	610.88	4.64	606.24		9.01	551	8.15	6.01	105.3	
SFC2	9-Oct-13						8.35	147	16.01	6.6	73.9	
SFC2B	9-Oct-13						8.95	638	9.68	6.2	66.1	
SFC3	9-Oct-13						8.85	291	16.35	6.74	74.1	
SFC11	9-Oct-13						8.29	83	14.75	6.7	79.5	
SFC4B	10-Oct-13						7.58	310	32.8	7.88	52.3	
L1	10-Oct-13						11.19	1753	10.5	7.38	5.2	
MW2D	19-Dec-13	603.84	604.9	6.38	598.52		7.2	1577		5.32		Used the Hanna pen, only Temp, conductivity and pH.
MW2S	20-Dec-13	603.84	604.94	6.3	598.64		6.7	642		5.54		The pen broke part way through the sampling so the physical paramters were not colletec for all the sample locations.
MW3	21-Dec-13	600.61	601.47	1.47	600							
MW4	22-Dec-13	596.54	677.54	4.36	673.18		7.2	495		5.28		
MW6	23-Dec-13	610.88	610.88	6	604.88							
SFC2	24-Dec-13											
SFC2B	25-Dec-13											
SFC3	26-Dec-13											Duplicate at this location (SFC 3 - Rep)
SFC11	27-Dec-13											
SFC4B	28-Dec-13											
L1	No sample											