MORRISON HERSHFIELD

Resort Municipality of Whistler Landfill Annual Monitoring Report – 2018

Whistler, BC

Presented to:

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WHISTLER

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TABLE OF CONTENTS

Page

WHISTLER

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

This annual report incorporates landfill monitoring data collected in 2018. 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 report documents the 2018 monitoring program and presents a summary of its findings.

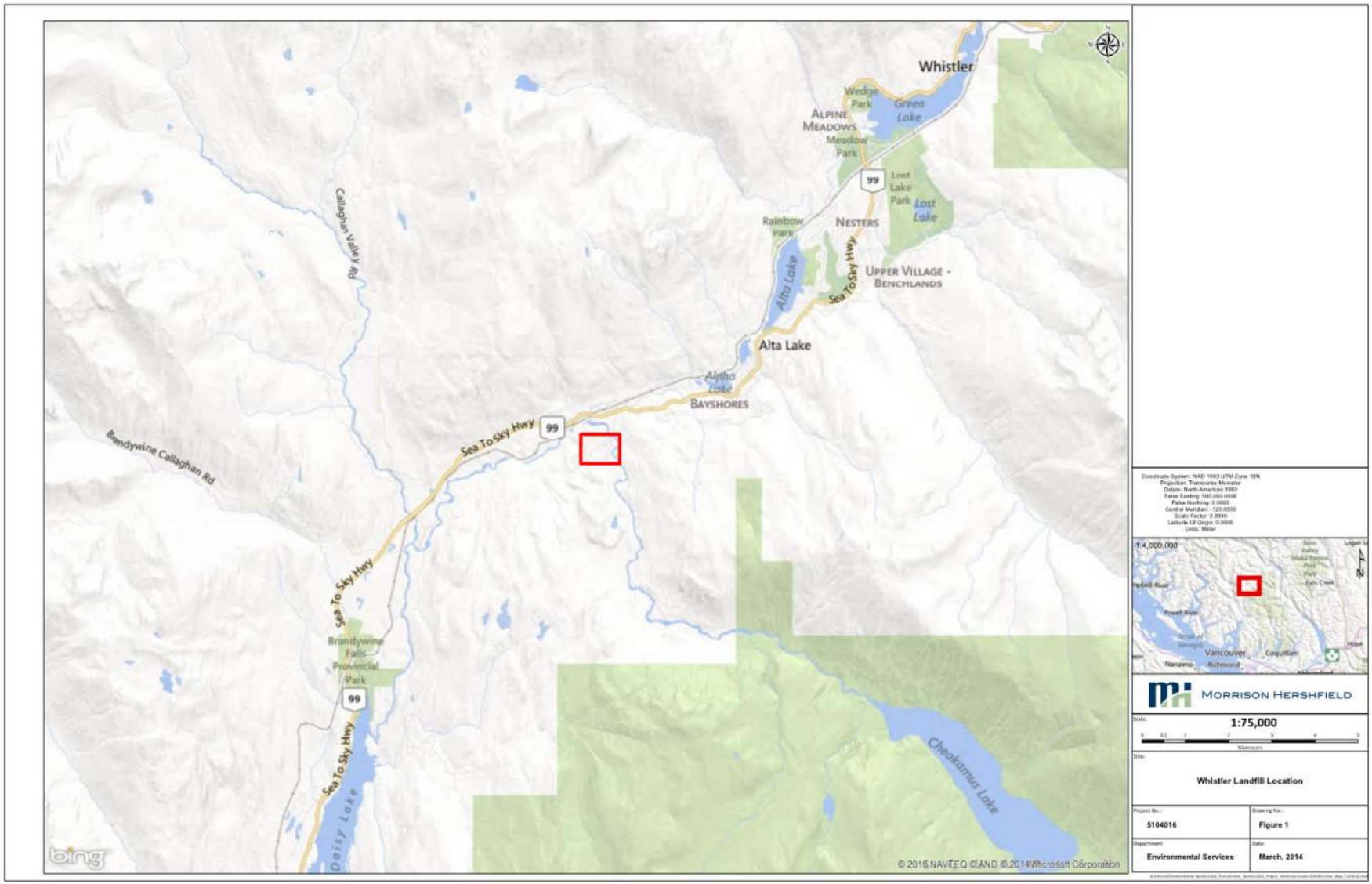

Figure 1: Former Whistler Landfill Location

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.

Specific monitoring requirements for surface water, groundwater and LFG are outlined in Section 3.

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 (2018); and
- Summary of maintenance activities that were completed on site in 2018, as well as any planned activities in 2019.

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. This cell 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 residential and ICI waste. This area was developed with a high-density polyethylene (HDPE) liner and an engineered 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 geological conditions associated with the site are 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 hydrogeological conditions associated with the site are 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 (1981 – 2010) recorded at the Whistler meteorological station (approximately 8 km from the site) indicate the daily average annual temperature in the area is 6.7^{o}C, and the mean annual precipitation is 1,228 mm per year. The precipitation can be further divided into an average of 856 mm of rainfall, and 419 cm of snowfall.

2.6 Potential Receptors

The receptors within the local area of the landfill include both natural and human aspects. Potential receptors and their distance from the landfill mass include:

- Cheakamus River – 250 m - 450 m
- Unnamed Creek – 10 m
- Residential and commercial development – immediately adjacent to and on top of the landfill mass

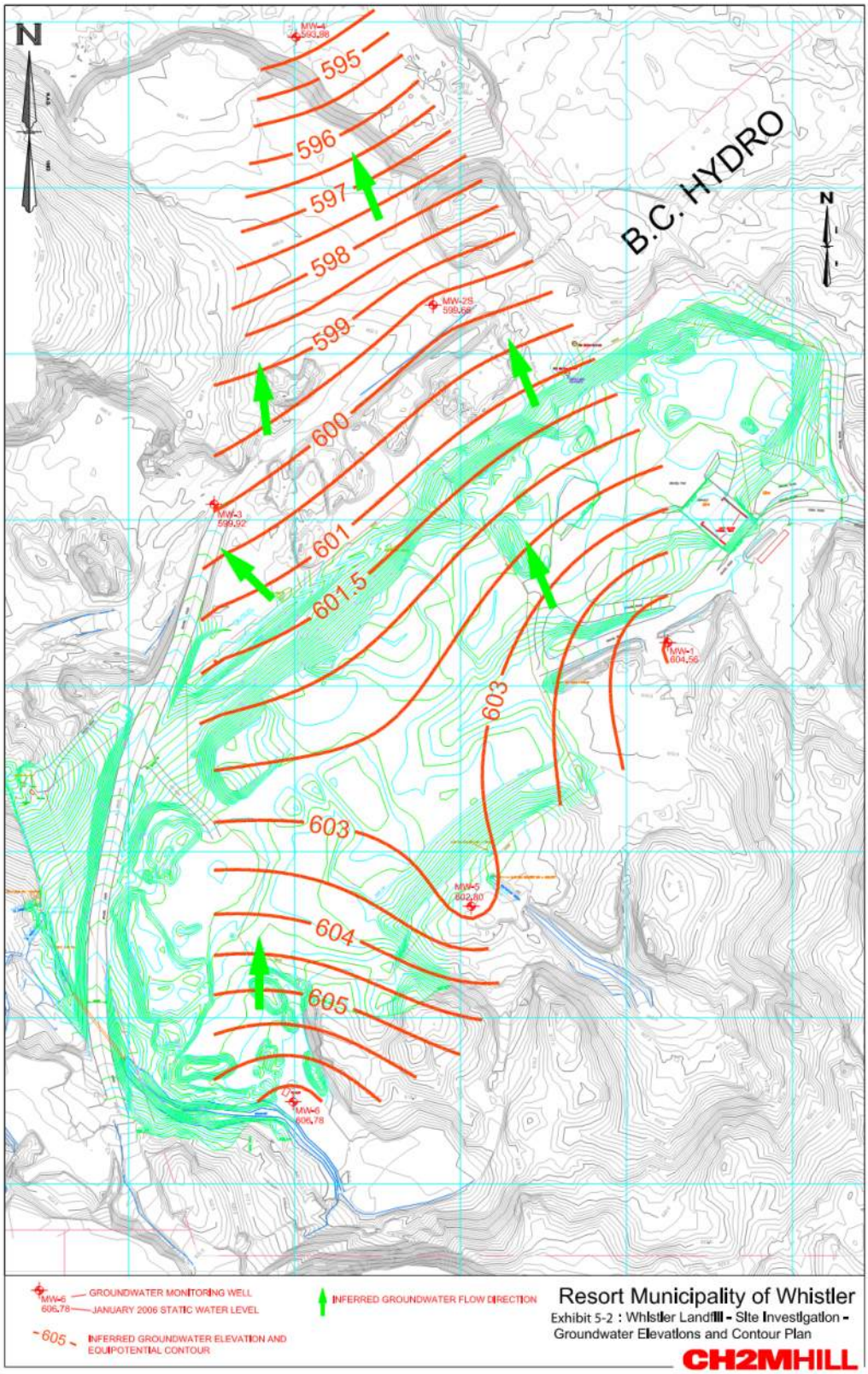

Figure 2: Groundwater Elevations and Flow Pattern at the Former Whistler Landfill Site (from CH2M Hill. 2006a)

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).

Monitoring and reporting requirements established in the Closure Plan (CH2MHill 2008c) were amended in 2012 (Morrison Hershfield, 2012) based on a review of monitoring data.

4. METHODOLOGY

4.1 Overview of Sampling Locations, Schedule and Applicable Standards & Guidelines

The various 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.

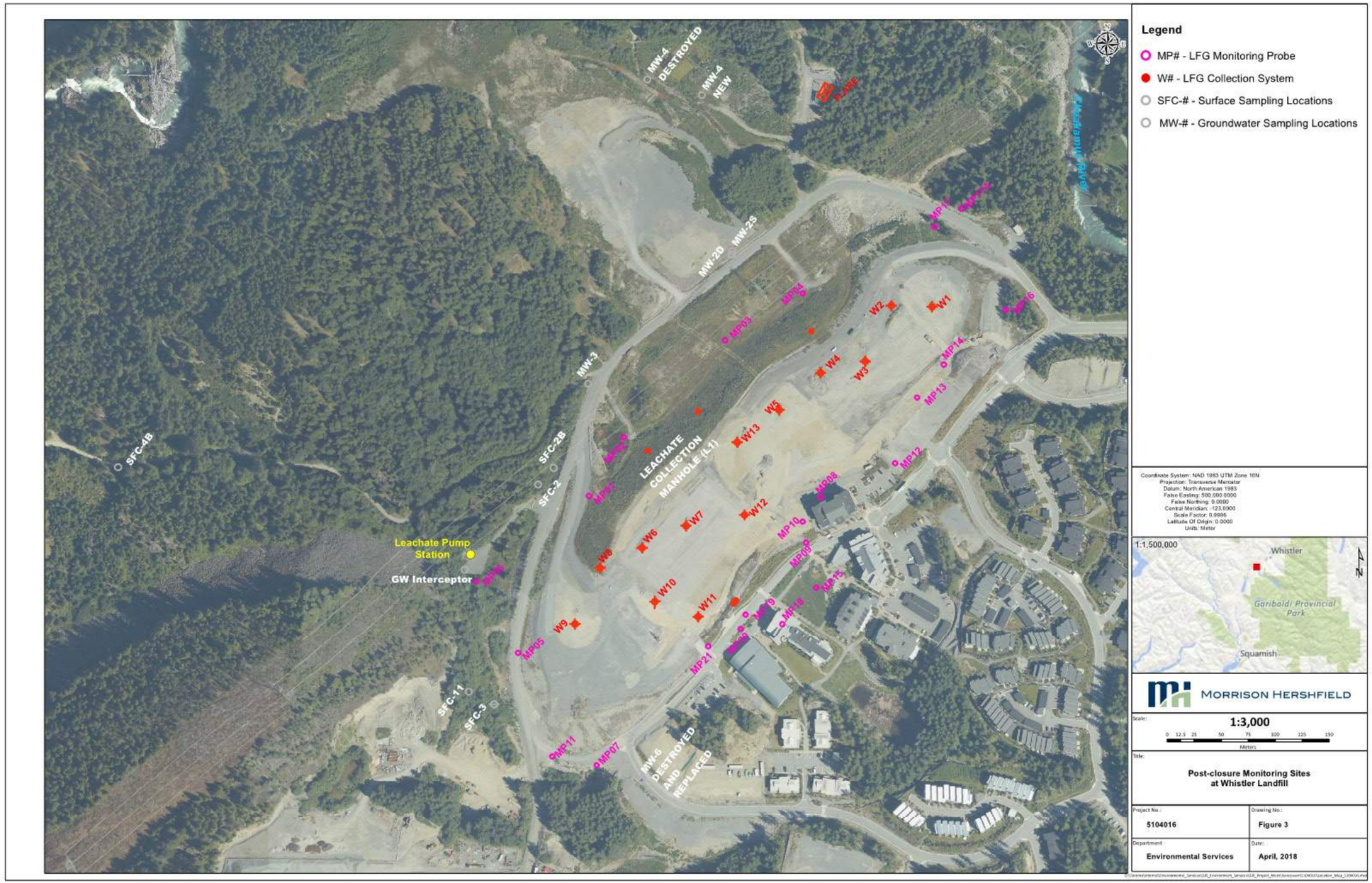

Figure 3: Post-Closure Monitoring Sites at the Former Whistler Landfill

Table 1: 2018 Quarterly Monitoring Dates

Monitoring Dates 2018	
Quarter 1 (Q1 2018)	March 20, 2018
Quarter 2 (Q2 2018)	June 20, 2018
Quarter 3 (Q3 2018)	September 25, 2018
Quarter 4 (Q4 2018)	December 11, 2018

The 2018 leachate, groundwater and surface water monitoring program was completed by Morrison Hershfield. The LFG monitoring program that has been in effect since 2009 has been conducted by Norseman Engineering Ltd. on a minimum monthly basis. During the winter months monitoring occurs on a weekly basis (November through April) when there is snow cover on the landfill or frozen ground (i.e. conditions that could facilitate subsurface LFG migration).

4.1.1 Leachate Monitoring

Leachate is captured and treated by the Whistler Wastewater Treatment Plant. For monitoring purposes, the leachate quality is tested as part of this monitoring program. The monitoring results help to determine when in the future leachate treatment will no longer be required.

A leachate collection point (Leachate Manhole) located on the down gradient side of the landfill mass (Figure 3) was sampled to provide an indicator of the concentrations 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 the first and third quarter sampling events. In addition to the sample for laboratory analysis, standard leachate field parameters were measured during the sampling event. The field 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.

Sampling is also conducted at the Groundwater (GW) Interceptor, adjacent to the Leachate Pump Station to the west and north of the landfill mass (Figure 3). The GW Interceptor is located adjacent to the existing leachate pump station in the southwest area of the closed landfill. The interceptor consists of 24 metres of perforated HDPE pipe (60 cm diameter). A new leachate collection wet well and pump station were constructed in 2009 in close proximity to the GW Interceptor. Intercepted groundwater is piped to the new leachate pump station wet well, where it is pumped along with landfill leachate, to the RMOW Wastewater Treatment Plant (WWTP) for treatment.

The GW Interceptor is located downgradient from the unlined Construction and Demolition (C&D) waste cell and was (presumably) installed to minimize the potential for off-site impacts associated with groundwater influenced by the C&D waste cell.

Samples were obtained using a plastic pail rinsed three times with the liquid in the manhole. One sample was collected during each quarterly sampling event in 2018. Two grabs were

required to fill all of the sample bottles on December 11, 2018 (Quarter 4) as a result of low water levels.

A summary of the leachate monitoring results in comparison to the applicable standards and guidelines are provided in Table 7 and Table 8. Complete laboratory results can be found in Appendix A.

4.1.2 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 groundwater sampling points. The 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 surface 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 leachate, and to be able to separate potential groundwater impacts of residential and commercial development from impacts of the landfill. MW-6 is up gradient of the landfill mass and is used to represent the local background conditions for the area. All of the other wells are down gradient of the landfill footprint. Table 2 provides a summary of groundwater wells monitored in 2018.

Table 2: 2018 Groundwater Monitoring Events and Locations

Site	Site Description	Q1	Q2	Q3	Q4
MW-2S & 2D	Immediately down gradient of the landfill footprint	✔	✔	✔	✔
MW-3	Down gradient of the landfill mass	✔	✔	✔	✔
MW-4	Down gradient of the landfill mass	✔	✔	✔	✔
MW-6	Up gradient of the landfill mass (background)	✔	✔	✔	✔

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 Environmental in Burnaby, BC. Appendix A provides a summary of the analytical results associated with groundwater quality monitoring.

All groundwater samples collected for dissolved metals analysis were filtered and preserved in the field. In addition to the samples for laboratory analysis, field parameters were also measured using a YSI model 556 multi-probe meter (or similar). The static water level depth in each well was also measured prior to sample collection.

Applicable Standards & Guidelines

The regulatory framework that applies to this project for groundwater water quality include the provincial standard for landfill closure: Schedule 3.2 (Generic Numerical Water Standards for Aquatic Life) of the B.C. Contaminated Sites Regulation (BCCSR). The BCCSR standards were updated as of November 2017 to reflect contemporary science as well as a number of other revisions; this 2018 report is the first year using the revised standards. As outlined in section 9.2.1 of the Closure Plan, exceedance of any compliance criteria for a period of two consecutive sampling events at any one monitoring location will trigger contingency planning.

In addition to the comparison to the regulatory standards, the tables showing the groundwater results also include a comparison to the B.C. Working and Approved Water Quality Guidelines to provide MoE with additional information for year to year comparison. These guidelines are more restrictive since they generally apply to receiving water conditions and not to groundwater within the landfill site. The guidelines provide 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; thus the values represented in the BC Ambient Water Quality guidelines are more stringent for many parameters. Therefore, while not directly applicable to monitoring locations at the landfill site, these guidelines provide a point of reference for assessing contaminant levels over time.

A summary of the groundwater quality results is provided in Section 5.1. Detailed laboratory results can be found in Appendix A.

4.1.3 Surface Water Monitoring

Table 3 provides a summary of the surface water sites sampled in 2018. 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. SFC-3 and SFC-11 are up gradient of the landfill and provide indicators of natural background surface water conditions.

Monitoring of the nearest receiving waterbody (Cheakamus River) is not incorporated within this monitoring program (as defined by the provincially-approved Landfill Closure Plan). Sampling results from the furthest down gradient surface water monitoring location, and the one nearest the Cheakamus River, at SFC-4B, provide the best indication of potential impacts to receiving water quality resulting from the site.

Surface water samples were collected using the techniques outlined in CH2M Hill (2008c). Field parameters were also measured using a YSI model 556 multi-probe meter (or similar). Appendix B provides a summary of the field data that was collected. Similar to the groundwater samples, all surface water samples were sent to ALS Environmental in Burnaby, BC for analysis.

Table 3: 2018 Surface Water Monitoring Events and Locations

Site	Site Description	Q1	Q2	Q3	Q4
SFC-2	Down stream of landfill	✔	✔	✔	✔
SFC-2B	Immediately adjacent to the leachate collection point	✔	✔	✔	✔
SFC-3	Located in a perimeter watercourse (background)	✔	✔	✔	✔
SFC-11	Cross gradient from the landfill (background)	✔	✔	✔	✔
SFC-4B	Furthest down gradient and the closest monitoring point to the Cheakamus River	✔	✔	✔	✔

Applicable Standards & Guidelines

The regulatory framework that applies to this project for surface water quality is the same as for groundwater, the applicable standards are the Schedule 3.2 (Generic Numerical Water Standards for Aquatic Life) of the B.C. Contaminated Sites Regulation. As outlined in section 9.2.1 of the Closure Plan, exceedance of any compliance criteria for a period of two consecutive sampling events at any one monitoring location will trigger contingency planning.

Surface water results are also compared to the B.C. Working and Approved Water Quality Guidelines to provide MoE with additional information for year to year comparison, in the same manner as groundwater results. These guidelines are more restrictive since they generally apply to receiving water conditions and not to locations within the landfill site. The guidelines provide 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; thus the values represented in the BC Ambient Water Quality guidelines are more stringent for many parameters. Therefore, while not directly applicable to monitoring locations at the landfill site, these guidelines provide a point of reference for assessing contaminant levels over time.

A summary of the surface water quality results is presented in Section 5.2. Appendix A provides a summary of the analytical results associated with surface water quality monitoring.

4.1.4 Landfill Gas Monitoring

Landfill gas monitoring was completed by Norseman Engineering Ltd. on a weekly (winter months) to monthly basis throughout the year. Monitoring at the building ports is conducted twice per year during months when there is snow pack, at least one month apart. 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 a 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 and/or migrating off-site.

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 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 frequency should be increased to daily at all of the monitoring probes and any buildings within 100 m of the MP. Monitoring at a daily frequency should continue 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.

4.2 Quality Assurance and Quality Control

In addition to using an accredited laboratory, Quality Assurance/Quality Control (QA/QC) measures were applied to the monitoring program to determine the accuracy and precision of the field results and the laboratory testing procedures.

For each surface and groundwater sampling event a sample duplicate and a travel blank were submitted for analysis. Duplicate samples were also collected from one monitoring location each Quarter using the word "Dup" as denoted in the sample ID. Travel blanks are used to confirm that the samples have not been contaminated during transportation from the site to the laboratory. The samples are transported in laboratory supplied coolers, remain closed, and are only reopened in the laboratory for analyses.

[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)

5. RESULTS AND DISCUSSION

Water quality monitoring at Whistler Landfill has included a broad suite of parameters, including the following groups of parameters:

- Dissolved & total metals
- Hardness
- Alkalinity
- Total Dissolved Solids
- Ammonia
- Volatile Organic Compounds (VOCs)
- Chemical Oxygen Demand (COD)
- Extractable and Volatile Hydrocarbons (EPH & VH)
- BTEX
- Polycyclic Aromatic Hydrocarbons (PAHs)

There are a limited number of key parameters that have been reviewed as both landfill related *indicator* parameters and parameters of potential *concern*:

Indicator parameters are compounds that are reliable indicators of groundwater impact from waste disposal, but in of themselves may not be a compound of concern. For the purposes of this water quality review, the landfill-related indicator parameters assessed include:

- chloride,
- conductivity,
- hardness,
- sulfate, and
- iron and manganese.

Parameters of potential concern at landfill sites consist primarily of ammonia (which can be toxic to aquatic life if it reaches an aquatic receptor at high enough concentrations). Other parameters of concern, may include presence of:

- ammonia
- hydrocarbons and/or volatile organic compounds, and
- possibly elevated concentration of heavy metals.

5.1 Groundwater

Monitoring locations up gradient provide a method to identify parameters that occur at natural or background elevated levels in the local groundwater 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.

A summary of the groundwater quality results in comparison to the applicable standards and guidelines are provided in Table 4 and Table 5. Detailed laboratory results can be found in Appendix A.

The following summarizes the groundwater exceedances of the standards and the guidelines for 2018.

BC Contaminated Sites Regulation, Schedule 3.2 Aquatic Life

- No parameters exceeded the standards in 2018.

BC Ambient Water Quality Guidelines

- Sulfate concentrations exceeded guidelines at MW-2D for all quarters.
- Arsenic concentrations exceeded guidelines at MW-4 (Q1, Q2 and Q4), and at MW-2D and MW-2S for all quarters.
- Cadmium concentrations exceeded guidelines at MW-3 in Q1 and Q3.
- Cobalt concentrations exceeded guidelines at MW-3 (Q1, Q3 and Q4), and at MW-2D and MW-4 for all quarters.
- Copper concentrations exceeded guidelines at MW-3 in Q1.
- Iron concentrations exceeded guidelines at MW-2S (Q1, Q2 and Q3), MW-3 (Q1 and Q4), MW-6 (Q1 and Q2), and at MW-2D and MW-4 for all quarters.
- Manganese concentrations exceeded guidelines at MW-2D, MW-2S, MW-3 and MW-4 for all quarters.
- Silver concentrations exceeded guidelines at MW-6 in Q1.
- Zinc concentrations exceeded guidelines at MW-2S (Q4) and MW-4 (Q2 and Q4).
- Chlorobenzene concentrations exceeded guidelines at MW-2D in Q1 and Q3.
- Pyrene concentrations exceeded guidelines at MW-6 in Q1 and Q3.

5.1.1 Discussion

Indicator parameters, such as iron, manganese and sulfate, are elevated at the wells downgradient of the landfill (MW-2D, MW-2S, MW-3 and MW-4), but have not exceeded the BCCSR standards in 2018. These indicator parameters were consistently elevated relative to background concentrations, which suggests MW-2D, MW-2S, MW-3 and MW-4 have been influenced by landfill leachate.

Silver and pyrene concentrations were in exceedance of guidelines at MW-6, but were not elevated at other down gradient wells. Over the last 1- 2 years there has been new construction in the area immediately adjacent to MW-6 which may have influenced the results at this location. Since this well is up gradient of the landfill footprint, it is suspected that these concentrations are not indicative of landfill leachate impacts.

5.2 Surface Water

Similarly to groundwater, there are surface water monitoring locations both up gradient and down gradient of the landfill. Sample locations SFC-3 and SFC-11 are up gradient of the landfill

and provide indicators of natural background surface water conditions. SFC-4B is the furthest down gradient and the closest monitoring point to the Cheakamus River.

A summary of the surface water monitoring results in comparison to the applicable standards and guidelines are provided in Table 6. Complete laboratory results can be found in Appendix A.

The following summarizes the surface water exceedances of the standards and the guidelines for 2018.

BC Contaminated Sites Regulation, Schedule 3.2 Aquatic Life

- Cobalt concentrations exceeded standards at SFC-2B in Q1, Q2 and Q3.
- Copper concentrations exceeded standards at SFC-2B for all quarters and at SFC-4B in Q4.
- Zinc concentrations exceeded standards at SFC-2B in Q2 and Q3.

BC Ambient Water Quality Guidelines

- Fluoride concentrations exceeded guidelines at SFC-2B in Q2 and Q3.
- Nitrate concentrations exceeded guidelines at SFC-2B in Q1.
- Sulfate concentrations exceeded guidelines at SFC-2B for all quarters.
- Beryllium concentrations exceeded guidelines at SFC-2B in Q1, Q2 and Q3.
- Chromium concentrations exceeded guidelines at SFC-2B (Q1 and Q2) and at SFC-3 and SFC-4B in Q4.
- Cobalt concentrations exceeded guidelines at SFC-2 and SFC-2B for all quarters, and at SFC-4B in Q4.
- Copper concentrations exceeded guidelines at SFC-2 in Q1 and Q4, SFC-2B for all quarters, and SCF-3 and SFC-4B in Q4.
- Iron concentrations exceeded guidelines at SFC-4B (Q1 and Q4) and at SFC-2 and SFC-2B for all quarters.
- Manganese concentrations exceeded guidelines at SFC-2 (Q2 and Q4) and SCF-2B for all quarters.
- Nickel concentrations exceeded guidelines at SFC-2B in Q2 and Q3.
- Zinc concentrations exceeded guidelines at SFC-3 (Q1), SFC-4B (Q2) and at SFC-2 and SFC-2B for all quarters.

5.2.1 Discussion

Indicators of leachate influenced groundwater quality are regularly above the standards and guidelines in the locations down gradient of the landfill footprint (SFC-2, SFC-2B, and SFC-4B).

- Hardness, conductivity, sulfate, iron and manganese (and aluminum) were consistently elevated at SFC-2, SFC-2B and SFC-4B relative to background concentrations and were

regularly above BC Water Quality Guidelines. These locations appear to be influenced by landfill leachate.

At the sample location SFC-2B, the concentrations of cobalt and copper were in exceedance of the BCCSR standards for at least two sampling events in a row, which as per the Closure Plan indicates that contingency planning should be initiated. Prior to initiating contingency planning or measures, an assessment of the environmental risks was conducted, the findings of which are discussed here. There were three key areas that we looked at; the zone of influence, contribution of flow or magnitude of the issue, and habitat value within the watercourse sampled at SFC-2B.

Zone of Influence: Exceedances of the standards did not report downstream at SFC-2 (located less than 30 m downstream), or at SFC-4B (the closest sampling location to the Cheakamus River) for all parameters excluding copper. Copper concentrations did not exceeded the standards downstream at SFC-2 and but did in Q4 at SFC-4B. The exceedance of the standard in Q4 at SFC-2B was over the guideline by 0.004 mg/l, but it did not report at SFC-2. Also, the up-gradient location SFC-3 that is uninfluenced by landfill activities also reported elevated copper concentrations in Q4. These concentrations did not exceed standards, but they did exceed guidelines.

Flow: SFC-2B is a drainage feature that is often dry or only standing water during Q3 sampling events. Throughout the year the flow contribution to the downstream environment in SFC-2 and SFC-4B is very minimal.

Habitat: SFC-2B is dense with vegetation, and as noted above has intermittent flow. Furthermore, there is a partial barrier to fish passage (gradient is steep with minimal flow) at the confluence with the downstream waterbody. Given these attributes, it is highly unlikely that it supports a fishery.

Based on these three elements (zone of influence, flow and habitat value), it was decided that immediate contingency planning is not warranted this year, however a trend analysis to observe water quality patterns should be completed in 2019 and used for future monitoring and contingency planning.

5.3 Leachate & Groundwater Interceptor

A summary of the leachate monitoring results in comparison to the applicable standards and guidelines are provided in Table 7 and Table 8. Complete laboratory results can be found in Appendix A.

The following summarizes the leachate exceedances of the standards and the guidelines for 2018.

BC Contaminated Sites Regulation, Schedule 3.2 Aquatic Life

- No parameters exceeded the standards in 2018.

BC Ambient Water Quality Guidelines

- Nitrate concentrations exceeded guidelines at the Leachate Manhole in Q1 and Q3 (all sampled quarters).
- Sulfate concentrations exceeded guidelines at the Leachate Manhole in Q3 and at the Groundwater Interceptor in Q1 and Q4.
- Cobalt concentrations exceeded guidelines at the Groundwater Interceptor in Q1 and Q4.
- Iron concentrations exceeded guidelines at the Groundwater Interceptor for all quarters.
- Manganese concentrations exceeded guidelines at the Leachate Manhole in Q3 and at the Groundwater Interceptor for all quarters.
- Zinc concentrations exceeded guidelines at the Leachate Manhole in Q1 and Q3 (all sampled quarters) and at the Groundwater Interceptor in Q3 and Q4.
- Fluoranthene concentrations exceeded guidelines at the Groundwater Interceptor in Q3.
- Pyrene concentrations exceeded guidelines at the Groundwater Interceptor for all quarters.

5.3.1 Discussion

The concentration of the indicator parameters were generally higher at the GW Interceptor than at the Leachate Manhole. Similarly, concentrations of the potential parameters of concern were also higher at the GW Interceptor than at the Leachate Manhole. Hydrocarbons and volatile organic compounds were not detected at the Leachate Manhole. However, two compounds were detected in the GW Interceptor, specifically fluoranthene and pyrene.

5.4 Landfill Gas

Testing was performed monthly during the months with no snow cover (May – October); however no sample was collected in October 2018. During the months with snow pack (January – April and November – December) sampling was completed weekly. A summary of the landfill gas monitoring results is provided in Table 9.

Trace amounts of methane were detected at MP #12 on December 14th, which is located next to the Podium Building at 1025 Legacy Way. Remedial action was taken immediately in the form of raising the flare flow and adjusting extraction wells #4 and #5. This was successful in eliminating the presence of methane at MP #12 by the end of the testing day (December 14th, 2018).

No methane was detected at any other monitoring points in 2018, meaning there was no off-site landfill gas migration. Based on 2018 data, the operation and maintenance of the landfill gas system ensured that landfill gas is effectively extracted from the landfill area and lateral migration was prevented.

5.4.1 Maintenance Activities

Routine maintenance of monitoring probes were completed on as needed basis during monthly (and weekly) monitoring activities by Norseman Engineering.

- In January, the vacuum at the flare indicated that the low point in the landfill gas transmission line was close to complete blockage. RMOW staff were contacted to pump out condensate from the low point in the landfill gas transmission line.
- In February, condensate at the low point of the landfill gas transmission line prevented any landfill gas flow to the flare from the North End wells. This initiated maintenance on February 14th, 2018 to pump out the low point. RMOW staff were notified that the flare would have to be shut down during pumping. Wells #11, #12 and #13 were turned off to prevent landfill gas from moving towards the pumping point. A 1 ½" PVC flex hose with graduated markings was used to place the end of the pipe in the proper position. A Pacer thermoplastic pump was used, with no metal parts that could cause a spark. It was hard to estimate the amount of condensate that was pumped, since the flow was sometimes erratic. However, the pump worked at full capacity for one minute, indicating that the amount of condensate pumped was roughly 227 liters. The condensate was directed to the downstream side of C2 manhole, and ultimately to the sewage treatment plant. The flare was re-started and full vacuum was restored to the South End wells.
- In March, high vibration and high amperage alarms were set-off when using blower #301. The blower was spun by hand to determine the cause of the alarms. The blower and motor spun freely, however there was some play in the direct coupler between the two. The cause of the high vibration and high amperage alarms should be investigated, so there is a spare blower in place.
- On April 20th, the flare was not igniting and the solenoid valve controlling the propane flame augmentation was not functioning. RMOW staff were notified and the problem was solved quickly. The electrician found that the problem was faulty input/output cards associated with the PLC in the control cabinet. The high vibration and amperage alarms reported in March were actually an electrical fault, and were also eliminated when the I/O cards were replaced.
- On June 18th, well #7 was isolated to accommodate the RMOW's plans to re-surface the soccer field where the well was located. The vacuum line to the main header had to be disconnected quickly and a 2" PVC cap installed to prevent air intrusion into the system. A Fernco type rubber coupling with stainless gear clamps was also installed to ensure that there will be no air intrusion.
- In July, there was very little vacuum in the southern wells (#11, #12 and #13) and a high steady vacuum was observed at the flare. This indicates that the low point in the landfill gas transmission line is starting to fill up again, and will need to be pumped out in the near future.
- In August, the methane content increased at the southern wells and decreased at the northern wells. This indicates that vacuum is restricted to the southern wells and the low point in the landfill gas transmission line is almost blocked. The line is scheduled to be pumped out in early fall.

- On September 12th, well #7 was decommissioned and backfilled. The concrete manhole reducer was removed such that the wellhead was exposed to the atmosphere, and broken wellhead pieces were removed. The well interior was filled with bentonite chips and then capped. Sand was placed in lifts and a “jumping jack” compactor was used to compact the lifts to the desired grade.
- On October 26th, the low spot in the landfill gas transmission line was pumped out. Inspection chamber C2 was accessed, the flange was unbolted, and wells #11, #12 and #13 were turned off. RMOW staff were warned that the flare would be shut off during the maintenance procedure. A specifically modified 1½“ flex hose was inserted into the 8” transmission line to the 35 foot mark, facing north. A fully thermoplastic pump (to avoid sparks) was used to empty the low spot of condensate. About 200 liters of condensate was pumped to the south side of the manhole. The wells and the flare were turned back on. The flare had to be re-started a few times until the air in the pipe had been expelled. The operation was successful, and full vacuum was restored to the southern wells.

6. RECOMMENDATIONS

6.1 Groundwater, Surface Water & Leachate

6.1.1 Monitoring

Data from the 2018 monitoring results are generally consistent with the results from previous years' monitoring. There were no new or extraordinary issues noted in the groundwater, surface water or leachate monitoring results.

Groundwater

- Indicators of leachate influenced groundwater quality appears at this time to be limited to locations immediately down gradient of the landfill footprint (MW-2S / MW-2D and MW-3), and further down gradient of the landfill (MW-4).
- Metals such as cobalt, copper, iron and manganese continue to exceed the guidelines. Arsenic was observed in 2018 to also exceed the guidelines which was not observed in 2017 annual results.
- Down gradient of the landfill there are no groundwater points of diversion / users.

Based on the elements noted above, continued monitoring of groundwater in 2019 is recommended and required as per the Closure Plan.

Surface Water

- The trigger for contingency planning was met at SFC-2B for copper and cobalt, however the zone of influence was limited to only SFC-2B (with the exception of copper), the flow contribution to downstream waterbodies is minimal, and the habitat value at this location is low. As a result, the risk to the environment is considered low. At this time it is recommended that trend analysis for the water quality at all of the sampling sites (ground and surface water) is conducted in 2019 (using 2018 data). The trend analysis should demonstrate the directionality of water quality (improvements or decline) as well as look at leachate influence areas for each sample site (surface and ground water locations). The data can then be used for future monitoring and contingency planning purposes.
- Surface water samples have exceeded the standards in the past for metals, this was observed again in 2018 results.
- Hardness, conductivity, sulfate, iron and manganese were consistently elevated at SFC-2, SFC-2B and SFC-3 relative to background concentrations; this is consistent with historic sampling events. These locations appears to be influenced by landfill leachate.
- Surface water sampling location SFC-4B is the nearest to the Cheakamus River, therefore this location provides the best indication of potential impacts to receiving water quality resulting from the site. All BCCSR standards were met at this location except for (total) copper during the Q4 sampling event. Suspended solids levels recorded during

the Q4 event at SFC-3 (an up gradient drainage uninfluenced by the landfill) were unusually high and likely contributed to the higher (total) copper concentrations at both SFC-3 and the downgradient site at SFC-4B.

In addition to the trend analysis outlined under bullet item one, continued surface water monitoring in 2019 is recommended and required as per the Closure Plan.

Leachate

Continued monitoring is recommended in 2018 for leachate to assist in determining when in the future leachate treatment will no longer be required.

6.1.2 Maintenance

The following are recommended for 2019 maintenance activities:

- Monitoring well sampling devices (i.e. tubing and footvalves) should be replaced as needed in 2019.

6.2 Landfill Gas

6.2.1 Monitoring

Monitoring data from 2018 indicates that the overall performance of the LFG Collection System continues to operate effectively and prevent LFG migration. Continued monitoring for LFG as prescribed in the methodology (Morrison Hershfield 2012) is recommended.

6.2.2 Maintenance

The LFG Collection System was adjusted as necessary throughout the year (see section 5.4), and as a result there was a recommendation to ensure that both landfill gas blowers are inspected and brought into working order to provide back-up in the event of one blower failing. Having a functional back-up is of particular importance during the winter months to prevent landfill gas migration. Continued maintenance and operation for the LFG Collection System as prescribed in the methodology (Morrison Hershfield 2012) is recommended.

7. REFERENCES

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MORRISON HERSHFIELD

TABLE 4: 2018 GROUNDWATER QUALITY - GENERAL CHEMISTRY AND DISSOLVED METALS

				Sample ID	MW-2D				MW-2S				MW-3				MW-4				MW-6			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW**	**BCAWWQG-FAL**																				
Field Parameters																								
Field Conductivity	uS/cm	-	-	-	750.0	705.0	734.0	715.0	265.9	245.7	258.8	349.8	172.3	153.0	176.6	183.5	311.7	321.7	190.4	217.4	527.0	481.7	386.2	307.4
Temperature	C	-	-	-	7.5	9.0	8.3	7.2	7.4	9.2	8.3	6.8	7.0	9.2	9.9	8.7	7.7	8.7	9.8	5.2	6.7	9.0	10.1	8
pH	-	-	-	-	6.61	6.43	6.57	6.39	6.88	6.41	6.73	6.08	5.68	6.51	6.05	6.27	6.64	6.4	6.54	6.41	6.02	5.87	6.08	6.33
Dissolved Oxygen	mg/L	-	-	-	2.64	4.91	1.65	2.99	2.10	4.98	2.77	3.96	2.53	4.70	2.75	4.51	2.63	3.38	6.04	4.23	6.21	11.57	3.57	5.35
Oxidation Reduction Potential	-	-	-	-	32.0	117	22.2	32.9	10.6	154	23.4	-5.8	219	146	166	77.5	19.7	150	155	-6.9	189	227	324	60.7
General Chemistry																								
Conductivity	uS/cm	2	-	-	935	903	910	989	305	271	282	433	250	222	232	266	347	366	200	289	790	727	513	479
Hardness (as CaCO3)	mg/L	0.5	-	-	361	372	383	353	97.8	94.6	115	147	56.3	60.7	69.3	65.9	134	139	86.4	101	159	140	89.5	88.5
pH	pH	0.1	-	9	7.38	8.25	6.82	6.79	7.56	7.80	7.52	6.81	6.67	7.25	6.47	6.40	7.52	8.22	6.67	6.62	6.75	7.38	6.51	6.80
Total Suspended Solids	mg/L	3	-	-	681	393	868	350	143	42.6	136	145	5.40	11.0	5.80	27.7	810	353	1350	689	342	233	303	65.5
COD	mg/L	20	-	-	40	40	37	46	<20	<20	<20	37	<20	<20	<20	<20	29	29	34	35	48	20	46	<20
Anions and Nutrients																								
Alkalinity, Total (as CaCO3)	mg/L	1.0	-	-	262	227	233	261	76.2	72.7	75.6	107	23.2	27.3	26.1	27.8	112	115	63.0	83.4	15.1	18.9	32.6	34.5
Ammonia, Total (as N)	mg/L	0.0050	pH & Temp based	pH & Temp based	11.8	11.1	11.4	10.9	4.41	3.42	2.95	4.31	0.548	0.383	0.654	0.540	2.38	2.38	1.21	1.58	0.039	0.031	0.073	0.031
Bromide (Br)	mg/L	0.050	-	-	<0.250	<0.250	<0.250	<0.250	<0.050	<0.050	<0.050	0.121	0.068	<0.050	<0.050	<0.050	0.058	<0.050	<0.050	<0.050	<0.250	<0.250	<0.050	<0.050
Chloride (Cl)	mg/L	0.50	1500	600	47.2	43.4	45.4	45.3	11.5	4.93	6.93	17.4	31.3	34.0	33.2	40.4	20.9	20.6	10.7	16.9	167	138	75.8	53.4
Fluoride (F)	mg/L	0.020	2	0.4	<0.100	<0.100	<0.100	<0.100	0.123	0.118	0.106	0.134	0.042	0.026	0.035	0.033	0.08	0.096	0.051	0.057	<0.100	<0.100	0.071	0.074
Nitrate and Nitrite (as N)	mg/L	0.0051	400	-	0.0250	0.0580	<0.025	<0.025	0.0238	0.0257	<0.0051	0.0072	0.1330	0.6250	<0.0051	0.293	0.0137	0.0082	0.0688	0.0202	0.3060	0.5070	0.6080	0.2820
Nitrate (as N)	mg/L	0.0050	400	3	0.0250	0.0580	<0.025	<0.025	0.0238	0.0257	<0.0050	0.0072	0.1310	0.6250	<0.0050	0.292	0.0126	0.0062	0.0653	0.0202	0.3060	0.5070	0.6080	0.2820
Nitrite (as N)	mg/L	0.0010	0.2	0.02	<0.0050	<0.0050	0.0077	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	<0.0010	<0.0010	0.0011	0.0011	0.0020	0.0035	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	12.3	11.1	11.1	11.5	4.80	3.72	3.25	4.85	0.682	0.582	0.709	0.626	2.86	2.62	1.89	1.92	1.52	1.22	1.34	0.294
Total Nitrogen	mg/L	0.030	-	-	12.0	11.6	11.4	12.1	4.82	3.56	3.20	4.83	0.742	1.03	0.690	0.863	2.83	2.53	1.84	1.94	1.63	2.95	1.87	0.582
Phosphorus (P)-Total	mg/L	0.0020	-	-	0.6450	0.3430	0.7750	0.3200	0.2550	0.0380	0.1520	0.1680	<0.0020	0.0022	<0.0020	0.0024	0.4860	0.1980	0.6700	0.5260	1.220	1.090	1.100	0.2600
Sulfate (SO4)	mg/L	0.30	1280	128	189	199	202	193	56.6	52.2	57.7	80.9	44.4	20.0	36.3	32.3	45.5	44.5	25.7	33.0	97.4	102.0	101	106
Dissolved Metals																								
Aluminum (Al)-Dissolved	mg/L	0.0010	-	0.1	<0.0040	0.0050	0.0025	0.0035	<0.0020	0.0027	0.0068	0.0034	0.0461	0.0148	0.0183	0.0237	<0.0050 *	0.0704	0.0117	0.0303	0.9920	0.0320	0.0364	0.0184
Antimony (Sb)-Dissolved	mg/L	0.00010	0.09	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.00010	0.05	0.005	0.0119	0.0140	0.0142	0.0135	0.0066	0.0071	0.0077	0.0079	<0.00010	<0.00010	<0.00010	<0.00010	0.0052	0.0069	0.0048	0.0058	0.0003	0.0001	<0.00010	0.00011
Barium (Ba)-Dissolved	mg/L	0.00010	10	1	0.0340	0.0344	0.0354	0.0355	0.0779	0.0696	0.0777	0.1140	0.0861	0.0846	0.1060	0.0969	0.1810	0.1740	0.0962	0.1200	0.0523	0.0370	0.0250	0.0296
Beryllium (Be)-Dissolved	mg/L	0.00010	0.0015	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	0.000050	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	0.010	12	1.2	0.284	0.262	0.298	0.250	0.104	0.098	0.110	0.115	<0.010	<0.010	<0.010	<0.010	0.065	0.056	0.033	0.043	0.017	0.015	0.018	0.015
Cadmium (Cd)-Dissolved	mg/L	0.0000050	0.0005 @ H <30 0.004 @ H >210	As per guideline calculation	0.0000074	0.0000114	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000051	0.000495	0.000184	0.000475	0.000383	0.000246	0.000156	0.000215	0.000112	0.000245	0.000162	0.0000949	0.0000575
Calcium (Ca)-Dissolved	mg/L	0.050	-	-	121	124	126	116	31.7	30.0	36.3	46.0	16.5	18.9	20.7	19.8	44.0	45.7	29.4	32.7	53.8	47.2	30.5	29.5
Cesium (Cs)-Dissolved	mg/L	0.000010	-	-	0.000019	0.000017	0.000015	0.00002	0.000019	0.000014	0.000015	0.000022	0.000053	0.000041	0.000055	0.00007	0.000037	0.000036	0.000036	0.000036	0.000046	0.000012	0.000013	0.000012
Chromium (Cr)-Dissolved	mg/L	0.00010	0.01	0.001	0.00019	<0.00010	0.00015	0.00023	<0.00010	<0.00010	0.00024	0.00013	<0.00010	<0.00010	0.00017	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	0.00052	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	0.00010	0.04	0.004	0.0121	0.0120	0.0122	0.0121	0.0013	0.0014	0.0019	0.0024	0.0195	0.0028	0.0156	0.0129	0.0273	0.0249	0.0127	0.0195	0.0014	0.0036	0.0004	0.0006
Copper (Cu)-Dissolved	mg/L	0.00020	0.02 @ H < 50 0.04 @ H 75 - 100 0.06 @ H 125 - 150	(0.094(H)+2) / 1000	<0.00020	0.00025	<0.00020	<0.00020	0.00044	0.00633	0.00315	0.00021	0.00770	0.00299	0.00266	0.00416	0.00106	0.00834	0.00350	0.00990	0.01660	0.00249	0.00151	0.00582
Iron (Fe)-Dissolved	mg/L	0.010	-	0.35	51.4	54.2	53.3	52.9	28.5	29.2	35.2	44.6	1.40	0.01	0.190	0.624	35.4	43.2	17.1	30.7	1.47	0.920	0.032	0.013
Lead (Pb)-Dissolved	mg/L	0.000050	0.04	0.003	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000216	0.000136	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000701	0.000071	0.000377	0.000456	<0.000050	<0.000050	0.00026
Lithium (Li)-Dissolved	mg/L	0.0010	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.0050	-	-	14.5	15.2	16.4	15.4	4.55	4.80	6.01	7.83	3.67	3.28	4.29	3.99	5.94	6.12	3.15	4.59	6.05	5.34	3.24	3.60
Manganese (Mn)-Dissolved	mg/L	0.00010	-	0.768	3.52	3.60	4.06	3.76	1.42	1.41	1.80	2.24	2.85	1.21	4.05	2.68	2.49	2.30	1.31	1.85	0.264	0.306	0.106	0.166
Mercury (Hg)-Dissolved	mg/L	0.0000050	0.00025	0.00001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.000050	10	1	0.01360	0.01330	0.01110	0.01230	0.00377	0.00460	0.00380	0.00388	0.00048	0.00066	0.00071	0.00049	0.00963	0.01500	0.01160	0.01040	0.00042	0.00054	0.00030	0.000773
Nickel (Ni)-Dissolved	mg/L	0.00050	0.25	0.025	0.00221	0.00236	0.00248	0.00242	0.00061	0.00062	0.00051	0.00104	0.00367	0.00062	0.00356	0.00245	0.00408	0.00327	0.00271	0.00288	0.00141	0.00100	<0.00050	<0.00050
Phosphorus (P)-Dissolved	mg/L	0.050	-	-	0.083	0.087	0.089	0.108	<0.050	<0.050	<0.050	0.052	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.112	<0.050	<0.050	0.061
Potassium (K)-Dissolved	mg/L	0.050	-	373	19.0	19.6	20.9	19.8	7.43	6.59	7.43	9.00	3.03	3.62	4.10	3.99	5.63	5.89	3.90	4.87	4.02	4.09	3.03	2.97
Rubidium (Rb)-Dissolved	mg/L	0.00020	-	-	0.01050	0.01040	0.01110	0.01180	0.00517	0.00417	0.00438	0.00636	0.00891	0.00852	0.01140	0.01250	0.00411	0.00405	0.00332	0.00361	0.00746	0.00614	0.00505	0.00493
Selenium (Se)-Dissolved	mg/L	0.000050	0.02	0.001	0.000081	0.000076	0.000091	0.000082	<0.000050	<0.000050	0.00006	<0.000050	0.000054	<0.000050	0.000064	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000072	0.000052
Silicon (Si)-Dissolved	mg/L	0.050	-	-	14.1	14.4	14.2	14.1	8.48	8.87	9.00	9.80	6.67	7.17	7.37	7.38	10.4	11.0	9.05	8.82	6.65	6.27	5.63	5.81
Silver (Ag)-Dissolved	mg/L	0.000010	0.0005	0.00005	<0.000010	<0.000010	<0.000020 *	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000404	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	0.050	-	-	32.7	35.1	41.0	36.8	8.11	6.46	8.35	13.1	14.4	11.6	19.1	20.4	15.5	16.5	13.5	13.4	91.0	88.0	83.0	58.8
Strontium (Sr)-Dissolved	mg/L	0.00020	-	-	0.556	0.552	0.517	0.530	0.192	0.184	0.186	0.261	0.135	0.178	0.184	0.151	0.297	0.281	0.172	0.202	0.622	0.452	0.349	0.263
Sulfur (S)-Dissolved	mg/L	0.50	-	-	61.7	66.4	66.8	64.7	17.0	17.1	20.4	27.3	11.4	6.19	13.3	9.94	14.5	14.9	8.87	10.6	33.8	34.8	37	34.9
Tellurium (Te)-Dissolved	mg/L	0.00020	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved	mg/L	0.000010	0.003	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000146	0.000082	0.000086	0.000148	0.000038	0.000026	0.000029	0.000022	0.000054	0.000051	0.000033	0.000037
Thorium (Th)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00032	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	0.00033	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00022	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.00030	1	2	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00504	<0.00030	<0.00030	0.0392	<0.00030	<0.00030	<0.00030
Tungsten (W)-Dissolved	mg/L	0.00010	-	-	0.00060	<0.00010	<0.00010	<0.00010	0.00016	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00038	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved	mg/L	0.000010	0.085	0.0085	0.000157	0.000166	0.000152	0.000169	0.000016	0.000015	0.000016	0.000037	<0.000010	<0.000010	<0.000010	<0.000010	0.000181	0.000265	0.000089	0.000145	0.000149	0.000022	0.000017	0.000021
Vanadium (V)-Dissolved	mg/L	0.00050	-	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00162	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.0010	0.075	0.0075	0.0026	0.0037	0.0016	0.0033	0.0018	0.0057	0.0042	0.0077	0.0074	0.0037	0.0044	0.0056	0.0056	0.0142	0.0073	0.0121	0.0046	0.0047	0.0016	0.0063
Zirconium (Zr)-Dissolved	mg/L	0.000060	-	-	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060	0.000076	0.000068	0.000127	<0.000060	<0.000060	<0.000060

***Standard: British Columbia Contaminated Sites Regulation Stage 10 Amendment (NOV, 2017) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (MAY, 2015) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 5: 2018 GROUNDWATER QUALITY - PETROLEUM HYDROCARBONS

				Sample ID	MW-2D				MW-2S				MW-3				MW-4				MW-6			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW**	**BCAWWQG-FAL**																				
Volatile Organic Compounds																								
Benzene	mg/L	0.00050	0.4	0.04	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<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	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Carbon Tetrachloride	mg/L	0.00050	0.13	0.0133	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
Chlorobenzene	mg/L	0.0010	0.013	0.0013	0.0022	-	0.0018	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Dibromochloromethane	mg/L	0.0010	-	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Chloroform	mg/L	0.0010	0.02	0.0018	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<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	-	<0.0050	-	<0.0050	-	<0.0050	-	<0.0050	-	<0.0050	-
1,2-Dichlorobenzene	mg/L	0.00050	0.007	0.0007	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
1,3-Dichlorobenzene	mg/L	0.0010	1.5	0.15	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
1,4-Dichlorobenzene	mg/L	0.0010	0.26	0.026	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
1,2-Dichloroethane	mg/L	0.0010	1	0.1	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<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	-	<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	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Dichloromethane	mg/L	0.0050	0.98	0.0981	<0.0050	-	<0.0050	-	<0.0050	-	<0.0050	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
cis-1,3-Dichloropropylene	mg/L	0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
trans-1,3-Dichloropropylene	mg/L	0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
1,3-Dichloropropene (cis & trans)	mg/L	0.0010	-	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Ethylbenzene	mg/L	0.00050	2	0.2	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
Methyl t-butyl ether (MTBE)	mg/L	0.00050	34	3.4	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
Styrene	mg/L	0.00050	0.72	0.072	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
1,1,2,2-Tetrachloroethane	mg/L	0.00020	-	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-	<0.00020	-
Tetrachloroethylene	mg/L	0.0010	1.1	0.11	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Toluene	mg/L	0.00045	0.005	0.0005	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-	<0.00045	-
1,1,1-Trichloroethane	mg/L	0.0010	-	11.1	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
1,1,2-Trichloroethane	mg/L	0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
Trichloroethylene	mg/L	0.0010	0.2	0.021	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<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	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Vinyl Chloride	mg/L	0.00040	-	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-	<0.00040	-
ortho-Xylene	mg/L	0.00050	-	0.03	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
meta- & para-Xylene	mg/L	0.00050	-	0.03	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-	<0.00050	-
Xylenes	mg/L	0.00075	0.3	0.03	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-	<0.00075	-
4-Bromofluorobenzene (SS)	%	Surrogate	-	-	91.2	-	94.0	-	93.2	-	96.7	-	92.3	-	97.8	-	93.2	-	98.0	-	88.9	-	96.9	-
1,4-Difluorobenzene (SS)	%	Surrogate	-	-	105.4	-	82.5	-	105.0	-	86.8	-	104.3	-	86.2	-	104.1	-	87.2	-	105.3	-	86.4	-
Hydrocarbons																								
EPH10-19	mg/L	0.25	5	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-
EPH19-32	mg/L	0.25	-	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	0.33	-
LEPH	mg/L	0.25	0.5	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-
HEPH	mg/L	0.25	-	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	<0.25	-	0.33	-
Volatile Hydrocarbons (VH6-10)	mg/L	0.10	15	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-
VPH (C6-C10)	mg/L	0.10	1.5	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-	<0.10	-
2-Bromobenzotrifluoride	%	Surrogate	-	-	90.1	-	97.9	-	86.5	-	96.7	-	88.0	-	95.0	-	87.1	-	96.9	-	87.6	-	97.6	-
3,4-Dichlorotoluene (SS)	%	Surrogate	-	-	86.1	-	101.3	-	105.8	-	122.5	-	74.3	-	117.7	-	111.4	-	121.7	-	67.7 *	-	125.5	-
Polycyclic Aromatic Hydrocarbons																								
Acenaphthene	mg/L	0.000010	0.06	0.006	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Acenaphthylene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Acridine	mg/L	0.000010	0.0005	0.00005	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Anthracene	mg/L	0.000010	0.001	0.0001	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Benz(a)anthracene	mg/L	0.000010	0.001	0.0001	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Benzo(a)pyrene	mg/L	0.0000050	0.0001	0.00001	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-
Benzo(b&j)fluoranthene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Benzo(b+j+k)fluoranthene	mg/L	0.000015	-	-	-	-	<0.000015	-	-	-	<0.000015	-	-	-	<0.000015	-	-	-	<0.000015	-	-	-	<0.000015	-
Benzo(g,h,i)perylene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Benzo(k)fluoranthene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Chrysene	mg/L	0.000010	0.001	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000020	-	<0.000020	-
Dibenz(a,h)anthracene	mg/L	0.0000050	-	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-	<0.0000050	-
Fluoranthene	mg/L	0.000010	0.002	0.0002	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Fluorene	mg/L	0.000010	0.12	0.012	<0.000020 *	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
Indeno(1,2,3-c,d)pyrene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-
1-Methylnaphthalene	mg/L	0.000050	-	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-
2-Methylnaphthalene	mg/L	0.000050	-	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-
Naphthalene	mg/L	0.000050	0.01	0.001	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-
Phenanthrene	mg/L	0.000020	0.003	0.0003	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-	<0.000020	-
Pyrene	mg/L	0.000010	0.0002	0.00002	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	<0.000010	-	0.000026	-	0.000023	-
Quinoline	mg/L	0.000050	0.034	0.0034	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-	<0.000050	-
Acridine d9	%	Surrogate	-	-	89.4	-	94.3	-	82.2	-	82.7	-	86.3	-	88.2	-	91.2	-	98.7	-	93.7	-	83.4	-
Chrysene d12	%	Surrogate	-	-	81.6	-	97.3	-	75.3	-	83.6	-	79.4	-	92.1	-	86.6	-	95.7	-	86.0	-	83.8	-
Naphthalene d8	%	Surrogate	-	-	106.4	-	93.3	-	93.6	-	92.9	-	87.4	-	89.8	-	100.6	-	104.3	-	84.3	-	91.1	-
Phenanthrene d10	%	Surrogate	-	-	95.6	-	98.4	-	89.9	-	90.9	-	95.6	-	90.5	-	101.6	-	106.3	-	103.5	-	88.3	-

***Standard: British Columbia Contaminated Sites Regulation Stage 10 Amendment (NOV, 2017) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (MAY, 2015) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 6: 2018 SURFACE WATER QUALITY GENERAL CHEMISTRY AND METALS

				Sample ID	SFC-2				SFC-2B				SFC-3				SFC-4B				SFC-11			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW**	**BCAWWQG-FAL**																				
Field Parameters																								
Field Conductivity	uS/cm	-	-	-	237.9	226.4	283.9	227.0	335.4	1052	1029	209.6	265.8	166.2	172.4	115.9	169.2	167.3	161.3	102.2	80.1	82.5	85.5	63.6
Temperature	C	-	-	-	6.1	8.6	10.0	7.2	5.2	15.0	11.0	1.1	4.0	9.9	8.7	3.8	4.3	9.5	9.4	2.8	3.5	7.3	8.3	4.3
pH	-	-	-	-	6.47	5.92	6.72	6.56	4.69	3.29	3.23	5.97	6.93	5.60	6.88	6.56	6.67	6.77	6.01	6.87	7.15	6.26	6.77	6.71
Dissolved Oxygen	mg/L	-	-	-	9.34	7.63	8.11	8.38	8.60	1.84	2.76	8.15	12.6	11.3	10.0	11.3	12.7	10.4	10.9	11.4	12.9	10.8	10.8	11.3
Oxidation Reduction Potential	-	-	-	-	166	204	189	24.9	208	273	263	95.0	188	168	138	6.6	181	176	328	40.2	170	178	149	61.0
General Chemistry																								
Conductivity	uS/cm	2	-	-	363	324	373	349	542	1540	1370	382	441	-	240	199	271	243	216	181	137	-	122	112
Hardness (as CaCO3)	mg/L	0.5	-	-	132	101	146	127	193	355	407	137	77.7	47.4	61.8	40.4	81.6	73.0	71.3	63.1	31.9	37.8	39.5	32.8
pH	pH	0.1	-	9	7.44	7.67	7.34	7.13	4.18	2.90	3.05	6.29	7.33	-	7.24	7.27	7.43	7.42	7.58	7.42	7.09	-	7.33	7.22
Total Suspended Solids	mg/L	3	-	-	13.8	9.90	4.60	11.5	61.2	61.5	30.2	28.1	<3.0	-	<3.0	19.3	<3.0	7.30	<3.0	3.30	<3.0	-	<3.0	<3.0
COD	mg/L	20	-	-	<20	<20	<20	<20	<20	40	<20	<20	<20	-	<20	<20	<20	<20	<20	20	<20	-	<20	<20
Anions and Nutrients																								
Alkalinity, Total (as CaCO3)	mg/L	1.0	-	-	51.6	63.2	89.5	57.5	<1.0	<1.0	<1.0	17.2	34.7	-	35.6	26.1	31.3	37.9	40.6	25.7	21.0	-	30.1	24.5
Ammonia, Total (as N)	mg/L	0.0050	pH & Temp based	pH & Temp based	0.1830	0.4790	0.2390	0.4650	0.2170	2.3000	2.4700	0.4060	0.0445	-	0.1150	0.0164	0.0848	0.0078	0.1020	0.0758	<0.0050	-	0.0667	<0.0050
Bromide (Br)	mg/L	0.050	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.250	<0.250	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	<0.050	<0.050
Chloride (Cl)	mg/L	0.50	1500	600	24.1	24.2	18.9	16.1	6.90	15.1	13.3	7.25	91.3	-	26.4	31.0	34.7	28.8	19.5	16.2	21.3	-	8.57	9.67
Fluoride (F)	mg/L	0.020	2	0.4	0.072	0.045	0.056	0.073	0.399	1.00	1.09	0.093	0.039	-	0.061	0.041	0.059	0.051	0.057	0.050	0.042	-	0.050	0.046
Nitrate and Nitrite (as N)	mg/L	0.0051	400	-	1.23	0.572	1.08	0.772	6.83	0.035	<0.025	2.13	0.418	-	0.445	0.228	0.525	0.232	0.478	0.331	0.297	-	0.464	0.287
Nitrate (as N)	mg/L	0.0050	400	3	1.23	0.572	1.08	0.769	6.82	0.035	<0.025	2.12	0.412	-	0.442	0.228	0.525	0.232	0.478	0.329	0.297	-	0.462	0.287
Nitrite (as N)	mg/L	0.0010	0.2	0.02	0.0020	<0.0010	0.0015	0.0029	0.0120	<0.0050	<0.0050	0.0133	0.0068	-	0.0022	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	<0.0010	-	0.0017	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	0.460	0.627	0.470	0.638	0.812	2.87	2.79	1.01	0.245	-	0.231	0.183	0.263	0.138	0.174	0.362	<0.050	-	0.147	<0.050
Total Nitrogen	mg/L	0.030	-	-	1.37	1.07	1.33	1.32	7.28	2.73	2.84	2.91	0.563	-	0.626	0.354	0.676	0.261	0.590	0.654	0.335	-	0.544	0.302
Phosphorus (P)-Total	mg/L	0.0020	-	-	0.0309	0.0031	0.0060	0.0053	0.2910	0.0444	0.0040	0.0182	0.0976	-	0.0213	0.109	0.0166	0.0059	0.0045	0.1510	0.0145	-	0.0082	0.0156
Sulfate (SO4)	mg/L	0.30	1280	128	79.80	53.90	71.80	81.20	226.0	678.0	716.0	138.0	29.60	-	38.60	18.10	43.40	31.80	33.80	31.80	9.470	-	15.40	12.40
Total Metals																								
Aluminum (Al)-Dissolved	mg/L	0.0010	-	0.1	1.76	0.573	0.522	1.66	10.5	26.6	32.2	3.59	0.088	0.041	0.155	0.823	0.471	0.175	0.090	4.020	0.268	0.204	0.175	0.280
Antimony (Sb)-Dissolved	mg/L	0.00010	0.09	-	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	0.0001	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.00010	0.05	0.005	0.0002	0.00025	0.00022	0.0002	0.00086	0.00130	0.00142	0.00025	0.00012	0.00012	0.00012	0.00024	<0.00010	0.00011	<0.00010	0.00091	<0.00010	0.00013	0.00011	0.00012
Barium (Ba)-Dissolved	mg/L	0.00010	10	1	0.0398	0.0588	0.0592	0.0471	0.0263	0.0421	0.0357	0.0363	0.0369	0.0235	0.0292	0.0234	0.0227	0.0191	0.0174	0.0382	0.0126	0.0117	0.0140	0.0118
Beryllium (Be)-Dissolved	mg/L	0.00010	0.0015	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	0.00027	0.00079	0.00092	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	0.000050	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	0.010	12	1.2	0.018	0.037	0.024	0.031	0.023	0.025	0.027	0.029	<0.010	<0.010	<0.010	<0.010	0.020	0.026	0.017	0.013	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.0000050	0.0005 @ H <30 0.004 @ H >210	As per guideline calculation	0.0000762	0.0000472	0.0000439	0.0000827	0.000432	0.00104	0.00109	0.000305	0.0000686	0.0000231	0.0000554	0.0000325	0.0000315	0.0000051	0.0000078	0.0000842	0.0000161	0.0000207	0.0000179	0.0000137
Calcium (Ca)-Dissolved	mg/L	0.050	-	-	45.8	34.7	50.8	43.7	62.8	92.7	109	44.8	26.9	15.7	20.5	13.2	27.9	24.6	24.1	19.0	10.2	11.8	12.4	10.4
Cesium (Cs)-Dissolved	mg/L	0.000010	-	-	<0.000010	0.000012	0.000013	<0.000010	0.000012	0.00013	0.000163	0.000014	<0.000010	<0.000010	<0.000010	0.000019	<0.000010	<0.000010	<0.000010	0.000082	<0.000010	<0.000010	<0.000010	<0.000010
Chromium (Cr)-Dissolved	mg/L	0.00010	0.01	0.001	0.00040	0.00024	0.00015	0.00030	0.00256	0.00214	0.00313	0.00082	0.00046	<0.00010	0.00037	0.00105	0.00018	0.00025	<0.00010	0.00255	0.00020	0.00025	<0.00010	0.00025
Cobalt (Co)-Dissolved	mg/L	0.00010	0.04	0.004	0.00824	0.00541	0.00429	0.00846	0.04510	0.16300	0.16700	0.01920	0.00059	0.00015	0.00228	0.00057	0.00217	0.00032	0.00028	0.00484	0.00011	<0.00010	<0.00010	0.00012
Copper (Cu)-Dissolved	mg/L	0.00020	0.02 @ H < 50 0.04 @ H 75 - 100 0.06 @ H 125 - 150 0.09 @ H > 200	(0.094(H)+2) / 1000	0.0329	0.0108	0.0097	0.0288	0.2100	0.3160	0.4220	0.0640	0.0038	0.0019	0.0070	0.0068	0.0076	0.0021	0.0019	0.0366	0.0021	0.0008	0.0015	0.0022
Iron (Fe)-Dissolved	mg/L	0.010	-	0.35	2.97	4.86	3.16	3.08	20.4	76.1	38.4	8.1	0.122	0.258	0.229	0.835	1.01	0.404	0.165	4.890	0.158	0.056	0.115	0.187
Lead (Pb)-Dissolved	mg/L	0.000050	0.04	0.003	<0.000050	0.000056	<0.000050	<0.000050	<0.000050	0.000179	0.000153	<0.000050	<0.000050	<0.000050	<0.000050	0.000289	<0.00010 *	0.00007	<0.000050	0.00141	<0.00015 *	<0.000050	0.000064	0.000122
Lithium (Li)-Dissolved	mg/L	0.0010	-	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0023	0.0081	0.0116	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.0050	-	-	4.28	3.46	4.73	4.36	8.74	30.0	32.6	6.03	2.58	2.01	2.55	1.82	2.87	2.81	2.74	3.81	1.58	2.01	2.05	1.68
Manganese (Mn)-Dissolved	mg/L	0.00010	-	0.768	0.464	1.31	0.646	0.770	1.08	7.65	7.61	1.43	0.024	0.020	0.045	0.030	0.233	0.085	0.096	0.338	0.005	0.014	0.009	0.008
Mercury (Hg)-Dissolved	mg/L	0.0000050	0.00025	0.00001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.000050	10	1	0.003520	0.002160	0.005450	0.003080	0.000224	0.000194	0.000155	0.000178	0.001510	0.000470	0.000806	0.000754	0.000860	0.000453	0.000940	0.001260	0.000285	0.000229	0.000244	0.000246
Nickel (Ni)-Dissolved	mg/L	0.00050	0.25	0.025	0.00374	0.00135	0.00151	0.00398	0.02320	0.06560	0.07330	0.01000	0.00201	0.00050	0.00177	0.00079	0.00142	0.00053	<0.00050	0.00380	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved	mg/L	0.050	-	-	<0.050	<0.050	<0.050	<0.050	0.261	<0.050	<0.050	<0.050	0.092	<0.050	<0.050	0.127	<0.050	<0.050	<0.050	0.196	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	0.050	-	373	3.70	3.71	4.73	3.88	2.94	3.73	3.92	3.60	2.62	1.85	1.67	1.52	2.04	1.76	1.86	1.81	0.891	0.711	0.783	0.747
Rubidium (Rb)-Dissolved	mg/L	0.00020	-	-	0.00318	0.00403	0.00466	0.00397	0.00259	0.00789	0.00775	0.00422	0.00201	0.00163	0.00143	0.00141	0.00184	0.00171	0.00173	0.00285	0.00057	0.00046	0.00052	0.00057
Selenium (Se)-Dissolved	mg/L	0.000050	0.02	0.001	0.000084	0.000061	0.000104	0.000098	0.000119	0.000096	0.000095	0.000052	<0.000050	<0.000050	0.000052	0.000058	<0.000050	<0.000050	<0.000050	0.000096	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved	mg/L	0.050	-	-	4.62	4.87	5.03	4.94	9.03	19.4	21.5	7.08	5.58	7.66	8.69	6.63	5.88	7.72	7.94	9.27	7.36	10.1	9.53	7.90
Silver (Ag)-Dissolved	mg/L	0.000010	0.0005	0.00005	<0.000010	<0.000010	<0.000020	<0.000010	<0.000010	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	<0.000010	<0.000010	0.000033	<0.000010	<0.000010	<0.000020 *	<0.000010
Sodium (Na)-Dissolved	mg/L	0.050	-	-	13.6	14.8	18.9	14.0	7.33	12.8	13.5	8.11	46.9	36.4	22.4	20.5	18.2	15.5	14.5	9.96	11.7	9.35	9.70	7.30
Strontium (Sr)-Dissolved	mg/L	0.00020	-	-	0.218	0.240	0.320	0.215	0.203	0.390	0.453	0.181	0.190	0.138	0.175	0.103	0.201	0.257	0.241	0.153	0.129	0.152	0.155	0.118
Sulfur (S)-Dissolved	mg/L	0.50	-	-	24.9	18.2	26.7	29.0	75.6	251	276	48.9	8.96	7.16	14.3	5.82	13.4	11.5	12.3	10.5	2.96	4.08	5.49	3.75
Tellurium (Te)-Dissolved	mg/L	0.00020	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved	mg/L	0.000010	0.003	0.0008	<0.000010	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000013	<0.000010	<0.000010	<0.000010	<0.000010
Thorium (Th)-Dissolved	mg/L	0.00010	-	-	0.00019	<0.00010	<0.00010	<0.00010	0.00195	0.00147	0.00281	0.00028	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00016	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.00030	1	2	0.00043	<0.00090	0.00115	<0.00060	0.00274	<0.0015	0.00467	<0.0018	0.00119	0.00106	<0.00090	0.0242	0.00312	0.00501	0.0014	0.128	0.00666	0.0015	0.00393	0.00807
Tungsten (W)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved	mg/L	0.000010	0.085	0.0085	0.000142	0.000039	0.000132	0.000112	0.000659	0.00109	0.0014	0.000167	0.00003	0.000011	0.000041	0.000036	0.000035	0.000013	0.000021	0.000159	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)-Dissolved	mg/L	0.00050	-	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00154	<0.00050	0.00052	<0.00050	0.00756	0.00082	0.00078	0.0008	0.00102
Zinc (Zn)-Dissolved	mg/L	0.0010	0.075	0.0075	0.0126	0.0146	0.0084	0.0173	0.0600	0.1460	0.1470	0.0506	0.0111	0.0040	0.0075	0.0061	0.0053	0.0107	<0.0030	0.0189	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Dissolved	mg/L	0.000060	-	-	<0.000060	0.000069	<0.000060	<0.000060	0.000093	0.000135	0.000139	<0.000060	<0.000060	<0.000060	<0.000060	0.000225	0.000078	0.000082	0.000091	0.000204	0.000154	<0.000060	0.000139	0.000203

***Standard: British Columbia Contaminated Sites Regulation Stage 10 Amendment (NOV, 2017) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (MAY, 2015) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 7: 2018 LEACHATE MANHOLE/GW INTERCEPTOR WATER QUALITY - GENERAL CHEMISTRY AND METALS

				Sample ID	LEACHATE MANHOLE				GW INTERCEPTOR			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW**	**BCAWWQG-FAL**								
Field Parameters												
Field Conductivity	uS/cm	-	-	-	201.0	-	568.0	-	743.0	668.0	438.9	302.2
Temperature	C	-	-	-	4.30	-	12.3	-	8.10	12.2	10.6	3.70
pH	-	-	-	-	6.82	-	6.26	-	6.60	6.11	6.01	6.32
Dissolved Oxygen	mg/L	-	-	-	11.1	-	3.35	-	2.95	0.910	1.07	8.71
Oxidation Reduction Potential	-	-	-	-	28.2	-	110	-	41.7	120	194	19.6
General Chemistry												
Conductivity	uS/cm	2	-	-	312	-	727	-	965	789	541	745
Hardness (as CaCO3)	mg/L	0.5	-	-	130	-	384	-	358	240	180	238
pH	pH	0.1	-	9	7.56	-	6.65	-	7.38	7.89	6.37	6.59
Total Suspended Solids	mg/L	3	-	-	<3.0	-	5.00	-	49.4	13.5	32.2	327
COD	mg/L	20	-	-	22	-	21	-	29	26	<20	32
Anions and Nutrients												
Alkalinity, Total (as CaCO3)	mg/L	1.0	-	-	48.2	-	110	-	144	105	109	103
Ammonia, Total (as N)	mg/L	0.0050	pH & Temp based	pH & Temp based	0.0089	-	0.1520	-	1.690	1.210	1.100	0.8990
Bromide (Br)	mg/L	0.050	-	-	<0.050	-	<0.250	-	<0.250	<0.250	<0.050	<0.250
Chloride (Cl)	mg/L	0.50	1500	600	2.27	-	5.70	-	109	110	68.0	65.3
Fluoride (F)	mg/L	0.020	2	0.4	0.024	-	<0.10	-	<0.10	<0.10	0.109	<0.10
Nitrate and Nitrite (as N)	mg/L	0.0051	400	-	9.30	-	21.9	-	<0.025	<0.025	<0.0051	<0.025
Nitrate (as N)	mg/L	0.0050	400	3	9.30	-	21.9	-	<0.025	<0.025	<0.0050	<0.025
Nitrite (as N)	mg/L	0.0010	0.2	0.02	<0.0010	-	0.0069	-	<0.0050	<0.0050	<0.0010	0.0062
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	1.08	-	1.27	-	1.95	1.38	1.20	1.35
Total Nitrogen	mg/L	0.030	-	-	9.55	-	21.4	-	1.90	1.35	1.21	1.29
Phosphorus (P)-Total	mg/L	0.0020	-	-	0.0709	-	0.0459	-	0.0543	0.0076	0.0022	0.4470
Sulfate (SO4)	mg/L	0.30	1280	128	56.5	-	192	-	213	126	65.2	169
Dissolved Metals												
Aluminum (Al)-Dissolved	mg/L	0.0010	-	0.1	0.0338	-	0.0191	-	0.0340	0.0333	0.0212	0.0376
Antimony (Sb)-Dissolved	mg/L	0.00010	0.09	-	0.00014	-	0.00013	-	<0.00010	<0.00010	<0.00010	0.00024
Arsenic (As)-Dissolved	mg/L	0.00010	0.05	0.005	0.00017	-	0.00020	-	0.00043	0.00052	0.00034	0.00055
Barium (Ba)-Dissolved	mg/L	0.00010	10	1	0.0219	-	0.0702	-	0.1030	0.0786	0.0633	0.0809
Beryllium (Be)-Dissolved	mg/L	0.00010	0.0015	0.00013	<0.00010	-	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	0.000050	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	0.010	12	1.2	0.021	-	0.050	-	0.219	0.127	0.132	0.124
Cadmium (Cd)-Dissolved	mg/L	0.0000050	0.0005 @ H <30 0.004 @ H >210	As per guidelines calculation	0.000038	-	0.0000994	-	<0.0000050	<0.0000050	0.0000246	0.0000436
Calcium (Ca)-Dissolved	mg/L	0.050	-	-	46.0	-	133	-	124	81.1	60.8	80.9
Cesium (Cs)-Dissolved	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	0.000017	0.000015	<0.000010	0.000022
Chromium (Cr)-Dissolved	mg/L	0.00010	0.01	0.001	0.00035	-	0.00017	-	0.0003	0.00013	0.00019	0.00068
Cobalt (Co)-Dissolved	mg/L	0.00010	0.04	0.004	0.00025	-	0.00182	-	0.00498	0.00265	0.00139	0.00453
Copper (Cu)-Dissolved	mg/L	0.00020	0.02 @ H < 50 0.04 @ H 75 - 100 0.06 @ H 125 - 150	(0.094(H)+2) / 1000	0.0255	-	0.0192	-	<0.00020	<0.00020	0.00036	0.00042
Iron (Fe)-Dissolved	mg/L	0.010	-	0.35	0.086	-	0.051	-	33.2	28.8	18.1	22.3
Lead (Pb)-Dissolved	mg/L	0.000050	0.04	0.003	<0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	mg/L	0.0010	-	-	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.0050	-	-	3.65	-	12.3	-	12.0	9.09	6.84	8.86
Manganese (Mn)-Dissolved	mg/L	0.00010	-	0.768	0.010	-	0.774	-	2.92	2.48	1.98	2.30

				Sample ID	LEACHATE MANHOLE				GW INTERCEPTOR			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW**	**BCAWWQG-FAL**								
Mercury (Hg)-Dissolved	mg/L	0.0000050	0.00025	0.00001	<0.0000050	-	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.000050	10	1	0.000212	-	0.000464	-	0.000535	0.000426	0.000218	0.000497
Nickel (Ni)-Dissolved	mg/L	0.00050	0.25	0.025	0.00160	-	0.00241	-	0.00288	0.00195	0.00108	0.00227
Phosphorus (P)-Dissolved	mg/L	0.050	-	-	0.067	-	<0.050	-	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	0.050	-	373	2.10	-	4.90	-	8.16	6.93	6.18	4.98
Rubidium (Rb)-Dissolved	mg/L	0.00020	-	-	0.0012	-	0.0032	-	0.0059	0.0047	0.0043	0.0040
Selenium (Se)-Dissolved	mg/L	0.000050	0.02	0.001	0.000088	-	0.000178	-	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved	mg/L	0.050	-	-	8.33	-	11.0	-	8.94	9.30	8.17	7.70
Silver (Ag)-Dissolved	mg/L	0.000010	0.0005	0.00005	<0.000010	-	0.000011	-	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	0.050	-	-	5.00	-	16.0	-	55.2	58.0	48.7	37.7
Strontium (Sr)-Dissolved	mg/L	0.00020	-	-	0.175	-	0.457	-	0.903	0.581	0.382	0.510
Sulfur (S)-Dissolved	mg/L	0.50	-	-	17.5	-	67.0	-	69.0	42.9	22.4	57.7
Tellurium (Te)-Dissolved	mg/L	0.00020	-	-	<0.00020	-	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved	mg/L	0.000010	0.003	0.0008	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
Thorium (Th)-Dissolved	mg/L	0.00010	-	-	<0.00010	-	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	mg/L	0.00010	-	-	<0.00010	-	0.00022	-	<0.00010	0.00023	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.00030	1	2	0.00033	-	<0.00030	-	0.00037	0.00039	<0.00030	<0.00060
Tungsten (W)-Dissolved	mg/L	0.00010	-	-	<0.00010	-	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved	mg/L	0.000010	0.085	0.0085	0.000015	-	0.000042	-	0.000024	0.000014	<0.000010	0.000032
Vanadium (V)-Dissolved	mg/L	0.00050	-	0.006	<0.00050	-	<0.00050	-	<0.00050	0.00053	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.0010	0.075	0.0075	0.0427	-	0.0378	-	0.0044	0.0074	0.0573	0.0395
Zirconium (Zr)-Dissolved	mg/L	0.000060	-	-	0.000099	-	0.000104	-	0.000095	0.000134	0.000075	0.000124
***Standard: British Columbia Contaminated Sites Regulation Stage 10 Amendment (NOV, 2017) - Schedule 3.2 Water Standards Freshwater Aquatic Life**												
****Guideline: British Columbia Approved and Working Water Quality Guidelines (MAY, 2015) - BCAWWQG - Freshwater Aquatic Life**												
Color Key:	Exceeds Standard and Guideline			Exceeds Guideline								

MORRISON HERSHFIELD

TABLE 8: 2018 LEACHATE MANHOLE/GW INTERCEPTOR WATER QUALITY - PETROLEUM HYDROCARBONS

				Sample ID	LEACHATE MANHOLE				GW INTERCEPTOR			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW***	**BCAWWQG-FAL****								
Volatile Organic Compounds												
Benzene	mg/L	0.00050	0.4	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	<0.0010
Bromoform	mg/L	0.0010	-	-	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Carbon Tetrachloride	mg/L	0.00050	0.13	0.0133	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.0010	0.013	0.0013	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Dibromochloromethane	mg/L	0.0010	-	-	<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	<0.0010
Chloroform	mg/L	0.0010	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	<0.0050
1,2-Dichlorobenzene	mg/L	0.00050	0.007	0.0007	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,3-Dichlorobenzene	mg/L	0.0010	1.5	0.15	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/L	0.0010	0.26	0.026	<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	<0.0010
1,2-Dichloroethane	mg/L	0.0010	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	<0.0010
cis-1,2-Dichloroethylene	mg/L	0.0010	-	-	<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	<0.0010
Dichloromethane	mg/L	0.0050	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	<0.0010
cis-1,3-Dichloropropylene	mg/L	0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
trans-1,3-Dichloropropylene	mg/L	0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
1,3-Dichloropropene (cis & trans)	mg/L	0.0010	-	-	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	0.00050	2	0.2	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	mg/L	0.00050	34	3.4	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.00050	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	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	0.00020	-	-	<0.00020	-	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020
Tetrachloroethylene	mg/L	0.0010	1.1	0.11	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/L	0.00045	0.005	0.0005	<0.00045	-	<0.00045	-	<0.00045	<0.00045	<0.00045	<0.00045
1,1,1-Trichloroethane	mg/L	0.0010	-	11.1	<0.0010	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	0.00050	-	-	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Trichloroethylene	mg/L	0.0010	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	<0.0010
Vinyl Chloride	mg/L	0.00040	-	-	<0.00040	-	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040
ortho-Xylene	mg/L	0.00050	-	0.03	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	mg/L	0.00050	-	0.03	<0.00050	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	0.00075	0.3	0.03	<0.00075	-	<0.00075	-	<0.00075	<0.00075	<0.00075	<0.00075
4-Bromofluorobenzene (SS)	%	Surrogate	-	-	90.2	-	98.3	-	95.0	93.5	96.3	109
1,4-Difluorobenzene (SS)	%	Surrogate	-	-	102	-	86.8	-	103	94.1	80.5	92.6
Hydrocarbons												
EPH10-19	mg/L	0.25	5	-	<0.25	-	<0.25	-	<0.25	<0.25	<0.25	<0.25
EPH19-32	mg/L	0.25	-	-	<0.25	-	<0.25	-	<0.25	<0.25	<0.25	<0.25
LEPH	mg/L	0.25	0.5	-	<0.25	-	<0.25	-	<0.25	<0.25	<0.25	<0.25
HEPH	mg/L	0.25	-	-	<0.25	-	<0.25	-	<0.25	<0.25	<0.25	<0.25
Volatile Hydrocarbons (VH6-10)	mg/L	0.10	15	-	<0.10	-	<0.10	-	<0.10	<0.10	<0.10	<0.10
VPH (C6-C10)	mg/L	0.10	1.5	-	<0.10	-	<0.10	-	<0.10	<0.10	<0.10	<0.10

				Sample ID	LEACHATE MANHOLE				GW INTERCEPTOR			
				Date Sampled	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18	20-Mar-18	20-Jun-18	25-Sep-18	11-Dec-18
				Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW***	**BCAWWQG-FAL****								
2-Bromobenzotrifluoride	%	Surrogate	-	-	88.9	-	94.9	-	87.2	93.5	99.3	96.6
3,4-Dichlorotoluene (SS)	%	Surrogate	-	-	68.0	-	112	-	103	85.7	115	91.2
Polycyclic Aromatic Hydrocarbons												
Acenaphthene	mg/L	0.000010	0.06	0.006	<0.000010	-	<0.000010	-	0.00119	0.00102	0.000669	0.000707
Acenaphthylene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
Acridine	mg/L	0.000010	0.0005	0.00005	<0.000010	-	<0.000010	-	<0.000020	<0.000010	<0.000020	0.00002
Anthracene	mg/L	0.000010	0.001	0.0001	<0.000010	-	<0.000010	-	0.000048	0.000024	0.000024	0.000026
Benz(a)anthracene	mg/L	0.000010	0.001	0.0001	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	0.00001
Benzo(a)pyrene	mg/L	0.0000050	0.0001	0.00001	<0.0000050	-	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	0.0000084
Benzo(b&j)fluoranthene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	0.000012
Benzo(b+j+k)fluoranthene	mg/L	0.000015	-	-	-	-	<0.000015	-	-	<0.000015	<0.000015	<0.000015
Benzo(g,h,i)perylene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(k)fluoranthene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
Chrysene	mg/L	0.000010	0.001	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000020	<0.000020
Dibenz(a,h)anthracene	mg/L	0.0000050	-	-	<0.0000050	-	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Fluoranthene	mg/L	0.000010	0.002	0.0002	<0.000010	-	<0.000010	-	0.000192	0.000148	0.000251	0.000165
Fluorene	mg/L	0.000010	0.12	0.012	<0.000010	-	<0.000010	-	0.000484	0.00018	0.000143	0.000192
Indeno(1,2,3-c,d)pyrene	mg/L	0.000010	-	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
1-Methylnaphthalene	mg/L	0.000050	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
2-Methylnaphthalene	mg/L	0.000050	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Naphthalene	mg/L	0.000050	0.01	0.001	<0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.000020	0.003	0.0003	<0.000020	-	<0.000020	-	<0.000020	<0.000020	0.000025	0.000023
Pyrene	mg/L	0.000010	0.0002	0.00002	<0.000010	-	<0.000010	-	0.000105	0.000077	0.000139	0.000086
Quinoline	mg/L	0.000050	0.034	0.0034	<0.000050	-	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
Acridine d9	%	Surrogate	-	-	82.8	-	83.2	-	92.2	78.9	93.3	101
Chrysene d12	%	Surrogate	-	-	76.4	-	86.2	-	80.5	67	86.9	107
Naphthalene d8	%	Surrogate	-	-	94.7	-	95.0	-	101	85.5	104	106
Phenanthrene d10	%	Surrogate	-	-	88.5	-	92.1	-	96.8	87.7	97.9	104

***Standard: British Columbia Contaminated Sites Regulation Stage 10 Amendment (NOV, 2017) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (MAY, 2015) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 9: 2018 LANDFILL GAS METHANE MEASUREMENTS (% CH_4)

	Monitoring Probe																			
SAMPLE DATE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17A	18	19	20	21
05-Jan-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Jan-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-Jan-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Jan-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02-Feb-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-Feb-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Feb-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Feb-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02-Mar-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-Mar-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Mar-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-Mar-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Mar-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06-Apr-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Apr-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Apr-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Apr-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-May-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Jun-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Jul-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Aug-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Sep-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Dec-18	0	0	0	0	0	0	0	0	0	0	0	Trace	0	0	0	0	0	0	0	0	0
21-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

Morrison Hershfield Limited
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 21-MAR-18
Report Date: 04-APR-18 15:01 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L2070544

Project P.O. #: 723851
Job Reference: 18001536
C of C Numbers: 17-669882
Legal Site Desc:

Carla Fuginski
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2070544-1 WATER 20-MAR-18 14:30 MW-2D	L2070544-2 WATER 20-MAR-18 14:00 MW-2S	L2070544-3 WATER 20-MAR-18 12:00 MW-3	L2070544-4 WATER 20-MAR-18 13:30 MW-4	L2070544-5 WATER 20-MAR-18 09:30 MW-6
WATER						
Physical Tests	Conductivity (uS/cm)	935	305	250	347	790
	Hardness (as CaCO3) (mg/L)	361	97.8	56.3	134	159
	pH (pH)	7.38	7.56	6.67	7.52	6.75
	Total Suspended Solids (mg/L)	681	143	5.4	810	342
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	262	76.2	23.2	112	15.1
	Ammonia, Total (as N) (mg/L)	11.8	4.41	0.548	2.38	0.0389
	Bromide (Br) (mg/L)	<0.25 DLDS	<0.050	0.068	0.058	<0.25 DLDS
	Chloride (Cl) (mg/L)	47.2	11.5	31.3	20.9	167
	Fluoride (F) (mg/L)	<0.10 DLDS	0.123	0.042	0.080	<0.10 DLDS
	Nitrate and Nitrite (as N) (mg/L)	0.025	0.0238	0.133	0.0137	0.306
	Nitrate (as N) (mg/L)	0.025	0.0238	0.131	0.0126	0.306
	Nitrite (as N) (mg/L)	<0.0050 DLDS	<0.0010	0.0016	0.0011	<0.0050 DLDS
	Total Kjeldahl Nitrogen (mg/L)	12.3	4.80	0.682	2.86	1.52
	Total Nitrogen (mg/L)	12.0	4.82	0.742	2.83	1.63
	Phosphorus (P)-Total (mg/L)	0.645	0.255	<0.0020	0.486	1.22
	Sulfate (SO4) (mg/L)	189	56.6	44.4	45.5	97.4
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)					
	Cesium (Cs)-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

Grouping	Analyte	L2070544-6 WATER 20-MAR-18 11:00 SFC-2	L2070544-7 WATER 20-MAR-18 11:00 SCF-2B	L2070544-8 WATER 20-MAR-18 10:30 SFC-3	L2070544-9 WATER 20-MAR-18 12:30 SFC-4B	L2070544-10 WATER 20-MAR-18 10:30 SFC-11
WATER						
Physical Tests	Conductivity (uS/cm)	363	542	441	271	137
	Hardness (as CaCO3) (mg/L)	132 HTC	193 HTC	77.7 HTC	81.6 HTC	31.9 HTC
	pH (pH)	7.44	4.18	7.33	7.43	7.09
	Total Suspended Solids (mg/L)	13.8	61.2	<3.0	<3.0	<3.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	51.6	<1.0	34.7	31.3	21.0
	Ammonia, Total (as N) (mg/L)	0.183	0.217	0.0445	0.0848	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	24.1	6.90	91.3	34.7	21.3
	Fluoride (F) (mg/L)	0.072	0.399	0.039	0.059	0.042
	Nitrate and Nitrite (as N) (mg/L)	1.23	6.83	0.418	0.525	0.297
	Nitrate (as N) (mg/L)	1.23	6.82	0.412	0.525	0.297
	Nitrite (as N) (mg/L)	0.0020	0.0120	0.0068	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.460	0.812	0.245	0.263	<0.050
	Total Nitrogen (mg/L)	1.37	7.28	0.563	0.676	0.335
	Phosphorus (P)-Total (mg/L)	0.0309	0.291	0.0976	0.0166	0.0145
	Sulfate (SO4) (mg/L)	79.8	226	29.6	43.4	9.47
Total Metals	Aluminum (Al)-Total (mg/L)	1.76	10.5	0.0882	0.471	0.268
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00020	0.00086	0.00012	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.0398	0.0263	0.0369	0.0227	0.0126
	Beryllium (Be)-Total (mg/L)	<0.00010	0.00027	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.018	0.023	<0.010	0.020	<0.010
	Cadmium (Cd)-Total (mg/L)	0.0000762	0.000432	0.0000686	0.0000315	0.0000161
	Calcium (Ca)-Total (mg/L)	45.8	62.8	26.9	27.9	10.2
	Cesium (Cs)-Total (mg/L)	<0.000010	0.000012	<0.000010	<0.000010	<0.000010
	Chromium (Cr)-Total (mg/L)	0.00040	0.00256	0.00046	0.00018	0.00020
	Cobalt (Co)-Total (mg/L)	0.00824	0.0451	0.00059	0.00217	0.00011
	Copper (Cu)-Total (mg/L)	0.0329	0.210	0.00383	0.00756	0.00208
	Iron (Fe)-Total (mg/L)	2.97	20.4	0.122	1.01	0.158
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.00010 DLB	<0.00015 DLB
	Lithium (Li)-Total (mg/L)	<0.0010	0.0023	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	4.28	8.74	2.58	2.87	1.58
	Manganese (Mn)-Total (mg/L)	0.464	1.08	0.0238	0.233	0.00530
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.00352	0.000224	0.00151	0.000860	0.000285
	Nickel (Ni)-Total (mg/L)	0.00374	0.0232	0.00201	0.00142	<0.00050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-11	L2070544-12	L2070544-13		
	Description	WATER	WATER	WATER		
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18		
	Sampled Time	15:00	15:30	16:30		
	Client ID	GW INT.	DUPLICATE - GW INT.	L1		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	965	967	312		
	Hardness (as CaCO3) (mg/L)	358	345	130		
	pH (pH)	7.38	7.54	7.56		
	Total Suspended Solids (mg/L)	49.4	53.0	<3.0		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	144	141	48.2		
	Ammonia, Total (as N) (mg/L)	1.69 DLDS	1.71 DLDS	0.0089		
	Bromide (Br) (mg/L)	<0.25	<0.25	<0.050		
	Chloride (Cl) (mg/L)	109 DLDS	109 DLDS	2.27		
	Fluoride (F) (mg/L)	<0.10	<0.10	0.024		
	Nitrate and Nitrite (as N) (mg/L)	<0.025 DLDS	<0.025 DLDS	9.30		
	Nitrate (as N) (mg/L)	<0.025 DLDS	<0.025 DLDS	9.30		
	Nitrite (as N) (mg/L)	<0.0050	<0.0050	<0.0010		
	Total Kjeldahl Nitrogen (mg/L)	1.95	1.93	1.08		
	Total Nitrogen (mg/L)	1.90	1.92	9.55		
	Phosphorus (P)-Total (mg/L)	0.0543	0.0561	0.0709		
	Sulfate (SO4) (mg/L)	213	212	56.5		
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)					
	Cesium (Cs)-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	L2070544-1	L2070544-2	L2070544-3	L2070544-4	L2070544-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18
Sampled Time	14:30	14:00	12:00	13:30	09:30
Client ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
Grouping / **Analyte**					
WATER					
Total Metals Phosphorus (P)-Total (mg/L)					
Potassium (K)-Total (mg/L)					
Rubidium (Rb)-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)					
Sulfur (S)-Total (mg/L)					
Tellurium (Te)-Total (mg/L)					
Thallium (Tl)-Total (mg/L)					
Thorium (Th)-Total (mg/L)					
Tin (Sn)-Total (mg/L)					
Titanium (Ti)-Total (mg/L)					
Tungsten (W)-Total (mg/L)					
Uranium (U)-Total (mg/L)					
Vanadium (V)-Total (mg/L)					
Zinc (Zn)-Total (mg/L)					
Zirconium (Zr)-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)	<0.0040 DLB	<0.0020 DLB	0.0461	<0.0050 DLB	0.992
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.0119	0.00657	<0.00010	0.00517	0.00026
Barium (Ba)-Dissolved (mg/L)	0.0340	0.0779	0.0861	0.181	0.0523
Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	0.284	0.104	<0.010	0.065	0.017
Cadmium (Cd)-Dissolved (mg/L)	0.0000074	<0.0000050	0.000495	0.000246	0.000245
Calcium (Ca)-Dissolved (mg/L)	121	31.7	16.5	44.0	53.8
Cesium (Cs)-Dissolved (mg/L)	0.000019	0.000019	0.000053	0.000037	0.000046
Chromium (Cr)-Dissolved (mg/L)	0.00019	<0.00010	<0.00010	0.00015	0.00052
Cobalt (Co)-Dissolved (mg/L)	0.0121	0.00133	0.0195	0.0273	0.00143
Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00044	0.00770	0.00106	0.0166
Iron (Fe)-Dissolved (mg/L)	51.4	28.5	1.40	35.4	1.47
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000456
Lithium (Li)-Dissolved (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	L2070544-6 WATER 20-MAR-18 11:00 SFC-2	L2070544-7 WATER 20-MAR-18 11:00 SCF-2B	L2070544-8 WATER 20-MAR-18 10:30 SFC-3	L2070544-9 WATER 20-MAR-18 12:30 SFC-4B	L2070544-10 WATER 20-MAR-18 10:30 SFC-11
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	0.261	0.092	<0.050	<0.050
	Potassium (K)-Total (mg/L)	3.70	2.94	2.62	2.04	0.891
	Rubidium (Rb)-Total (mg/L)	0.00318	0.00259	0.00201	0.00184	0.00057
	Selenium (Se)-Total (mg/L)	0.000084	0.000119	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	4.62	9.03	5.58	5.88	7.36
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000015	<0.000010
	Sodium (Na)-Total (mg/L)	13.6	7.33	46.9	18.2	11.7
	Strontium (Sr)-Total (mg/L)	0.218	0.203	0.190	0.201	0.129
	Sulfur (S)-Total (mg/L)	24.9	75.6	8.96	13.4	2.96
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Thorium (Th)-Total (mg/L)	0.00019	0.00195	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00043	0.00274	0.00119	0.00312	0.00666
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)-Total (mg/L)	0.000142	0.000659	0.000030	0.000035	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00082
	Zinc (Zn)-Total (mg/L)	0.0126	0.0600	0.0111	0.0053	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.000060	0.000093	<0.000060	0.000078	0.000154
Dissolved Metals	Dissolved Mercury Filtration Location					
	Dissolved Metals Filtration Location					
	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Cesium (Cs)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-11	L2070544-12	L2070544-13		
	Description	WATER	WATER	WATER		
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18		
	Sampled Time	15:00	15:30	16:30		
	Client ID	GW INT.	DUPLICATE - GW INT.	L1		
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Rubidium (Rb)-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)					
	Sulfur (S)-Total (mg/L)					
	Tellurium (Te)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Thorium (Th)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Tungsten (W)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0340	0.0339	0.0338		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00014		
	Arsenic (As)-Dissolved (mg/L)	0.00043	0.00041	0.00017		
	Barium (Ba)-Dissolved (mg/L)	0.103	0.102	0.0219		
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.219	0.205	0.021		
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	0.0000380		
	Calcium (Ca)-Dissolved (mg/L)	124	119	46.0		
	Cesium (Cs)-Dissolved (mg/L)	0.000017	0.000014	<0.000010		
	Chromium (Cr)-Dissolved (mg/L)	0.00030	0.00064	0.00035		
	Cobalt (Co)-Dissolved (mg/L)	0.00498	0.00499	0.00025		
	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.0255		
	Iron (Fe)-Dissolved (mg/L)	33.2	33.2	0.086		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<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	L2070544-1	L2070544-2	L2070544-3	L2070544-4	L2070544-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18
	Sampled Time	14:30	14:00	12:00	13:30	09:30
	Client ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	14.5	4.55	3.67	5.94	6.05
	Manganese (Mn)-Dissolved (mg/L)	3.52	1.42	2.85	2.49	0.264
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.0136	0.00377	0.000479	0.00963	0.000420
	Nickel (Ni)-Dissolved (mg/L)	0.00221	0.00061	0.00367	0.00408	0.00141
	Phosphorus (P)-Dissolved (mg/L)	0.083	<0.050	<0.050	<0.050	0.112
	Potassium (K)-Dissolved (mg/L)	19.0	7.43	3.03	5.63	4.02
	Rubidium (Rb)-Dissolved (mg/L)	0.0105	0.00517	0.00891	0.00411	0.00746
	Selenium (Se)-Dissolved (mg/L)	0.000081	<0.000050	0.000054	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	14.1	8.48	6.67	10.4	6.65
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000404
	Sodium (Na)-Dissolved (mg/L)	32.7	8.11	14.4	15.5	91.0
	Strontium (Sr)-Dissolved (mg/L)	0.556	0.192	0.135	0.297	0.622
	Sulfur (S)-Dissolved (mg/L)	61.7	17.0	11.4	14.5	33.8
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000146	0.000038	0.000054
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00013	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.0392
	Tungsten (W)-Dissolved (mg/L)	0.00060	0.00016	<0.00010	0.00038	0.00014
	Uranium (U)-Dissolved (mg/L)	0.000157	0.000016	<0.000010	0.000181	0.000149
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00162
	Zinc (Zn)-Dissolved (mg/L)	0.0026	0.0018	0.0074	0.0056	0.0046
	Zirconium (Zr)-Dissolved (mg/L)	<0.000060	<0.000060	<0.000060	<0.000060	0.000127
Aggregate Organics	COD (mg/L)	40	<20	<20	29	48
Volatile Organic Compounds	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
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Chlorobenzene (mg/L)	0.0022	<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
	1,2-Dichlorobenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,3-Dichlorobenzene (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	L2070544-6	L2070544-7	L2070544-8	L2070544-9	L2070544-10
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18
	Sampled Time	11:00	11:00	10:30	12:30	10:30
	Client ID	SFC-2	SCF-2B	SFC-3	SFC-4B	SFC-11
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Rubidium (Rb)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Sulfur (S)-Dissolved (mg/L)					
	Tellurium (Te)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Thorium (Th)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Tungsten (W)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					
	Zirconium (Zr)-Dissolved (mg/L)					
Aggregate Organics	COD (mg/L)	<20	<20	<20	<20	<20
Volatile Organic Compounds	Benzene (mg/L)					
	Bromodichloromethane (mg/L)					
	Bromoform (mg/L)					
	Carbon Tetrachloride (mg/L)					
	Chlorobenzene (mg/L)					
	Dibromochloromethane (mg/L)					
	Chloroethane (mg/L)					
	Chloroform (mg/L)					
	Chloromethane (mg/L)					
	1,2-Dichlorobenzene (mg/L)					
	1,3-Dichlorobenzene (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-11	L2070544-12	L2070544-13		
	Description	WATER	WATER	WATER		
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18		
	Sampled Time	15:00	15:30	16:30		
	Client ID	GW INT.	DUPLICATE - GW INT.	L1		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	12.0	11.7	3.65		
	Manganese (Mn)-Dissolved (mg/L)	2.92	2.98	0.00994		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000535	0.000532	0.000212		
	Nickel (Ni)-Dissolved (mg/L)	0.00288	0.00287	0.00160		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	0.067		
	Potassium (K)-Dissolved (mg/L)	8.16	8.04	2.10		
	Rubidium (Rb)-Dissolved (mg/L)	0.00590	0.00583	0.00120		
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	0.000088		
	Silicon (Si)-Dissolved (mg/L)	8.94	8.80	8.33		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	55.2	54.7	5.00		
	Strontium (Sr)-Dissolved (mg/L)	0.903	0.910	0.175		
	Sulfur (S)-Dissolved (mg/L)	69.0	68.4	17.5		
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	0.00037	0.00039	0.00033		
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Uranium (U)-Dissolved (mg/L)	0.000024	0.000025	0.000015		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00051	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0044	0.0046	0.0427		
	Zirconium (Zr)-Dissolved (mg/L)	0.000095	0.000093	0.000099		
Aggregate Organics	COD (mg/L)	29	25	22		
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050		
	Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010		
	Bromoform (mg/L)	<0.0010	<0.0010	<0.0010		
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050		
	Chlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010		
	Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010		
	Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010		
	Chloroform (mg/L)	<0.0010	<0.0010	<0.0010		
	Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050		
	1,2-Dichlorobenzene (mg/L)	<0.00050	<0.00050	<0.00050		
	1,3-Dichlorobenzene (mg/L)	<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	L2070544-1	L2070544-2	L2070544-3	L2070544-4	L2070544-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18
Sampled Time	14:30	14:00	12:00	13:30	09:30
Client ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds 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
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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
trans-1,3-Dichloropropylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,3-Dichloropropene (cis & trans) (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 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)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene (mg/L)	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
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)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
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) (%)	91.2	93.2	92.3	93.2	88.9
Surrogate: 1,4-Difluorobenzene (SS) (%)	105.4	105.0	104.3	104.1	105.3
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: 2-Bromobenzotrifluoride (%)	90.1	86.5	88.0	87.1	87.6
Surrogate: 3,4-Dichlorotoluene (SS) (%)	86.1	105.8	74.3	111.4	SURR-ND 67.7

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-6	L2070544-7	L2070544-8	L2070544-9	L2070544-10
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18
	Sampled Time	11:00	11:00	10:30	12:30	10:30
	Client ID	SFC-2	SCF-2B	SFC-3	SFC-4B	SFC-11
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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)					
	Dichloromethane (mg/L)					
	1,2-Dichloropropane (mg/L)					
	cis-1,3-Dichloropropylene (mg/L)					
	trans-1,3-Dichloropropylene (mg/L)					
	1,3-Dichloropropene (cis & trans) (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (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)					
	Vinyl Chloride (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
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)					
	Surrogate: 2-Bromobenzotrifluoride (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-11	L2070544-12	L2070544-13		
	Description	WATER	WATER	WATER		
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18		
	Sampled Time	15:00	15:30	16:30		
	Client ID	GW INT.	DUPLICATE - GW INT.	L1		
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010		
	1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010		
	1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010		
	1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010		
	cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010		
	trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010		
	Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050		
	1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010		
	cis-1,3-Dichloropropylene (mg/L)	<0.00050	<0.00050	<0.00050		
	trans-1,3-Dichloropropylene (mg/L)	<0.00050	<0.00050	<0.00050		
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0010	<0.0010	<0.0010		
	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050		
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050		
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050		
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010		
	1,1,2,2-Tetrachloroethane (mg/L)	<0.00020	<0.00020	<0.00020		
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010		
	Toluene (mg/L)	<0.00045	<0.00045	<0.00045		
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010		
	1,1,2-Trichloroethane (mg/L)	<0.00050	<0.00050	<0.00050		
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010		
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010		
	Vinyl Chloride (mg/L)	<0.00040	<0.00040	<0.00040		
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050		
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050		
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	95.0	85.1	90.2		
	Surrogate: 1,4-Difluorobenzene (SS) (%)	102.7	99.3	102.4		
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25		
	EPH19-32 (mg/L)	<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	<0.10		
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10		
	Surrogate: 2-Bromobenzotrifluoride (%)	87.2	90.6	88.9		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	102.9	70.9	SURR-ND 68.0		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2070544-1 WATER 20-MAR-18 14:30 MW-2D	L2070544-2 WATER 20-MAR-18 14:00 MW-2S	L2070544-3 WATER 20-MAR-18 12:00 MW-3	L2070544-4 WATER 20-MAR-18 13:30 MW-4	L2070544-5 WATER 20-MAR-18 09:30 MW-6
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Acenaphthylene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Acridine (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Anthracene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benz(a)anthracene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(a)pyrene (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Benzo(b&j)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(g,h,i)perylene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(k)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Chrysene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020 DLCI
	Dibenz(a,h)anthracene (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Fluorene (mg/L)	<0.000020 DLCI	<0.000010	<0.000010	<0.000010	<0.000010
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	1-Methylnaphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	2-Methylnaphthalene (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)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000026
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acridine d9 (%)	89.4	82.2	86.3	91.2	93.7
	Surrogate: Chrysene d12 (%)	81.6	75.3	79.4	86.6	86.0
	Surrogate: Naphthalene d8 (%)	106.4	93.6	87.4	100.6	84.3
	Surrogate: Phenanthrene d10 (%)	95.6	89.9	95.6	101.6	103.5

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-6	L2070544-7	L2070544-8	L2070544-9	L2070544-10
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18	20-MAR-18
	Sampled Time	11:00	11:00	10:30	12:30	10:30
	Client ID	SFC-2	SCF-2B	SFC-3	SFC-4B	SFC-11
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)					
	Acenaphthylene (mg/L)					
	Acridine (mg/L)					
	Anthracene (mg/L)					
	Benz(a)anthracene (mg/L)					
	Benzo(a)pyrene (mg/L)					
	Benzo(b&j)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)					
	1-Methylnaphthalene (mg/L)					
	2-Methylnaphthalene (mg/L)					
	Naphthalene (mg/L)					
	Phenanthrene (mg/L)					
	Pyrene (mg/L)					
	Quinoline (mg/L)					
	Surrogate: Acridine d9 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2070544-11	L2070544-12	L2070544-13		
	Description	WATER	WATER	WATER		
	Sampled Date	20-MAR-18	20-MAR-18	20-MAR-18		
	Sampled Time	15:00	15:30	16:30		
	Client ID	GW INT.	DUPLICATE - GW INT.	L1		
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	0.00119	0.00109	<0.000010		
	Acenaphthylene (mg/L)	<0.000010	<0.000010	<0.000010		
	Acridine (mg/L)	<0.000020 DLCI	<0.000020 DLCI	<0.000010		
	Anthracene (mg/L)	0.000048	0.000043	<0.000010		
	Benz(a)anthracene (mg/L)	<0.000010	<0.000010	<0.000010		
	Benzo(a)pyrene (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Benzo(b&j)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010		
	Benzo(g,h,i)perylene (mg/L)	<0.000010	<0.000010	<0.000010		
	Benzo(k)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010		
	Chrysene (mg/L)	<0.000010	<0.000010	<0.000010		
	Dibenz(a,h)anthracene (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Fluoranthene (mg/L)	0.000192	0.000174	<0.000010		
	Fluorene (mg/L)	0.000484	0.000436	<0.000010		
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000010	<0.000010	<0.000010		
	1-Methylnaphthalene (mg/L)	<0.000050	<0.000050	<0.000050		
	2-Methylnaphthalene (mg/L)	<0.000050	<0.000050	<0.000050		
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050		
	Phenanthrene (mg/L)	<0.000020	<0.000020	<0.000020		
	Pyrene (mg/L)	0.000105	0.000096	<0.000010		
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050		
	Surrogate: Acridine d9 (%)	92.2	91.7	82.8		
	Surrogate: Chrysene d12 (%)	80.5	81.9	76.4		
	Surrogate: Naphthalene d8 (%)	100.8	79.9	94.7		
	Surrogate: Phenanthrene d10 (%)	96.8	95.2	88.5		

* 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, Total (as CaCO3)	B	L2070544-10, -3, -5, -6, -7, -8
Method Blank	Alkalinity, Total (as CaCO3)	B	L2070544-1, -11, -12, -13, -2, -4, -9
Method Blank	Aluminum (Al)-Dissolved	MB-LOR	L2070544-1, -11, -12, -13, -2, -3, -4, -5
Method Blank	Lead (Pb)-Total	MB-LOR	L2070544-10, -6, -7, -8, -9
Matrix Spike	Total Nitrogen	MS-B	L2070544-1, -10, -11, -12, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Total Nitrogen	MS-B	L2070544-1, -10, -11, -12, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Total Nitrogen	MS-B	L2070544-1, -10, -11, -12, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Nitrate (as N)	MS-B	L2070544-10, -3, -5, -6, -7, -8
Matrix Spike	Sulfate (SO4)	MS-B	L2070544-10, -3, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SURR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by 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-N+N-CALC-VA	Water	Nitrite & Nitrate in Water (Calculation)	EPA 300.0
Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
EPH-ME-FID-VA	Water	EPH in Water	BC Lab Manual
EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. EPH results include PAHs and are therefore not equivalent to LEPH or HEPH.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-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-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Reference Information

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

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-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

N-T-COL-VA Water Total Nitrogen in water by Colour APHA4500-P(J)/NEMI9171/USGS03-4174

This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.

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.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PAH-ME-MS-VA Water PAHs in Water EPA 3511/8270D (mod)

PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

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.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-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.

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.

Reference Information

Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	BC Env. Lab Manual (VH in Water)

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	BC Env. Lab Manual (VH in Solids)
VOC-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA 5021A/8260C

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

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA 5021A/8260C

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	EPA 5035A/5021A/8260C
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:

17-669882

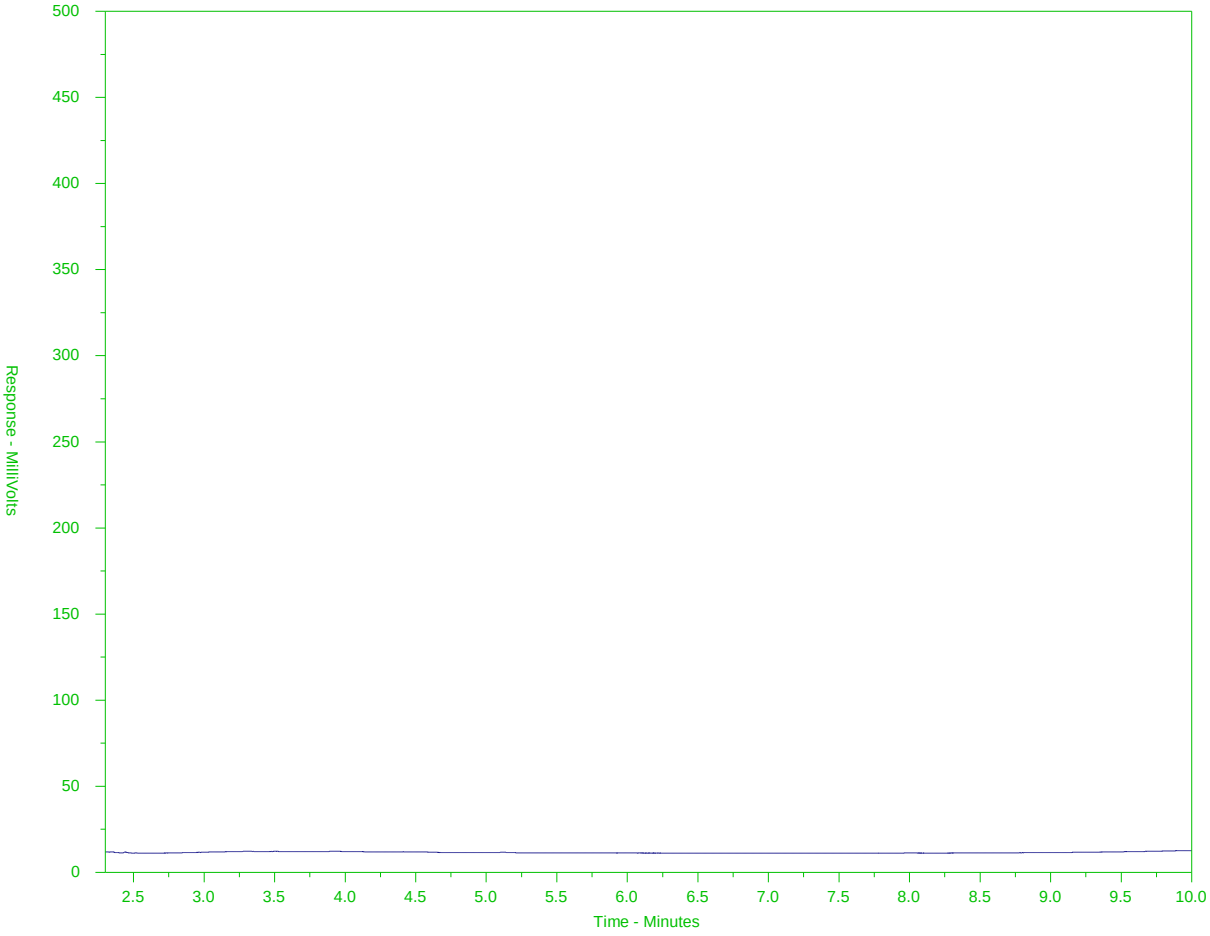
GLOSSARY OF REPORT TERMS

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.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-1
Client Sample ID: MW-2D



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

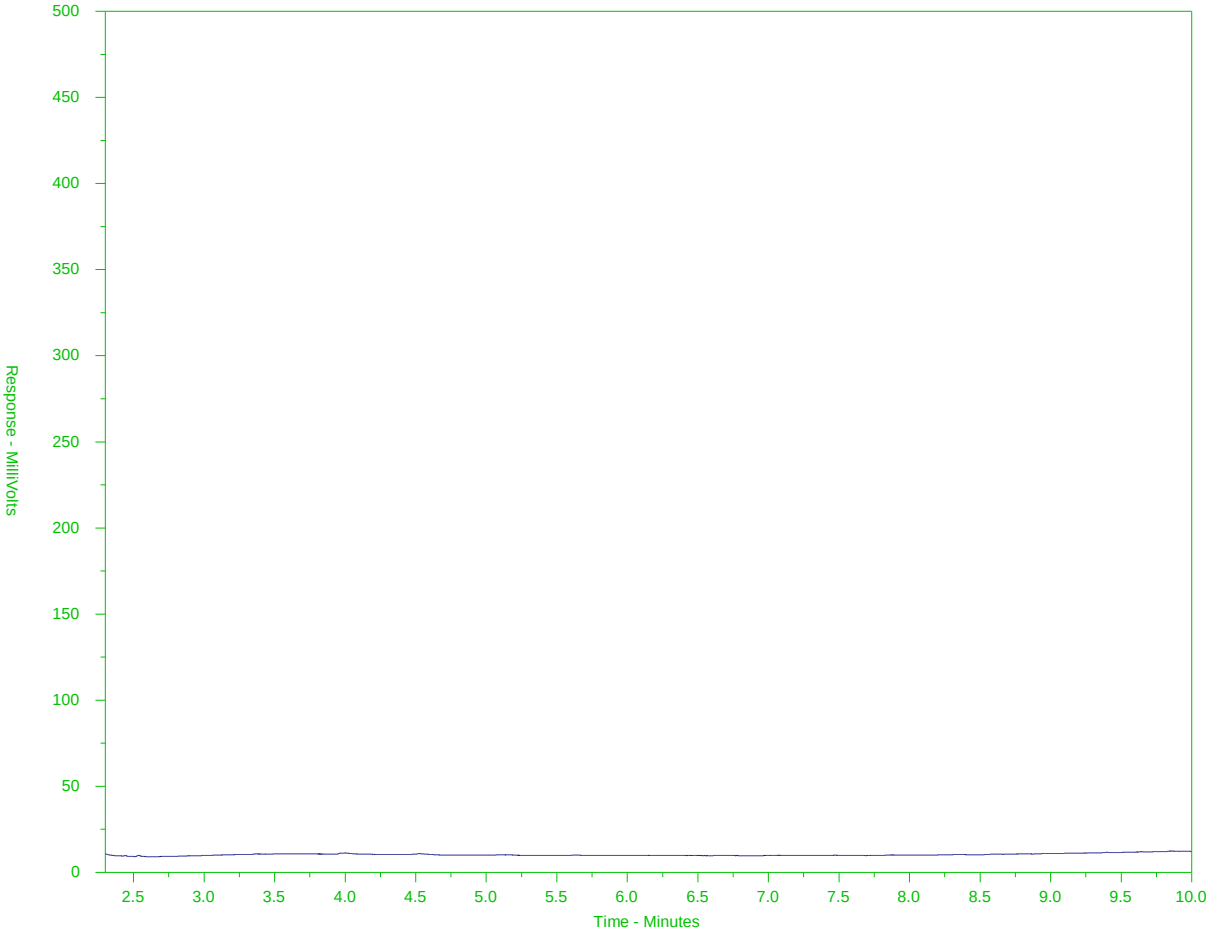
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-2
Client Sample ID: MW-2S



← EPH10-19 →		← EPH19-32 →
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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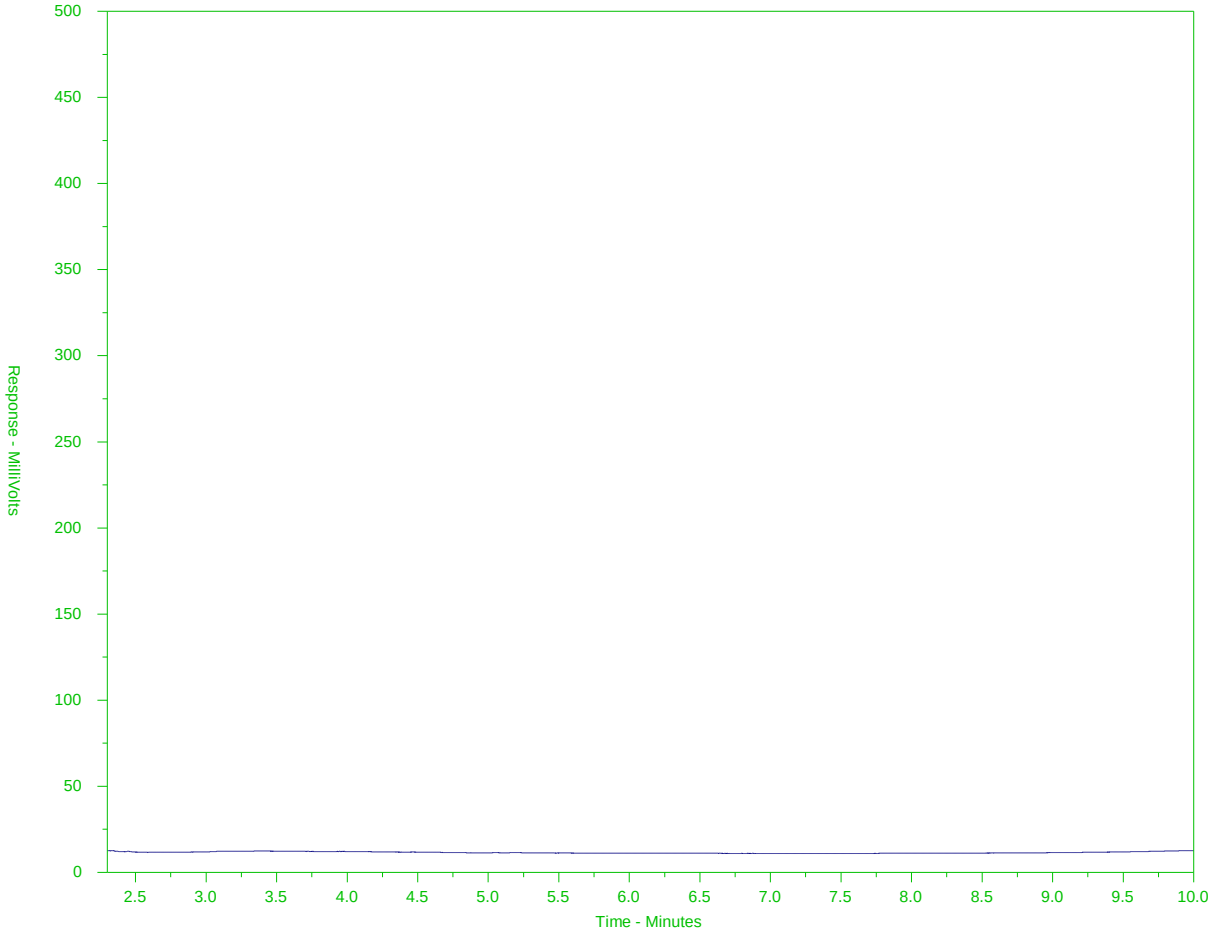
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-3
Client Sample ID: MW-3



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

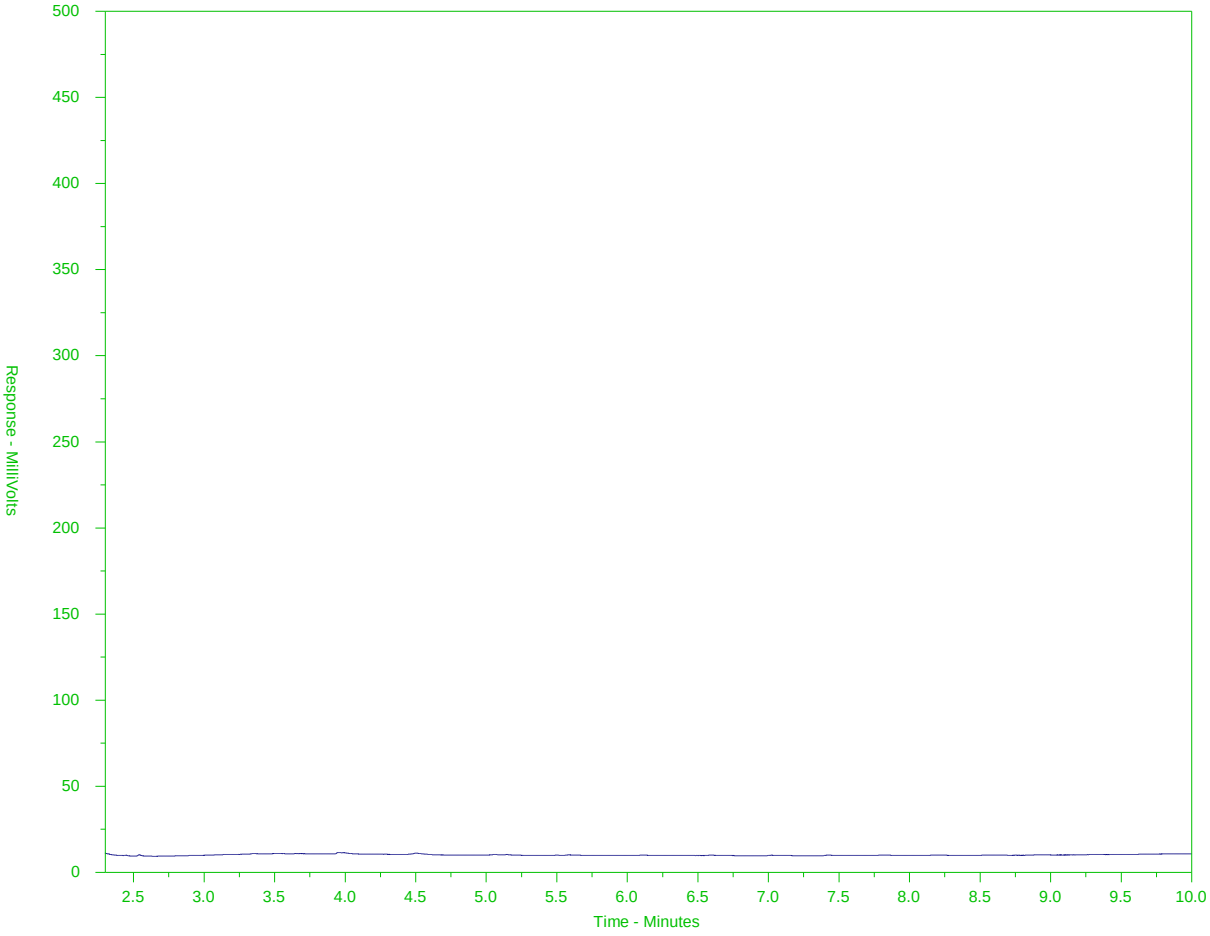
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-4
Client Sample ID: MW-4



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

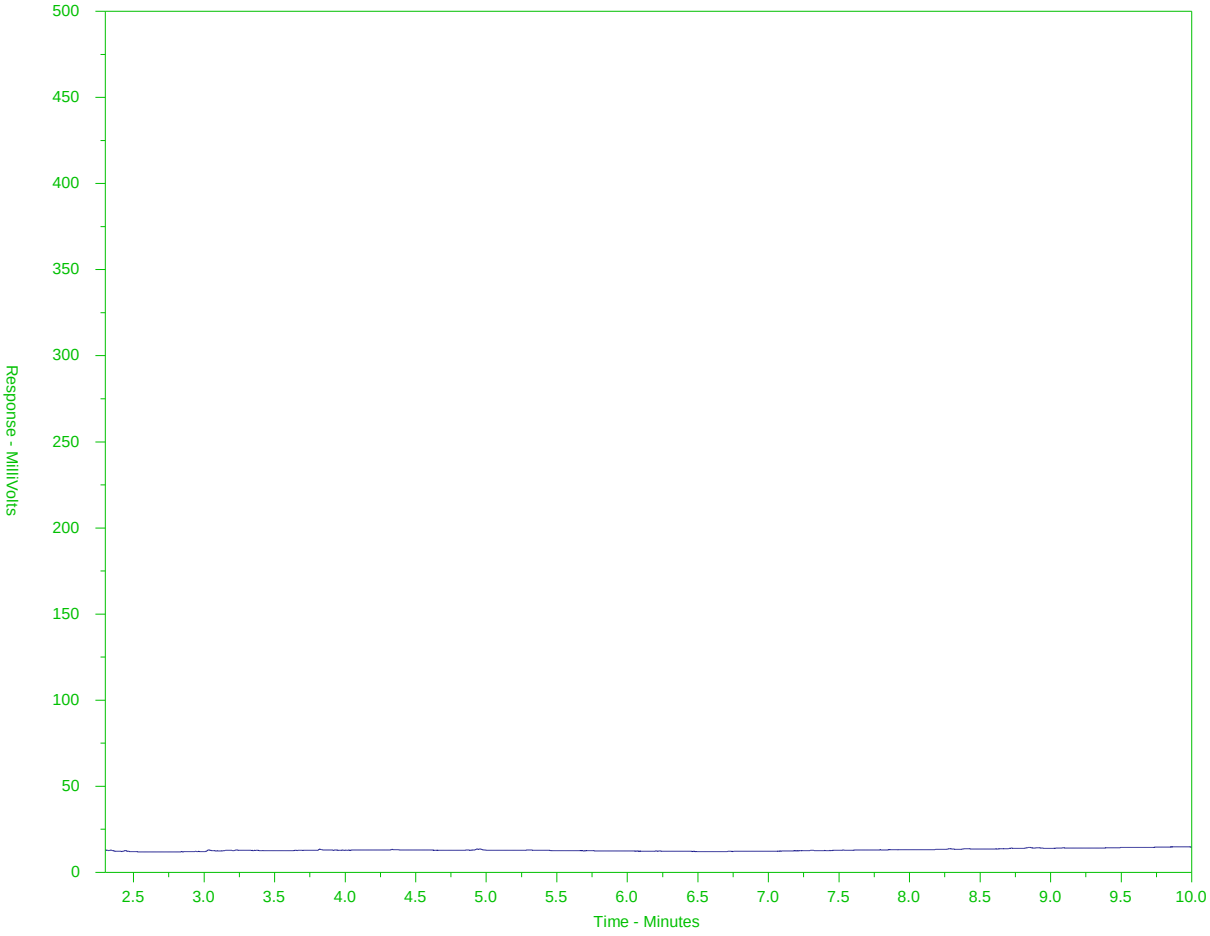
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-5
Client Sample ID: MW-6



← EPH10-19 →		← EPH19-32 →
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, but general patterns and distributions will remain similar.

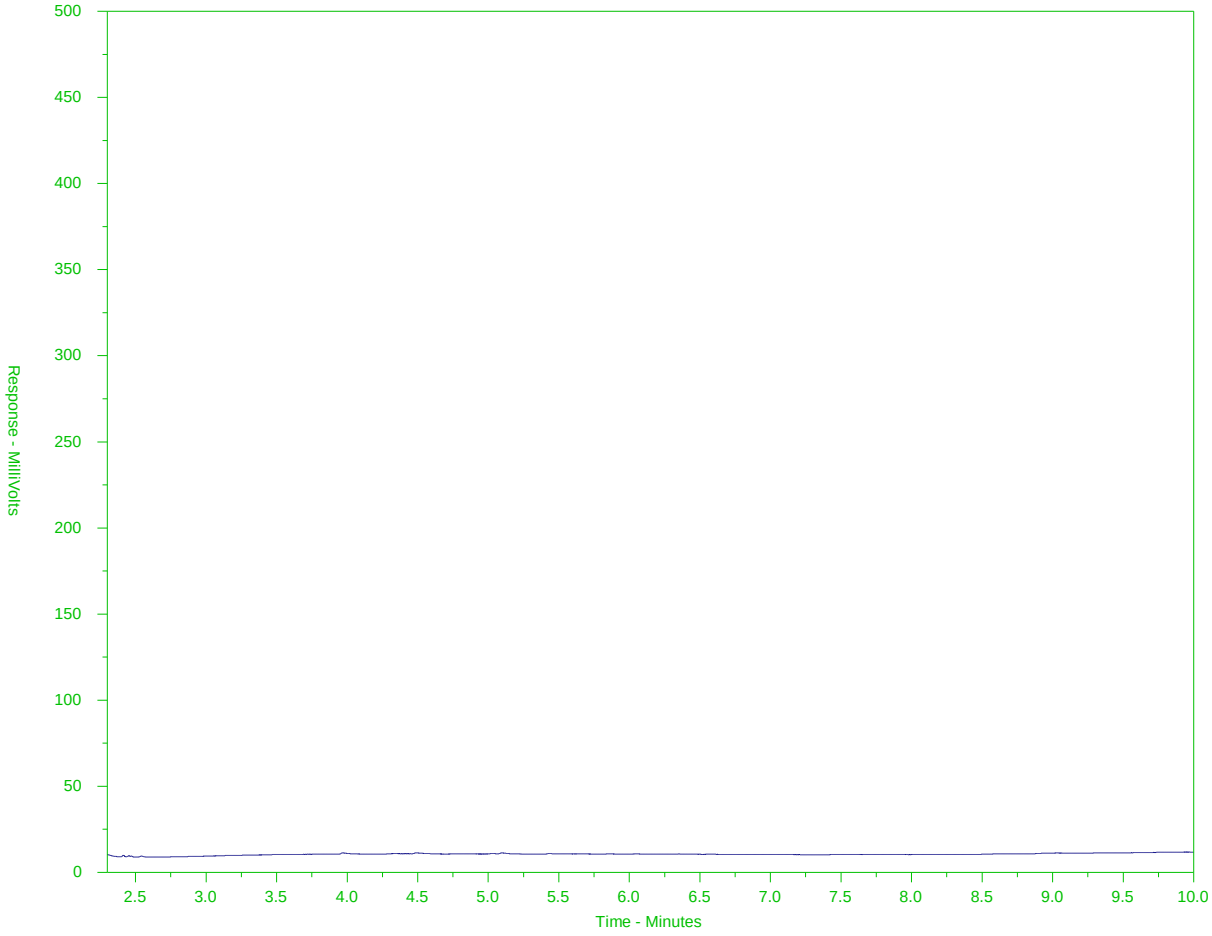
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-11
Client Sample ID: GW INT.



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

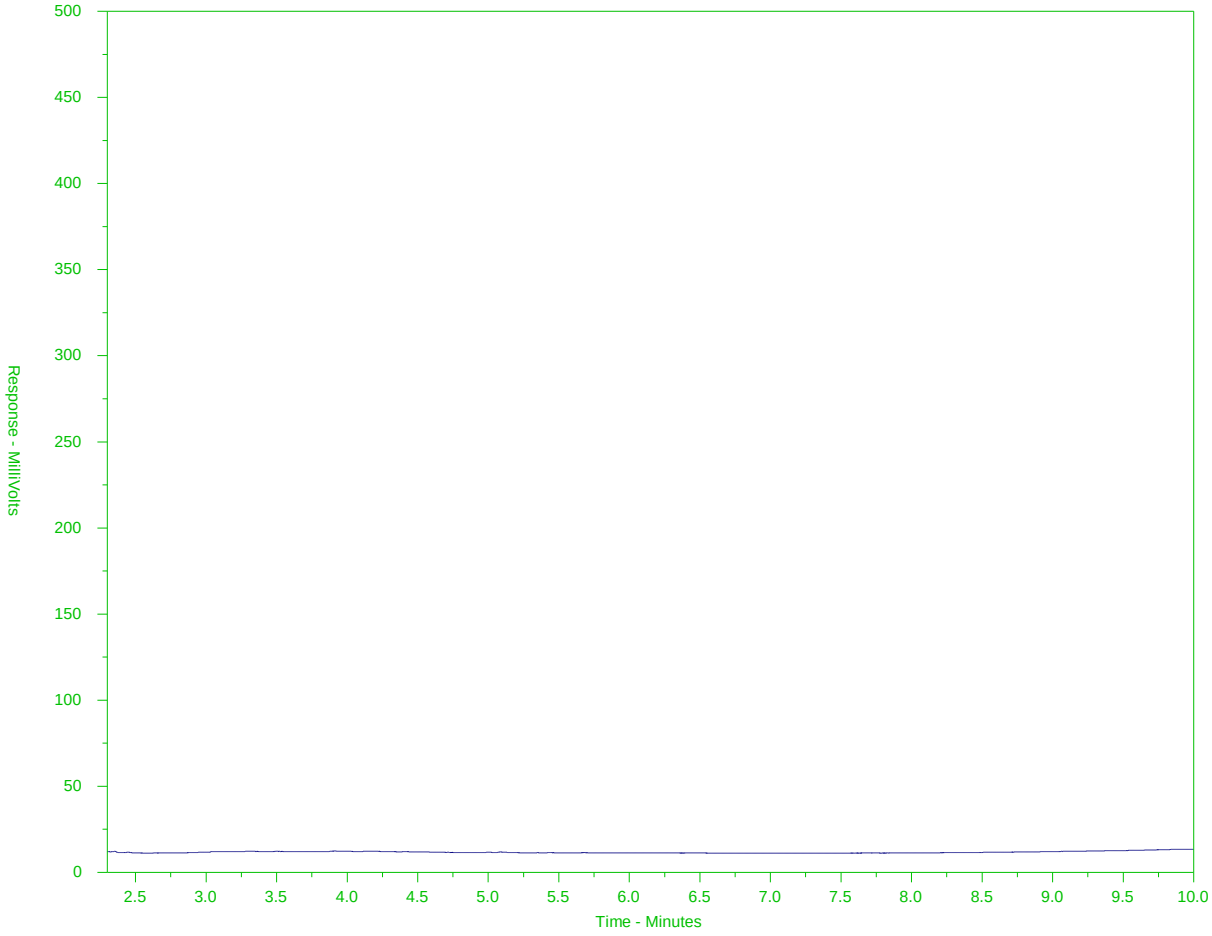
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-12
Client Sample ID: DUPLICATE - GW INT.



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

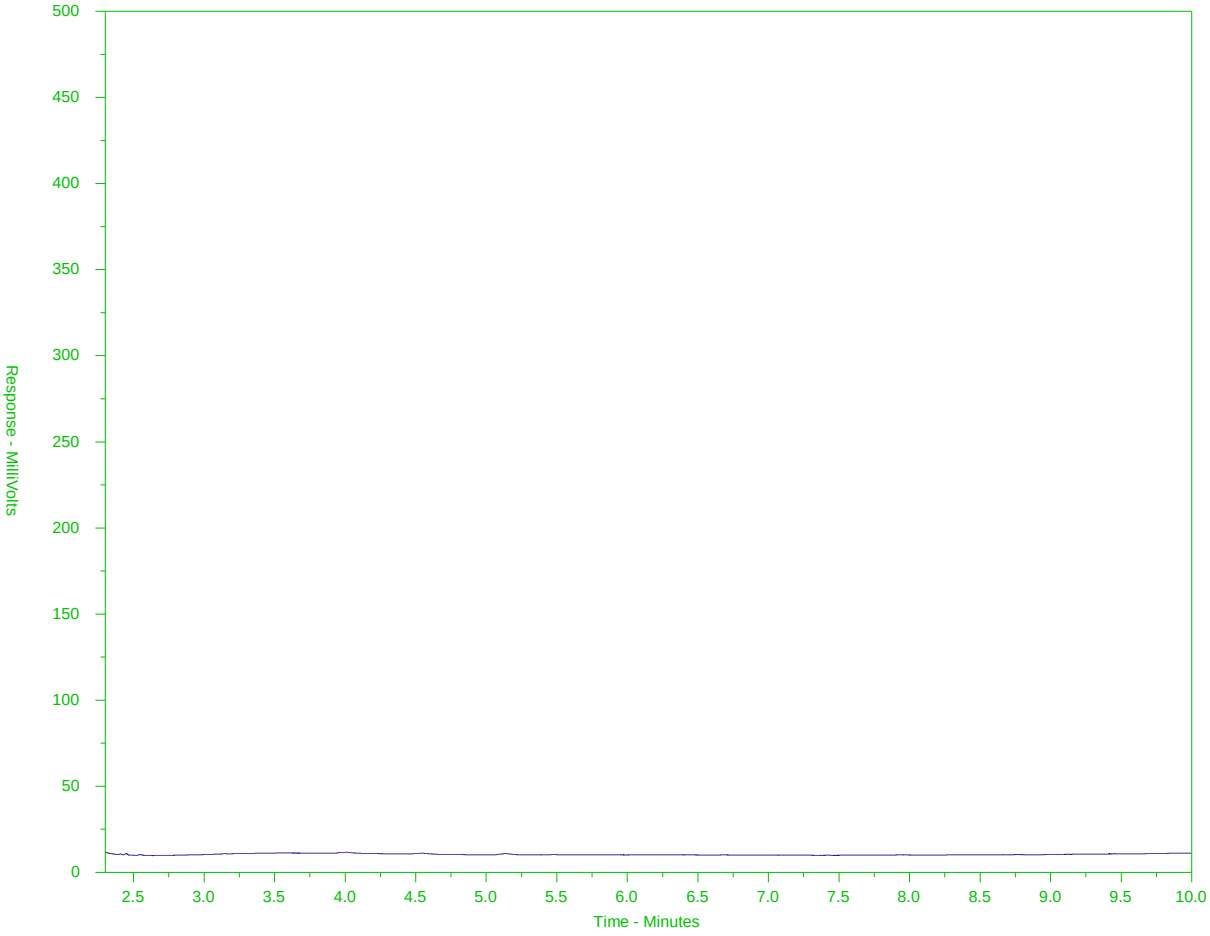
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2070544-13
Client Sample ID: L1



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

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

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2070544-COFC

COC Number: 17 - 669882

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Morrison Hershfield Ltd
Contact:	Josie Gilson
Phone:	778-803-9801
	Company address below will appear on the final report
Street:	301-4321 Still Creek Drive -
City/Province:	Burnaby BC
Postal Code:	V5C 6S7
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Resort Municipality of Whistler
Contact:	Andrew Tucker

Project Information

ALS Account # / Quote #:	Q65605
Job #:	18001536
PO / AFE:	723851
LSD:	

ALS Lab Work Order # (lab use only)

Report Format / Distribution

Select Report Format: ☐ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: jgilson@morrisonhershfield.com

Email 2: Cajones@morrisonhershfield.com

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Atucker@whistler.ca

Email 2: ap@whistler.ca

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: C. Funginski **Sampler:** J. Gilson

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolved Metals + Mercury	Total Metals + Mercury	General Parameters	Nutrients, Anions and COD	PAH/EPH/LEPH/HEPH	VOC	Number of Containers
	MW-2D	March 20/18	14:30	Water	R		R	R	R	R	8
	MW-2S	March 20/18	14:00	Water	R		R	R	R	R	8
	MW-3	March 20/18	12:00	Water	R		R	R	R	R	8
	MW-4	March 20/18	13:30	Water	R		R	R	R	R	8
	MW-6	March 20/18	9:30	Water	R		R	R	R	R	8
	SFC-2	March 20/18	11:00	Water		R	R	R			4
	SCF-2B	March 20/18	11:00	Water		R	R	R			4
	SFC-3	March 20/18	10:30	Water		R	R	R			4
	SFC-4B	March 20/18	12:30	Water		R	R	R			4
	SFC-11	March 20/18	10:30	Water		R	R	R			4
	GW Int.	March 20/18	15:00	Water	R		R	R	R	R	8
	Duplicate - GW Int.	March 20/18	15:30	Water	R		R	R	R	R	8
	L1	March 20/18	16:30	Water	R		R	R	R	R	8

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

British Columbia Contaminated Sites Regulation (MAY, 2011), Schedule 6

3 coolers in shipment

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			4	6	8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: J. Gilson	Date: March 20. 2018	Time: 10:00	Received by:	Date:	Time:	Received by: JC	Date: 3/21/18	Time: 1159 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Morrison Hershfield Limited
ATTN: Cynthia Jones
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 21-JUN-18
Report Date: 09-JUL-18 10:42 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L2116893

Project P.O. #: 723851
Job Reference: MHG100-WHI500-VA
C of C Numbers: 17-667964
Legal Site Desc:

Carla Fuginski
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2116893-1 Water 20-JUN-18 07:25 MW-6	L2116893-2 Water 20-JUN-18 08:15 MW-4	L2116893-3 Water 20-JUN-18 09:20 MW-2S	L2116893-4 Water 20-JUN-18 09:45 MW-2D	L2116893-5 Water 20-JUN-18 10:10 MW-3
WATER						
Physical Tests	Conductivity (uS/cm)	727	366	271	903	222
	Hardness (as CaCO3) (mg/L)	140	139	94.6	372	60.7
	pH (pH)	7.38	8.22	7.80	8.25	7.25
	Total Suspended Solids (mg/L)	233	353	42.6	393	11.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	18.9	115	72.7	227	27.3
	Ammonia, Total (as N) (mg/L)	0.0309	2.38	3.42	11.1	0.383
	Bromide (Br) (mg/L)	<0.25 DLDS	<0.050	<0.050	<0.25 DLDS	<0.050
	Chloride (Cl) (mg/L)	138	20.6	4.93	43.4	34.0
	Fluoride (F) (mg/L)	<0.10 DLDS	0.096	0.118	<0.10 DLDS	0.026
	Nitrate and Nitrite (as N) (mg/L)	0.507	0.0082	0.0257	0.058	0.625
	Nitrate (as N) (mg/L)	0.507	0.0062	0.0257	0.058	0.625
	Nitrite (as N) (mg/L)	<0.0050 DLDS	0.0020	<0.0010	<0.0050 DLDS	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	1.22	2.62	3.72	11.1	0.582
	Total Nitrogen (mg/L)	2.95	2.53	3.56	11.6	1.03
	Phosphorus (P)-Total (mg/L)	1.09	0.198	0.0380	0.343	0.0022
	Sulfate (SO4) (mg/L)	102	44.5	52.2	199	20.0
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)					
	Cesium (Cs)-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	L2116893-6	L2116893-7	L2116893-8	L2116893-9	L2116893-10
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	10:55	11:25	11:35	12:15	12:30
Client ID	SFC-4B	SFC-2B	SFC-2	GW-INT	DUP-GW
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	243	1540	324	789	796
Hardness (as CaCO3) (mg/L)	73.0 HTC	355 HTC	101 HTC	240	236
pH (pH)	7.42	2.90	7.67	7.89	7.89
Total Suspended Solids (mg/L)	7.3	61.5	9.9	13.5	23.5
Anions and Nutrients					
Alkalinity, Total (as CaCO3) (mg/L)	37.9	<1.0	63.2	105	112
Ammonia, Total (as N) (mg/L)	0.0078	2.30	0.479	1.21	1.26
Bromide (Br) (mg/L)	<0.050	<0.25 DLDS	<0.050	<0.25 DLDS	<0.25 DLDS
Chloride (Cl) (mg/L)	28.8	15.1	24.2	110	109
Fluoride (F) (mg/L)	0.051	1.00	0.045	<0.10 DLDS	<0.10 DLDS
Nitrate and Nitrite (as N) (mg/L)	0.232	0.035	0.572	<0.025	0.045
Nitrate (as N) (mg/L)	0.232	0.035	0.572	<0.025 DLDS	0.045
Nitrite (as N) (mg/L)	<0.0010	<0.0050 DLDS	<0.0010	<0.0050 DLDS	<0.0050 DLDS
Total Kjeldahl Nitrogen (mg/L)	0.138	2.87	0.627	1.38	1.37
Total Nitrogen (mg/L)	0.261	2.73	1.07	1.35	1.27
Phosphorus (P)-Total (mg/L)	0.0059	0.0444	0.0031	0.0076	0.0097
Sulfate (SO4) (mg/L)	31.8	678	53.9	126	125
Total Metals					
Aluminum (Al)-Total (mg/L)	0.175	26.6	0.573		
Antimony (Sb)-Total (mg/L)	0.00011	0.00012	0.00011		
Arsenic (As)-Total (mg/L)	0.00011	0.00130	0.00025		
Barium (Ba)-Total (mg/L)	0.0191	0.0421	0.0588		
Beryllium (Be)-Total (mg/L)	<0.00010	0.00079	<0.00010		
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
Boron (B)-Total (mg/L)	0.026	0.025	0.037		
Cadmium (Cd)-Total (mg/L)	0.0000051	0.00104	0.0000472		
Calcium (Ca)-Total (mg/L)	24.6	92.7	34.7		
Cesium (Cs)-Total (mg/L)	<0.000010	0.000130	0.000012		
Chromium (Cr)-Total (mg/L)	0.00025	0.00214	0.00024		
Cobalt (Co)-Total (mg/L)	0.00032	0.163	0.00541		
Copper (Cu)-Total (mg/L)	0.00207	0.316	0.0108		
Iron (Fe)-Total (mg/L)	0.404	76.1	4.86		
Lead (Pb)-Total (mg/L)	0.000070	0.000179	0.000056		
Lithium (Li)-Total (mg/L)	<0.0010	0.0081	<0.0010		
Magnesium (Mg)-Total (mg/L)	2.81	30.0	3.46		
Manganese (Mn)-Total (mg/L)	0.0848	7.65	1.31		
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050		
Molybdenum (Mo)-Total (mg/L)	0.000453	0.000194	0.00216		
Nickel (Ni)-Total (mg/L)	0.00053	0.0656	0.00135		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2116893-11	L2116893-12			
	Description	Water	Water			
	Sampled Date	20-JUN-18	20-JUN-18			
	Sampled Time	12:55	13:00			
	Client ID	SFC-3	SFC-11			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)	47.4 HTC	37.8 HTC			
	pH (pH)					
	Total Suspended Solids (mg/L)					
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)					
	Ammonia, Total (as N) (mg/L)					
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate and Nitrite (as N) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Total Kjeldahl Nitrogen (mg/L)					
	Total Nitrogen (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Sulfate (SO4) (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)	0.0408	0.204			
	Antimony (Sb)-Total (mg/L)	0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00012	0.00013			
	Barium (Ba)-Total (mg/L)	0.0235	0.0117			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.0000231	0.0000207			
	Calcium (Ca)-Total (mg/L)	15.7	11.8			
	Cesium (Cs)-Total (mg/L)	<0.000010	<0.000010			
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00025			
	Cobalt (Co)-Total (mg/L)	0.00015	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00191	0.00080			
	Iron (Fe)-Total (mg/L)	0.258	0.056			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Total (mg/L)	2.01	2.01			
	Manganese (Mn)-Total (mg/L)	0.0198	0.0139			
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	0.000470	0.000229			
	Nickel (Ni)-Total (mg/L)	0.00050	<0.00050			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2116893-1	L2116893-2	L2116893-3	L2116893-4	L2116893-5
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	07:25	08:15	09:20	09:45	10:10
Client ID	MW-6	MW-4	MW-2S	MW-2D	MW-3
Grouping / **Analyte**					
WATER					
Total Metals					
Phosphorus (P)-Total (mg/L)					
Potassium (K)-Total (mg/L)					
Rubidium (Rb)-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)					
Sulfur (S)-Total (mg/L)					
Tellurium (Te)-Total (mg/L)					
Thallium (Tl)-Total (mg/L)					
Thorium (Th)-Total (mg/L)					
Tin (Sn)-Total (mg/L)					
Titanium (Ti)-Total (mg/L)					
Tungsten (W)-Total (mg/L)					
Uranium (U)-Total (mg/L)					
Vanadium (V)-Total (mg/L)					
Zinc (Zn)-Total (mg/L)					
Zirconium (Zr)-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)	0.0320	0.0704	0.0027	0.0050	0.0148
Antimony (Sb)-Dissolved (mg/L)	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.00010	0.00690	0.00707	0.0140	<0.00010
Barium (Ba)-Dissolved (mg/L)	0.0370	0.174	0.0696	0.0344	0.0846
Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	0.015	0.056	0.098	0.262	<0.010
Cadmium (Cd)-Dissolved (mg/L)	0.000162	0.000156	<0.0000050	0.0000114	0.000184
Calcium (Ca)-Dissolved (mg/L)	47.2	45.7	30.0	124	18.9
Cesium (Cs)-Dissolved (mg/L)	0.000012	0.000036	0.000014	0.000017	0.000041
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	0.00364	0.0249	0.00144	0.0120	0.00277
Copper (Cu)-Dissolved (mg/L)	0.00249	0.00834	0.00633	0.00025	0.00299
Iron (Fe)-Dissolved (mg/L)	0.920	43.2	29.2	54.2	0.014
Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000701	0.000216	<0.000050	<0.000050
Lithium (Li)-Dissolved (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	L2116893-6	L2116893-7	L2116893-8	L2116893-9	L2116893-10
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	10:55	11:25	11:35	12:15	12:30
Client ID	SFC-4B	SFC-2B	SFC-2	GW-INT	DUP-GW
Grouping / **Analyte**					
WATER					
Total Metals Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050		
Potassium (K)-Total (mg/L)	1.76	3.73	3.71		
Rubidium (Rb)-Total (mg/L)	0.00171	0.00789	0.00403		
Selenium (Se)-Total (mg/L)	<0.000050	0.000096	0.000061		
Silicon (Si)-Total (mg/L)	7.72	19.4	4.87		
Silver (Ag)-Total (mg/L)	<0.000010	<0.000020 DLAI	<0.000010		
Sodium (Na)-Total (mg/L)	15.5	12.8	14.8		
Strontium (Sr)-Total (mg/L)	0.257	0.390	0.240		
Sulfur (S)-Total (mg/L)	11.5	251	18.2		
Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020		
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	0.000014		
Thorium (Th)-Total (mg/L)	<0.00010	0.00147	<0.00010		
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Titanium (Ti)-Total (mg/L)	0.00501	<0.0015 DLM	<0.00090 DLM		
Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Uranium (U)-Total (mg/L)	0.000013	0.00109	0.000039		
Vanadium (V)-Total (mg/L)	0.00052	<0.00050	<0.00050		
Zinc (Zn)-Total (mg/L)	0.0107	0.146	0.0146		
Zirconium (Zr)-Total (mg/L)	0.000082	0.000135	0.000069		
Dissolved Metals Dissolved Mercury Filtration Location				FIELD	FIELD
Dissolved Metals Filtration Location				FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)				0.0333	0.0326
Antimony (Sb)-Dissolved (mg/L)				<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)				0.00052	0.00048
Barium (Ba)-Dissolved (mg/L)				0.0786	0.0773
Beryllium (Be)-Dissolved (mg/L)				<0.00010	<0.00010
Bismuth (Bi)-Dissolved (mg/L)				<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)				0.127	0.127
Cadmium (Cd)-Dissolved (mg/L)				<0.0000050	<0.0000050
Calcium (Ca)-Dissolved (mg/L)				81.1	79.7
Cesium (Cs)-Dissolved (mg/L)				0.000015	0.000017
Chromium (Cr)-Dissolved (mg/L)				0.00013	<0.00010
Cobalt (Co)-Dissolved (mg/L)				0.00265	0.00261
Copper (Cu)-Dissolved (mg/L)				<0.00020	0.00020
Iron (Fe)-Dissolved (mg/L)				28.8	28.8
Lead (Pb)-Dissolved (mg/L)				<0.000050	<0.000050
Lithium (Li)-Dissolved (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	L2116893-11	L2116893-12			
	Description	Water	Water			
	Sampled Date	20-JUN-18	20-JUN-18			
	Sampled Time	12:55	13:00			
	Client ID	SFC-3	SFC-11			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	1.85	0.711			
	Rubidium (Rb)-Total (mg/L)	0.00163	0.00046			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	7.66	10.1			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	36.4	9.35			
	Strontium (Sr)-Total (mg/L)	0.138	0.152			
	Sulfur (S)-Total (mg/L)	7.16	4.08			
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Thorium (Th)-Total (mg/L)	<0.00010	<0.00010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	0.00106	0.00150			
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010			
	Uranium (U)-Total (mg/L)	0.000011	<0.000010			
	Vanadium (V)-Total (mg/L)	<0.00050	0.00078			
	Zinc (Zn)-Total (mg/L)	0.0040	<0.0030			
	Zirconium (Zr)-Total (mg/L)	<0.000060	<0.000060			
Dissolved Metals	Dissolved Mercury Filtration Location					
	Dissolved Metals Filtration Location					
	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Cesium (Cs)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2116893-1	L2116893-2	L2116893-3	L2116893-4	L2116893-5
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	07:25	08:15	09:20	09:45	10:10
Client ID	MW-6	MW-4	MW-2S	MW-2D	MW-3
Grouping / **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)	5.34	6.12	4.80	15.2	3.28
Manganese (Mn)-Dissolved (mg/L)	0.306	2.30	1.41	3.60	1.21
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000538	0.0150	0.00460	0.0133	0.000657
Nickel (Ni)-Dissolved (mg/L)	0.00100	0.00327	0.00062	0.00236	0.00062
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	0.087	<0.050
Potassium (K)-Dissolved (mg/L)	4.09	5.89	6.59	19.6	3.62
Rubidium (Rb)-Dissolved (mg/L)	0.00614	0.00405	0.00417	0.0104	0.00852
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000076	<0.000050
Silicon (Si)-Dissolved (mg/L)	6.27	11.0	8.87	14.4	7.17
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	88.0	16.5	6.46	35.1	11.6
Strontium (Sr)-Dissolved (mg/L)	0.452	0.281	0.184	0.552	0.178
Sulfur (S)-Dissolved (mg/L)	34.8	14.9	17.1	66.4	6.19
Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved (mg/L)	0.000051	0.000026	<0.000010	<0.000010	0.000082
Thorium (Th)-Dissolved (mg/L)	<0.00010	0.00032	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved (mg/L)	0.00022	<0.00010	<0.00010	<0.00010	0.00033
Titanium (Ti)-Dissolved (mg/L)	<0.00030	0.00504	<0.00030	<0.00030	<0.00030
Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved (mg/L)	0.000022	0.000265	0.000015	0.000166	<0.000010
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0047	0.0142	0.0057	0.0037	0.0037
Zirconium (Zr)-Dissolved (mg/L)	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060
Aggregate Organics COD (mg/L)	20	29	<20	40	<20
Volatile Organic Compounds Benzene (mg/L)					
Bromodichloromethane (mg/L)					
Bromoform (mg/L)					
Carbon Tetrachloride (mg/L)					
Chlorobenzene (mg/L)					
Dibromochloromethane (mg/L)					
Chloroethane (mg/L)					
Chloroform (mg/L)					
Chloromethane (mg/L)					
1,2-Dichlorobenzene (mg/L)					
1,3-Dichlorobenzene (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2116893-6	L2116893-7	L2116893-8	L2116893-9	L2116893-10
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	10:55	11:25	11:35	12:15	12:30
Client ID	SFC-4B	SFC-2B	SFC-2	GW-INT	DUP-GW
Grouping / **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)				9.09	8.99
Manganese (Mn)-Dissolved (mg/L)				2.48	2.45
Mercury (Hg)-Dissolved (mg/L)				<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)				0.000426	0.000420
Nickel (Ni)-Dissolved (mg/L)				0.00195	0.00199
Phosphorus (P)-Dissolved (mg/L)				<0.050	<0.050
Potassium (K)-Dissolved (mg/L)				6.93	6.93
Rubidium (Rb)-Dissolved (mg/L)				0.00473	0.00473
Selenium (Se)-Dissolved (mg/L)				<0.000050	0.000059
Silicon (Si)-Dissolved (mg/L)				9.30	9.41
Silver (Ag)-Dissolved (mg/L)				<0.000010	0.000020
Sodium (Na)-Dissolved (mg/L)				58.0	58.2
Strontium (Sr)-Dissolved (mg/L)				0.581	0.562
Sulfur (S)-Dissolved (mg/L)				42.9	44.2
Tellurium (Te)-Dissolved (mg/L)				<0.00020	<0.00020
Thallium (Tl)-Dissolved (mg/L)				<0.000010	<0.000010
Thorium (Th)-Dissolved (mg/L)				<0.00010	<0.00010
Tin (Sn)-Dissolved (mg/L)				0.00023	0.00023
Titanium (Ti)-Dissolved (mg/L)				0.00039	0.00041
Tungsten (W)-Dissolved (mg/L)				<0.00010	<0.00010
Uranium (U)-Dissolved (mg/L)				0.000014	0.000014
Vanadium (V)-Dissolved (mg/L)				0.00053	0.00051
Zinc (Zn)-Dissolved (mg/L)				0.0074	0.0077
Zirconium (Zr)-Dissolved (mg/L)				0.000134	0.000139
Aggregate Organics COD (mg/L)	<20	40	<20	26	22
Volatile Organic Compounds Benzene (mg/L)				<0.00050	<0.00050
Bromodichloromethane (mg/L)				<0.0010	<0.0010
Bromoform (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
1,2-Dichlorobenzene (mg/L)				<0.00050	<0.00050
1,3-Dichlorobenzene (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	L2116893-11	L2116893-12			
	Description	Water	Water			
	Sampled Date	20-JUN-18	20-JUN-18			
	Sampled Time	12:55	13:00			
	Client ID	SFC-3	SFC-11			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Rubidium (Rb)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Sulfur (S)-Dissolved (mg/L)					
	Tellurium (Te)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Thorium (Th)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Tungsten (W)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					
	Zirconium (Zr)-Dissolved (mg/L)					
Aggregate Organics	COD (mg/L)					
Volatile Organic Compounds	Benzene (mg/L)					
	Bromodichloromethane (mg/L)					
	Bromoform (mg/L)					
	Carbon Tetrachloride (mg/L)					
	Chlorobenzene (mg/L)					
	Dibromochloromethane (mg/L)					
	Chloroethane (mg/L)					
	Chloroform (mg/L)					
	Chloromethane (mg/L)					
	1,2-Dichlorobenzene (mg/L)					
	1,3-Dichlorobenzene (mg/L)					

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2116893-1	L2116893-2	L2116893-3	L2116893-4	L2116893-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
	Sampled Time	07:25	08:15	09:20	09:45	10:10
	Client ID	MW-6	MW-4	MW-2S	MW-2D	MW-3
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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)					
	Dichloromethane (mg/L)					
	1,2-Dichloropropane (mg/L)					
	cis-1,3-Dichloropropylene (mg/L)					
	trans-1,3-Dichloropropylene (mg/L)					
	1,3-Dichloropropene (cis & trans) (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (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)					
	Vinyl Chloride (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
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)					
	Surrogate: 2-Bromobenzotrifluoride (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2116893-6	L2116893-7	L2116893-8	L2116893-9	L2116893-10
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	10:55	11:25	11:35	12:15	12:30
Client ID	SFC-4B	SFC-2B	SFC-2	GW-INT	DUP-GW
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds 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
Dichloromethane (mg/L)				<0.0050	<0.0050
1,2-Dichloropropane (mg/L)				<0.0010	<0.0010
cis-1,3-Dichloropropylene (mg/L)				<0.00050	<0.00050
trans-1,3-Dichloropropylene (mg/L)				<0.00050	<0.00050
1,3-Dichloropropene (cis & trans) (mg/L)				<0.0010	<0.0010
Ethylbenzene (mg/L)				<0.00050	<0.00050
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)				<0.00020	<0.00020
Tetrachloroethylene (mg/L)				<0.0010	<0.0010
Toluene (mg/L)				<0.00045	<0.00045
1,1,1-Trichloroethane (mg/L)				<0.0010	<0.0010
1,1,2-Trichloroethane (mg/L)				<0.00050	<0.00050
Trichloroethylene (mg/L)				<0.0010	<0.0010
Trichlorofluoromethane (mg/L)				<0.0010	<0.0010
Vinyl Chloride (mg/L)				<0.00040	<0.00040
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) (%)				93.5	94.9
Surrogate: 1,4-Difluorobenzene (SS) (%)				94.1	91.8
Hydrocarbons EPH10-19 (mg/L)				<0.25	<0.25
EPH19-32 (mg/L)				<0.25	<0.25
LEPH (mg/L)				<0.25	<0.25
HEPH (mg/L)				<0.25	<0.25
Volatile Hydrocarbons (VH6-10) (mg/L)				<0.10	<0.10
VPH (C6-C10) (mg/L)				<0.10	<0.10
Surrogate: 2-Bromobenzotrifluoride (%)				93.5	93.7
Surrogate: 3,4-Dichlorotoluene (SS) (%)				85.7	59.7 SURR-ND

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2116893-11	L2116893-12			
	Description	Water	Water			
	Sampled Date	20-JUN-18	20-JUN-18			
	Sampled Time	12:55	13:00			
	Client ID	SFC-3	SFC-11			
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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)					
	Dichloromethane (mg/L)					
	1,2-Dichloropropane (mg/L)					
	cis-1,3-Dichloropropylene (mg/L)					
	trans-1,3-Dichloropropylene (mg/L)					
	1,3-Dichloropropene (cis & trans) (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (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)					
	Vinyl Chloride (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
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)					
	Surrogate: 2-Bromobenzotrifluoride (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2116893-1	L2116893-2	L2116893-3	L2116893-4	L2116893-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
	Sampled Time	07:25	08:15	09:20	09:45	10:10
	Client ID	MW-6	MW-4	MW-2S	MW-2D	MW-3
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)					
	Acenaphthylene (mg/L)					
	Acridine (mg/L)					
	Anthracene (mg/L)					
	Benz(a)anthracene (mg/L)					
	Benzo(a)pyrene (mg/L)					
	Benzo(b&j)fluoranthene (mg/L)					
	Benzo(b+j+k)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)					
	1-Methylnaphthalene (mg/L)					
	2-Methylnaphthalene (mg/L)					
	Naphthalene (mg/L)					
	Phenanthrene (mg/L)					
	Pyrene (mg/L)					
	Quinoline (mg/L)					
	Surrogate: Acridine d9 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2116893-6	L2116893-7	L2116893-8	L2116893-9	L2116893-10
Description	Water	Water	Water	Water	Water
Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
Sampled Time	10:55	11:25	11:35	12:15	12:30
Client ID	SFC-4B	SFC-2B	SFC-2	GW-INT	DUP-GW
Grouping / **Analyte**					
WATER					
Polycyclic Aromatic Hydrocarbons / Acenaphthene (mg/L)				0.00102	0.000967
Acenaphthylene (mg/L)				<0.000010	<0.000010
Acridine (mg/L)				<0.000010	<0.000010
Anthracene (mg/L)				0.000024	0.000022
Benz(a)anthracene (mg/L)				<0.000010	<0.000010
Benzo(a)pyrene (mg/L)				<0.0000050	<0.0000050
Benzo(b&j)fluoranthene (mg/L)				<0.000010	<0.000010
Benzo(b+j+k)fluoranthene (mg/L)				<0.000015	<0.000015
Benzo(g,h,i)perylene (mg/L)				<0.000010	<0.000010
Benzo(k)fluoranthene (mg/L)				<0.000010	<0.000010
Chrysene (mg/L)				<0.000010	<0.000010
Dibenz(a,h)anthracene (mg/L)				<0.0000050	<0.0000050
Fluoranthene (mg/L)				0.000148	0.000138
Fluorene (mg/L)				0.000180	0.000166
Indeno(1,2,3-c,d)pyrene (mg/L)				<0.000010	<0.000010
1-Methylnaphthalene (mg/L)				<0.000050	<0.000050
2-Methylnaphthalene (mg/L)				<0.000050	<0.000050
Naphthalene (mg/L)				<0.000050	<0.000050
Phenanthrene (mg/L)				<0.000020	<0.000020
Pyrene (mg/L)				0.000077	0.000070
Quinoline (mg/L)				<0.000050	<0.000050
Surrogate: Acridine d9 (%)				78.9	90.0
Surrogate: Chrysene d12 (%)				67.0	74.8
Surrogate: Naphthalene d8 (%)				85.5	89.7
Surrogate: Phenanthrene d10 (%)				87.7	94.1

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2116893-11	L2116893-12			
	Description	Water	Water			
	Sampled Date	20-JUN-18	20-JUN-18			
	Sampled Time	12:55	13:00			
	Client ID	SFC-3	SFC-11			
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)					
	Acenaphthylene (mg/L)					
	Acridine (mg/L)					
	Anthracene (mg/L)					
	Benz(a)anthracene (mg/L)					
	Benzo(a)pyrene (mg/L)					
	Benzo(b&j)fluoranthene (mg/L)					
	Benzo(b+j+k)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)					
	1-Methylnaphthalene (mg/L)					
	2-Methylnaphthalene (mg/L)					
	Naphthalene (mg/L)					
	Phenanthrene (mg/L)					
	Pyrene (mg/L)					
	Quinoline (mg/L)					
	Surrogate: Acridine d9 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					

* 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)
Laboratory Control Sample	Sulfur (S)-Dissolved	MES	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2116893-1, -10, -2, -3, -4, -5, -9
Matrix Spike	Aluminum (Al)-Total	MS-B	L2116893-11, -12, -6, -7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2116893-11, -12, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2116893-11, -12, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2116893-11, -12, -6, -7, -8
Matrix Spike	Manganese (Mn)-Total	MS-B	L2116893-11, -12, -6, -7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2116893-11, -12, -6, -7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2116893-11, -12, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLAI	Detection limit raised due to low level analytical interference or background.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SURR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by 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-N+N-CALC-VA	Water	Nitrite & Nitrate in Water (Calculation)	EPA 300.0
Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
EPH-ME-FID-VA	Water	EPH in Water	BC Lab Manual

Reference Information

EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. EPH results include PAHs and are therefore not equivalent to LEPH or HEPH.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-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-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LEPH/HEPH

LEPHw and HEPHw are measures of Light and Heavy Extractable Petroleum Hydrocarbons in water. Results are calculated by subtraction of applicable PAH concentrations from EPH10-19 and EPH19-32, as per the BC Lab Manual LEPH/HEPH calculation procedure.
LEPHw = EPH10-19 minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene.
HEPH = EPH19-32 minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

N-T-COL-VA	Water	Total Nitrogen in water by Colour	APHA4500-P(J)/NEMI9171/USGS03-4174

This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.

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.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PAH-ME-MS-VA	Water	PAHs in Water	EPA 3511/8270D (mod)

PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

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.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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.

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. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	BC Env. Lab Manual (VH in Water)

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	BC Env. Lab Manual (VH in Solids)
VOC-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA 5021A/8260C

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

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA 5021A/8260C

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	EPA 5035A/5021A/8260C
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE VPH

VPHw measures Volatile Petroleum Hydrocarbons in water. Results are calculated by subtraction of specific Monocyclic Aromatic Hydrocarbons from VH6-10, as per the BC Lab Manual VPH calculation procedure.
VPHw = VH6-10 minus Benzene, Toluene, Ethylbenzene, Xylenes, and Styrene

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:

17-667964

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Morrison Hershfield Limited
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7
Contact: Cynthia Jones

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-VA	**Water**							
Batch R4097824								
WG2804864-3 CRM		**VA-ALK-TITR-CONTROL**						
Alkalinity, Total (as CaCO3)			100.7		%		85-115	25-JUN-18
WG2804864-5 DUP		**L2116893-10**						
Alkalinity, Total (as CaCO3)		112	112		mg/L	0.4	20	25-JUN-18
WG2804864-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-JUN-18
Batch R4114949								
WG2804769-3 CRM		**VA-ALK-TITR-CONTROL**						
Alkalinity, Total (as CaCO3)			99.9		%		85-115	06-JUL-18
WG2804769-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-JUL-18
BR-L-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-3 DUP		**L2116893-1**						
Bromide (Br)		<0.25	<0.25	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804444-2 LCS								
Bromide (Br)			95.0		%		85-115	22-JUN-18
WG2804838-2 LCS								
Bromide (Br)			95.4		%		85-115	22-JUN-18
WG2804444-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	22-JUN-18
WG2804838-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	22-JUN-18
WG2804838-4 MS		**L2116893-2**						
Bromide (Br)			99.8		%		75-125	22-JUN-18
CL-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-3 DUP		**L2116893-1**						
Chloride (Cl)		138	137		mg/L	0.5	20	22-JUN-18
WG2804444-2 LCS								
Chloride (Cl)			96.2		%		90-110	22-JUN-18
WG2804838-2 LCS								
Chloride (Cl)			96.3		%		90-110	22-JUN-18
WG2804444-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUN-18
WG2804838-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUN-18
WG2804838-4 MS		**L2116893-2**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-4 MS		**L2116893-2**						
Chloride (Cl)			98.7		%		75-125	22-JUN-18
COD-COL-VA	**Water**							
Batch R4100313								
WG2808773-2 DUP		**L2116893-8**						
COD		<20	<20	RPD-NA	mg/L	N/A	20	27-JUN-18
WG2808773-3 LCS								
COD			98.4		%		85-115	27-JUN-18
WG2808773-1 MB								
COD			<20		mg/L		20	27-JUN-18
EC-PCT-VA	**Water**							
Batch R4097824								
WG2804864-4 CRM		**VA-EC-PCT-CONTROL**						
Conductivity			101.8		%		90-110	25-JUN-18
WG2804864-5 DUP		**L2116893-10**						
Conductivity		796	794		uS/cm	0.3	10	25-JUN-18
WG2804864-1 MB								
Conductivity			<2.0		uS/cm		2	25-JUN-18
Batch R4114949								
WG2804769-4 CRM		**VA-EC-PCT-CONTROL**						
Conductivity			97.5		%		90-110	06-JUL-18
WG2804769-1 MB								
Conductivity			<2.0		uS/cm		2	06-JUL-18
EPH-ME-FID-VA	**Water**							
Batch R4101700								
WG2807915-2 LCS								
EPH10-19			92.8		%		70-130	28-JUN-18
EPH19-32			99.0		%		70-130	28-JUN-18
WG2808226-2 LCS								
EPH10-19			87.8		%		70-130	29-JUN-18
EPH19-32			90.4		%		70-130	29-JUN-18
WG2807915-1 MB								
EPH10-19			<0.25		mg/L		0.25	28-JUN-18
EPH19-32			<0.25		mg/L		0.25	28-JUN-18
Surrogate: 2-Bromobenzotrifluoride			78.3		%		60-140	28-JUN-18
WG2808226-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EPH-ME-FID-VA	**Water**							
Batch R4101700								
WG2808226-1 MB								
EPH10-19			<0.25		mg/L		0.25	29-JUN-18
EPH19-32			<0.25		mg/L		0.25	29-JUN-18
Surrogate: 2-Bromobenzotrifluoride			87.6		%		60-140	29-JUN-18
F-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-3 DUP		**L2116893-1**						
Fluoride (F)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804444-2 LCS								
Fluoride (F)			99.0		%		90-110	22-JUN-18
WG2804838-2 LCS								
Fluoride (F)			99.4		%		90-110	22-JUN-18
WG2804444-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUN-18
WG2804838-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUN-18
WG2804838-4 MS		**L2116893-2**						
Fluoride (F)			100.1		%		75-125	22-JUN-18
HG-D-CVAA-VA	**Water**							
Batch R4096679								
WG2805235-6 LCS								
Mercury (Hg)-Dissolved			102.5		%		80-120	25-JUN-18
WG2805235-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	25-JUN-18
Batch R4101090								
WG2805235-7 DUP		**L2116893-2**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	28-JUN-18
WG2805235-8 MS		**L2116893-1**						
Mercury (Hg)-Dissolved			88.3		%		70-130	28-JUN-18
HG-T-CVAA-VA	**Water**							
Batch R4102828								
WG2810350-2 LCS								
Mercury (Hg)-Total			99.4		%		80-120	29-JUN-18
WG2810350-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	29-JUN-18
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4103327								
WG2805462-2 LCS								
Aluminum (Al)-Dissolved			96.9		%		80-120	28-JUN-18
Antimony (Sb)-Dissolved			97.7		%		80-120	28-JUN-18
Arsenic (As)-Dissolved			96.8		%		80-120	28-JUN-18
Barium (Ba)-Dissolved			98.5		%		80-120	28-JUN-18
Beryllium (Be)-Dissolved			95.8		%		80-120	28-JUN-18
Bismuth (Bi)-Dissolved			102.6		%		80-120	28-JUN-18
Boron (B)-Dissolved			92.6		%		80-120	28-JUN-18
Cadmium (Cd)-Dissolved			95.4		%		80-120	28-JUN-18
Calcium (Ca)-Dissolved			93.4		%		80-120	28-JUN-18
Cesium (Cs)-Dissolved			98.9		%		80-120	28-JUN-18
Chromium (Cr)-Dissolved			93.3		%		80-120	28-JUN-18
Cobalt (Co)-Dissolved			96.2		%		80-120	28-JUN-18
Copper (Cu)-Dissolved			96.7		%		80-120	28-JUN-18
Iron (Fe)-Dissolved			94.9		%		80-120	28-JUN-18
Lead (Pb)-Dissolved			101.0		%		80-120	28-JUN-18
Lithium (Li)-Dissolved			98.9		%		80-120	28-JUN-18
Magnesium (Mg)-Dissolved			100.5		%		80-120	28-JUN-18
Manganese (Mn)-Dissolved			93.7		%		80-120	28-JUN-18
Molybdenum (Mo)-Dissolved			97.1		%		80-120	28-JUN-18
Nickel (Ni)-Dissolved			98.6		%		80-120	28-JUN-18
Phosphorus (P)-Dissolved			103.0		%		80-120	28-JUN-18
Potassium (K)-Dissolved			102.8		%		80-120	28-JUN-18
Rubidium (Rb)-Dissolved			98.9		%		80-120	28-JUN-18
Selenium (Se)-Dissolved			98.3		%		80-120	28-JUN-18
Silicon (Si)-Dissolved			99.6		%		80-120	28-JUN-18
Silver (Ag)-Dissolved			93.7		%		80-120	28-JUN-18
Sodium (Na)-Dissolved			98.9		%		80-120	28-JUN-18
Strontium (Sr)-Dissolved			98.2		%		80-120	28-JUN-18
Sulfur (S)-Dissolved			74.4	MES	%		80-120	28-JUN-18
Tellurium (Te)-Dissolved			93.3		%		80-120	28-JUN-18
Thallium (Tl)-Dissolved			102.3		%		80-120	28-JUN-18
Thorium (Th)-Dissolved			92.9		%		80-120	28-JUN-18
Tin (Sn)-Dissolved			92.3		%		80-120	28-JUN-18
Titanium (Ti)-Dissolved			94.0		%		80-120	28-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4103327								
WG2805462-2 LCS								
Tungsten (W)-Dissolved			100.5		%		80-120	28-JUN-18
Uranium (U)-Dissolved			98.2		%		80-120	28-JUN-18
Vanadium (V)-Dissolved			99.4		%		80-120	28-JUN-18
Zinc (Zn)-Dissolved			90.9		%		80-120	28-JUN-18
Zirconium (Zr)-Dissolved			95.4		%		80-120	28-JUN-18
WG2805462-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-JUN-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-JUN-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	28-JUN-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-JUN-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-JUN-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-JUN-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R4103327								
WG2805462-1 MB		**NP**						
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	28-JUN-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-JUN-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-JUN-18
Zirconium (Zr)-Dissolved			<0.000060		mg/L		0.00006	28-JUN-18
MET-T-CCMS-VA	**Water**							
Batch R4110521								
WG2807914-2 LCS								
Aluminum (Al)-Total			99.3		%		80-120	29-JUN-18
Antimony (Sb)-Total			103.6		%		80-120	29-JUN-18
Arsenic (As)-Total			101.0		%		80-120	29-JUN-18
Barium (Ba)-Total			107.9		%		80-120	29-JUN-18
Beryllium (Be)-Total			89.4		%		80-120	29-JUN-18
Bismuth (Bi)-Total			98.6		%		80-120	29-JUN-18
Boron (B)-Total			90.0		%		80-120	29-JUN-18
Cadmium (Cd)-Total			104.5		%		80-120	29-JUN-18
Calcium (Ca)-Total			95.6		%		80-120	29-JUN-18
Cesium (Cs)-Total			99.4		%		80-120	29-JUN-18
Chromium (Cr)-Total			90.3		%		80-120	29-JUN-18
Cobalt (Co)-Total			98.3		%		80-120	29-JUN-18
Copper (Cu)-Total			96.6		%		80-120	29-JUN-18
Iron (Fe)-Total			96.6		%		80-120	29-JUN-18
Lead (Pb)-Total			98.7		%		80-120	29-JUN-18
Lithium (Li)-Total			90.1		%		80-120	29-JUN-18
Magnesium (Mg)-Total			98.5		%		80-120	29-JUN-18
Manganese (Mn)-Total			101.8		%		80-120	29-JUN-18
Molybdenum (Mo)-Total			99.9		%		80-120	29-JUN-18
Nickel (Ni)-Total			97.4		%		80-120	29-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4110521								
WG2807914-2 LCS								
Phosphorus (P)-Total			98.7		%		80-120	29-JUN-18
Potassium (K)-Total			104.3		%		80-120	29-JUN-18
Rubidium (Rb)-Total			104.7		%		80-120	29-JUN-18
Selenium (Se)-Total			98.3		%		80-120	29-JUN-18
Silicon (Si)-Total			100.6		%		80-120	29-JUN-18
Silver (Ag)-Total			98.6		%		80-120	29-JUN-18
Sodium (Na)-Total			98.3		%		80-120	29-JUN-18
Strontium (Sr)-Total			99.1		%		80-120	29-JUN-18
Sulfur (S)-Total			99.7		%		80-120	29-JUN-18
Tellurium (Te)-Total			104.7		%		80-120	29-JUN-18
Thallium (Tl)-Total			98.0		%		80-120	29-JUN-18
Thorium (Th)-Total			95.5		%		80-120	29-JUN-18
Tin (Sn)-Total			100.4		%		80-120	29-JUN-18
Titanium (Ti)-Total			94.6		%		80-120	29-JUN-18
Tungsten (W)-Total			100.3		%		80-120	29-JUN-18
Uranium (U)-Total			99.9		%		80-120	29-JUN-18
Vanadium (V)-Total			99.9		%		80-120	29-JUN-18
Zinc (Zn)-Total			96.6		%		80-120	29-JUN-18
Zirconium (Zr)-Total			95.5		%		80-120	29-JUN-18
WG2807914-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	29-JUN-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	29-JUN-18
Boron (B)-Total			<0.010		mg/L		0.01	29-JUN-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	29-JUN-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	29-JUN-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	29-JUN-18
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Copper (Cu)-Total			<0.00050		mg/L		0.0005	29-JUN-18
Iron (Fe)-Total			<0.010		mg/L		0.01	29-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R4110521								
WG2807914-1 MB								
Lead (Pb)-Total			<0.000050		mg/L		0.00005	29-JUN-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	29-JUN-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	29-JUN-18
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	29-JUN-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	29-JUN-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	29-JUN-18
Potassium (K)-Total			<0.050		mg/L		0.05	29-JUN-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	29-JUN-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	29-JUN-18
Silicon (Si)-Total			<0.10		mg/L		0.1	29-JUN-18
Silver (Ag)-Total			<0.000010		mg/L		0.00001	29-JUN-18
Sodium (Na)-Total			<0.050		mg/L		0.05	29-JUN-18
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	29-JUN-18
Sulfur (S)-Total			<0.50		mg/L		0.5	29-JUN-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	29-JUN-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	29-JUN-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	29-JUN-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	29-JUN-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	29-JUN-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	29-JUN-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	29-JUN-18
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	29-JUN-18
N-T-COL-VA	**Water**							
Batch R4104568								
WG2809678-15 DUP		**L2116893-7**						
Total Nitrogen		2.73	2.72		mg/L	0.4	20	29-JUN-18
WG2809678-10 LCS								
Total Nitrogen			101.4		%		75-125	29-JUN-18
WG2809678-14 LCS								
Total Nitrogen			100.9		%		75-125	29-JUN-18
WG2809678-18 LCS								
Total Nitrogen			98.0		%		75-125	29-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N-T-COL-VA	**Water**							
Batch R4104568								
WG2809678-2 LCS								
Total Nitrogen			99.0		%		75-125	29-JUN-18
WG2809678-22 LCS								
Total Nitrogen			97.7		%		75-125	29-JUN-18
WG2809678-6 LCS								
Total Nitrogen			105.0		%		75-125	29-JUN-18
WG2809678-1 MB								
Total Nitrogen			<0.030		mg/L		0.03	29-JUN-18
WG2809678-13 MB								
Total Nitrogen			<0.030		mg/L		0.03	29-JUN-18
WG2809678-21 MB								
Total Nitrogen			<0.030		mg/L		0.03	29-JUN-18
WG2809678-5 MB								
Total Nitrogen			<0.030		mg/L		0.03	29-JUN-18
WG2809678-9 MB								
Total Nitrogen			<0.030		mg/L		0.03	29-JUN-18
WG2809678-16 MS		**L2116893-8**						
Total Nitrogen			95.6		%		70-130	29-JUN-18
NH3-F-VA	**Water**							
Batch R4110637								
WG2812363-6 LCS								
Ammonia, Total (as N)			100.3		%		85-115	03-JUL-18
WG2812363-5 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	03-JUL-18
NO2-L-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-3 DUP		**L2116893-1**						
Nitrite (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804444-2 LCS								
Nitrite (as N)			97.8		%		90-110	22-JUN-18
WG2804838-2 LCS								
Nitrite (as N)			97.6		%		90-110	22-JUN-18
WG2804444-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	22-JUN-18
WG2804838-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	22-JUN-18
WG2804838-4 MS		**L2116893-2**						
Nitrite (as N)			98.1		%		75-125	22-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-3 DUP		**L2116893-1**						
Nitrate (as N)		0.507	0.505		mg/L	0.3	20	22-JUN-18
WG2804444-2 LCS								
Nitrate (as N)			97.3		%		90-110	22-JUN-18
WG2804838-2 LCS								
Nitrate (as N)			97.1		%		90-110	22-JUN-18
WG2804444-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	22-JUN-18
WG2804838-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	22-JUN-18
WG2804838-4 MS		**L2116893-2**						
Nitrate (as N)			99.5		%		75-125	22-JUN-18
P-T-PRES-COL-VA	**Water**							
Batch R4107076								
WG2811282-10 CRM		**VA-ERA-PO4**						
Phosphorus (P)-Total			93.1		%		80-120	30-JUN-18
WG2811282-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	30-JUN-18
Batch R4109808								
WG2811663-2 CRM		**VA-ERA-PO4**						
Phosphorus (P)-Total			111.2		%		80-120	03-JUL-18
WG2811663-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	03-JUL-18
PAH-ME-MS-VA	**Water**							
Batch R4103909								
WG2807915-2 LCS								
Acenaphthene			84.9		%		60-130	29-JUN-18
Acenaphthylene			84.9		%		60-130	29-JUN-18
Acridine			75.1		%		60-130	29-JUN-18
Anthracene			86.3		%		60-130	29-JUN-18
Benz(a)anthracene			83.1		%		60-130	29-JUN-18
Benzo(a)pyrene			83.5		%		60-130	29-JUN-18
Benzo(b&j)fluoranthene			73.0		%		60-130	29-JUN-18
Benzo(g,h,i)perylene			82.7		%		60-130	29-JUN-18
Benzo(k)fluoranthene			79.4		%		60-130	29-JUN-18
Chrysene			87.0		%		60-130	29-JUN-18
Dibenz(a,h)anthracene			83.3		%		60-130	29-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ME-MS-VA	**Water**							
Batch R4103909								
WG2807915-2 LCS								
Fluoranthene			84.9		%		60-130	29-JUN-18
Fluorene			84.8		%		60-130	29-JUN-18
Indeno(1,2,3-c,d)pyrene			89.1		%		60-130	29-JUN-18
1-Methylnaphthalene			79.6		%		60-130	29-JUN-18
2-Methylnaphthalene			80.0		%		60-130	29-JUN-18
Naphthalene			79.0		%		50-130	29-JUN-18
Phenanthrene			86.2		%		60-130	29-JUN-18
Pyrene			86.0		%		60-130	29-JUN-18
Quinoline			76.5		%		60-130	29-JUN-18
WG2808226-2 LCS								
Acenaphthene			78.7		%		60-130	30-JUN-18
Acenaphthylene			80.5		%		60-130	30-JUN-18
Acridine			77.4		%		60-130	30-JUN-18
Anthracene			83.4		%		60-130	30-JUN-18
Benz(a)anthracene			84.6		%		60-130	30-JUN-18
Benzo(a)pyrene			78.4		%		60-130	30-JUN-18
Benzo(b&j)fluoranthene			69.6		%		60-130	30-JUN-18
Benzo(g,h,i)perylene			92.6		%		60-130	30-JUN-18
Benzo(k)fluoranthene			78.5		%		60-130	30-JUN-18
Chrysene			91.3		%		60-130	30-JUN-18
Dibenz(a,h)anthracene			94.9		%		60-130	30-JUN-18
Fluoranthene			85.2		%		60-130	30-JUN-18
Fluorene			79.7		%		60-130	30-JUN-18
Indeno(1,2,3-c,d)pyrene			97.5		%		60-130	30-JUN-18
1-Methylnaphthalene			71.3		%		60-130	30-JUN-18
2-Methylnaphthalene			70.7		%		60-130	30-JUN-18
Naphthalene			70.2		%		50-130	30-JUN-18
Phenanthrene			84.6		%		60-130	30-JUN-18
Pyrene			86.2		%		60-130	30-JUN-18
Quinoline			67.4		%		60-130	30-JUN-18
WG2807915-1 MB								
Acenaphthene			<0.000010		mg/L		0.00001	29-JUN-18
Acenaphthylene			<0.000010		mg/L		0.00001	29-JUN-18
Acridine			<0.000010		mg/L		0.00001	29-JUN-18
Anthracene			<0.000010		mg/L		0.00001	29-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ME-MS-VA	**Water**							
Batch R4103909								
WG2807915-1 MB								
Benz(a)anthracene			<0.000010		mg/L		0.00001	29-JUN-18
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	29-JUN-18
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	29-JUN-18
Benzo(g,h,i)perylene			<0.000010		mg/L		0.00001	29-JUN-18
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	29-JUN-18
Chrysene			<0.000010		mg/L		0.00001	29-JUN-18
Dibenz(a,h)anthracene			<0.000005C		mg/L		0.000005	29-JUN-18
Fluoranthene			<0.000010		mg/L		0.00001	29-JUN-18
Fluorene			<0.000010		mg/L		0.00001	29-JUN-18
Indeno(1,2,3-c,d)pyrene			<0.000010		mg/L		0.00001	29-JUN-18
1-Methylnaphthalene			<0.000050		mg/L		0.00005	29-JUN-18
2-Methylnaphthalene			<0.000050		mg/L		0.00005	29-JUN-18
Naphthalene			<0.000050		mg/L		0.00005	29-JUN-18
Phenanthrene			<0.000020		mg/L		0.00002	29-JUN-18
Pyrene			<0.000010		mg/L		0.00001	29-JUN-18
Quinoline			<0.000050		mg/L		0.00005	29-JUN-18
Surrogate: Acridine d9			76.7		%		60-130	29-JUN-18
Surrogate: Chrysene d12			69.3		%		60-130	29-JUN-18
Surrogate: Naphthalene d8			85.4		%		50-130	29-JUN-18
Surrogate: Phenanthrene d10			93.1		%		60-130	29-JUN-18
WG2808226-1 MB								
Acenaphthene			<0.000010		mg/L		0.00001	30-JUN-18
Acenaphthylene			<0.000010		mg/L		0.00001	30-JUN-18
Acridine			<0.000010		mg/L		0.00001	30-JUN-18
Anthracene			<0.000010		mg/L		0.00001	30-JUN-18
Benz(a)anthracene			<0.000010		mg/L		0.00001	30-JUN-18
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	30-JUN-18
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	30-JUN-18
Benzo(g,h,i)perylene			<0.000010		mg/L		0.00001	30-JUN-18
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	30-JUN-18
Chrysene			<0.000010		mg/L		0.00001	30-JUN-18
Dibenz(a,h)anthracene			<0.000005C		mg/L		0.000005	30-JUN-18
Fluoranthene			<0.000010		mg/L		0.00001	30-JUN-18
Fluorene			<0.000010		mg/L		0.00001	30-JUN-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-ME-MS-VA	**Water**							
Batch R4103909								
WG2808226-1 MB								
Indeno(1,2,3-c,d)pyrene			<0.000010		mg/L		0.00001	30-JUN-18
1-Methylnaphthalene			<0.000050		mg/L		0.00005	30-JUN-18
2-Methylnaphthalene			<0.000050		mg/L		0.00005	30-JUN-18
Naphthalene			<0.000050		mg/L		0.00005	30-JUN-18
Phenanthrene			<0.000020		mg/L		0.00002	30-JUN-18
Pyrene			<0.000010		mg/L		0.00001	30-JUN-18
Quinoline			<0.000050		mg/L		0.00005	30-JUN-18
Surrogate: Acridine d9			91.0		%		60-130	30-JUN-18
Surrogate: Chrysene d12			78.4		%		60-130	30-JUN-18
Surrogate: Naphthalene d8			92.8		%		50-130	30-JUN-18
Surrogate: Phenanthrene d10			97.1		%		60-130	30-JUN-18
PH-PCT-VA	**Water**							
Batch R4097824								
WG2804864-2 CRM		**VA-PH7-BUF**						
pH			6.99		pH		6.9-7.1	25-JUN-18
WG2804864-5 DUP		**L2116893-10**						
pH		7.89	7.72	J	pH	0.17	0.3	25-JUN-18
Batch R4114949								
WG2804769-2 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	06-JUL-18
SO4-IC-N-VA	**Water**							
Batch R4096549								
WG2804838-3 DUP		**L2116893-1**						
Sulfate (SO4)		102	102		mg/L	0.1	20	22-JUN-18
WG2804444-2 LCS								
Sulfate (SO4)			97.8		%		90-110	22-JUN-18
WG2804838-2 LCS								
Sulfate (SO4)			97.9		%		90-110	22-JUN-18
WG2804444-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUN-18
WG2804838-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUN-18
WG2804838-4 MS		**L2116893-2**						
Sulfate (SO4)			97.4		%		75-125	22-JUN-18
TKN-F-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-F-VA	**Water**							
Batch R4113168								
WG2813982-7 DUP		**L2116893-5**						
Total Kjeldahl Nitrogen		0.582	0.591		mg/L	1.7	20	05-JUL-18
WG2813982-6 LCS								
Total Kjeldahl Nitrogen			103.6		%		75-125	05-JUL-18
WG2813982-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-JUL-18
WG2813982-8 MS		**L2116893-6**						
Total Kjeldahl Nitrogen			104.2		%		70-130	05-JUL-18
TSS-VA	**Water**							
Batch R4100268								
WG2808039-6 DUP		**L2116893-1**						
Total Suspended Solids		233	236		mg/L	1.5	20	27-JUN-18
WG2808039-5 LCS								
Total Suspended Solids			95.2		%		85-115	27-JUN-18
WG2808039-4 MB								
Total Suspended Solids			<3.0		mg/L		3	27-JUN-18
Batch R4100728								
WG2808528-2 LCS								
Total Suspended Solids			95.0		%		85-115	27-JUN-18
WG2808528-1 MB								
Total Suspended Solids			<3.0		mg/L		3	27-JUN-18
VH-HSFID-VA	**Water**							
Batch R4100831								
WG2809913-2 LCS								
Volatile Hydrocarbons (VH6-10)			76.5		%		70-130	29-JUN-18
WG2809913-1 MB								
Volatile Hydrocarbons (VH6-10)			<0.10		mg/L		0.1	29-JUN-18
VOC-HSMS-VA	**Water**							
Batch R4100827								
WG2809913-2 LCS								
Bromodichloromethane			115.5		%		70-130	03-JUL-18
Bromoform			102.6		%		70-130	03-JUL-18
Carbon Tetrachloride			98.4		%		70-130	03-JUL-18
Chlorobenzene			105.6		%		70-130	03-JUL-18
Dibromochloromethane			129.6		%		70-130	03-JUL-18
Chloroethane			103.7		%		60-140	03-JUL-18
Chloroform			110.0		%		70-130	03-JUL-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-HSMS-VA	**Water**							
Batch R4100827								
WG2809913-2 LCS								
Chloromethane			132.0		%		60-140	03-JUL-18
1,2-Dichlorobenzene			95.0		%		70-130	03-JUL-18
1,3-Dichlorobenzene			78.4		%		70-130	03-JUL-18
1,4-Dichlorobenzene			81.0		%		70-130	03-JUL-18
1,1-Dichloroethane			112.0		%		70-130	03-JUL-18
1,2-Dichloroethane			106.5		%		70-130	03-JUL-18
1,1-Dichloroethylene			92.4		%		70-130	03-JUL-18
cis-1,2-Dichloroethylene			80.9		%		70-130	03-JUL-18
trans-1,2-Dichloroethylene			88.9		%		70-130	03-JUL-18
Dichloromethane			102.2		%		60-140	03-JUL-18
1,2-Dichloropropane			119.0		%		70-130	03-JUL-18
cis-1,3-Dichloropropylene			106.8		%		70-130	03-JUL-18
trans-1,3-Dichloropropylene			84.8		%		70-130	03-JUL-18
1,1,1,2-Tetrachloroethane			99.2		%		70-130	03-JUL-18
1,1,2,2-Tetrachloroethane			90.2		%		70-130	03-JUL-18
Tetrachloroethylene			90.2		%		70-130	03-JUL-18
1,1,1-Trichloroethane			122.4		%		70-130	03-JUL-18
1,1,2-Trichloroethane			88.0		%		70-130	03-JUL-18
Trichloroethylene			99.5		%		70-130	03-JUL-18
Trichlorofluoromethane			127.3		%		60-140	03-JUL-18
Vinyl Chloride			119.8		%		60-140	03-JUL-18
WG2809913-1 MB								
Bromodichloromethane			<0.0010		mg/L		0.001	03-JUL-18
Bromoform			<0.0010		mg/L		0.001	03-JUL-18
Carbon Tetrachloride			<0.00050		mg/L		0.0005	03-JUL-18
Chlorobenzene			<0.0010		mg/L		0.001	03-JUL-18
Dibromochloromethane			<0.0010		mg/L		0.001	03-JUL-18
Chloroethane			<0.0010		mg/L		0.001	03-JUL-18
Chloroform			<0.0010		mg/L		0.001	03-JUL-18
Chloromethane			<0.0050		mg/L		0.005	03-JUL-18
1,2-Dichlorobenzene			<0.00050		mg/L		0.0005	03-JUL-18
1,3-Dichlorobenzene			<0.0010		mg/L		0.001	03-JUL-18
1,4-Dichlorobenzene			<0.0010		mg/L		0.001	03-JUL-18
1,1-Dichloroethane			<0.0010		mg/L		0.001	03-JUL-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-HSMS-VA	**Water**							
Batch R4100827								
WG2809913-1 MB								
1,2-Dichloroethane			<0.0010		mg/L		0.001	03-JUL-18
1,1-Dichloroethylene			<0.0010		mg/L		0.001	03-JUL-18
cis-1,2-Dichloroethylene			<0.0010		mg/L		0.001	03-JUL-18
trans-1,2-Dichloroethylene			<0.0010		mg/L		0.001	03-JUL-18
Dichloromethane			<0.0050		mg/L		0.005	03-JUL-18
1,2-Dichloropropane			<0.0010		mg/L		0.001	03-JUL-18
cis-1,3-Dichloropropylene			<0.00050		mg/L		0.0005	03-JUL-18
trans-1,3-Dichloropropylene			<0.00050		mg/L		0.0005	03-JUL-18
1,1,1,2-Tetrachloroethane			<0.0010		mg/L		0.001	03-JUL-18
1,1,2,2-Tetrachloroethane			<0.00020		mg/L		0.0002	03-JUL-18
Tetrachloroethylene			<0.0010		mg/L		0.001	03-JUL-18
1,1,1-Trichloroethane			<0.0010		mg/L		0.001	03-JUL-18
1,1,2-Trichloroethane			<0.00050		mg/L		0.0005	03-JUL-18
Trichloroethylene			<0.0010		mg/L		0.001	03-JUL-18
Trichlorofluoromethane			<0.0010		mg/L		0.001	03-JUL-18
Vinyl Chloride			<0.00040		mg/L		0.0004	03-JUL-18
VOC7-HSMS-VA	**Water**							
Batch R4100827								
WG2809913-2 LCS								
Benzene			100.3		%		70-130	03-JUL-18
Ethylbenzene			108.7		%		70-130	03-JUL-18
Methyl t-butyl ether (MTBE)			99.7		%		70-130	03-JUL-18
Styrene			101.2		%		70-130	03-JUL-18
Toluene			95.6		%		70-130	03-JUL-18
meta- & para-Xylene			100.2		%		70-130	03-JUL-18
ortho-Xylene			104.5		%		70-130	03-JUL-18
WG2809913-1 MB								
Benzene			<0.00050		mg/L		0.0005	03-JUL-18
Ethylbenzene			<0.00050		mg/L		0.0005	03-JUL-18
Methyl t-butyl ether (MTBE)			<0.00050		mg/L		0.0005	03-JUL-18
Styrene			<0.00050		mg/L		0.0005	03-JUL-18
Toluene			<0.00045		mg/L		0.00045	03-JUL-18
meta- & para-Xylene			<0.00050		mg/L		0.0005	03-JUL-18
ortho-Xylene			<0.00050		mg/L		0.0005	03-JUL-18

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter (Automated)							
	1	20-JUN-18 07:25	06-JUL-18 13:47	0.25	390	hours	EHTR-FM
	2	20-JUN-18 08:15	06-JUL-18 13:47	0.25	390	hours	EHTR-FM
	3	20-JUN-18 09:20	06-JUL-18 13:47	0.25	389	hours	EHTR-FM
	4	20-JUN-18 09:45	06-JUL-18 13:47	0.25	388	hours	EHTR-FM
	5	20-JUN-18 10:10	06-JUL-18 13:47	0.25	388	hours	EHTR-FM
	6	20-JUN-18 10:55	06-JUL-18 13:47	0.25	387	hours	EHTR-FM
	7	20-JUN-18 11:25	06-JUL-18 13:57	0.25	387	hours	EHTR-FM
	8	20-JUN-18 11:35	06-JUL-18 13:57	0.25	386	hours	EHTR-FM
	9	20-JUN-18 12:15	06-JUL-18 13:57	0.25	386	hours	EHTR-FM
	10	20-JUN-18 12:30	25-JUN-18 16:44	0.25	124	hours	EHTR-FM
Anions and Nutrients							
Alkalinity Species by Titration							
	1	20-JUN-18 07:25	06-JUL-18 13:47	14	16	days	EHT
	2	20-JUN-18 08:15	06-JUL-18 13:47	14	16	days	EHT
	3	20-JUN-18 09:20	06-JUL-18 13:47	14	16	days	EHT
	4	20-JUN-18 09:45	06-JUL-18 13:47	14	16	days	EHT
	5	20-JUN-18 10:10	06-JUL-18 13:47	14	16	days	EHT
	6	20-JUN-18 10:55	06-JUL-18 13:47	14	16	days	EHT
	7	20-JUN-18 11:25	06-JUL-18 13:57	14	16	days	EHT
	8	20-JUN-18 11:35	06-JUL-18 13:57	14	16	days	EHT
	9	20-JUN-18 12:15	06-JUL-18 13:57	14	16	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2116893 were received on 21-JUN-18 15:10.

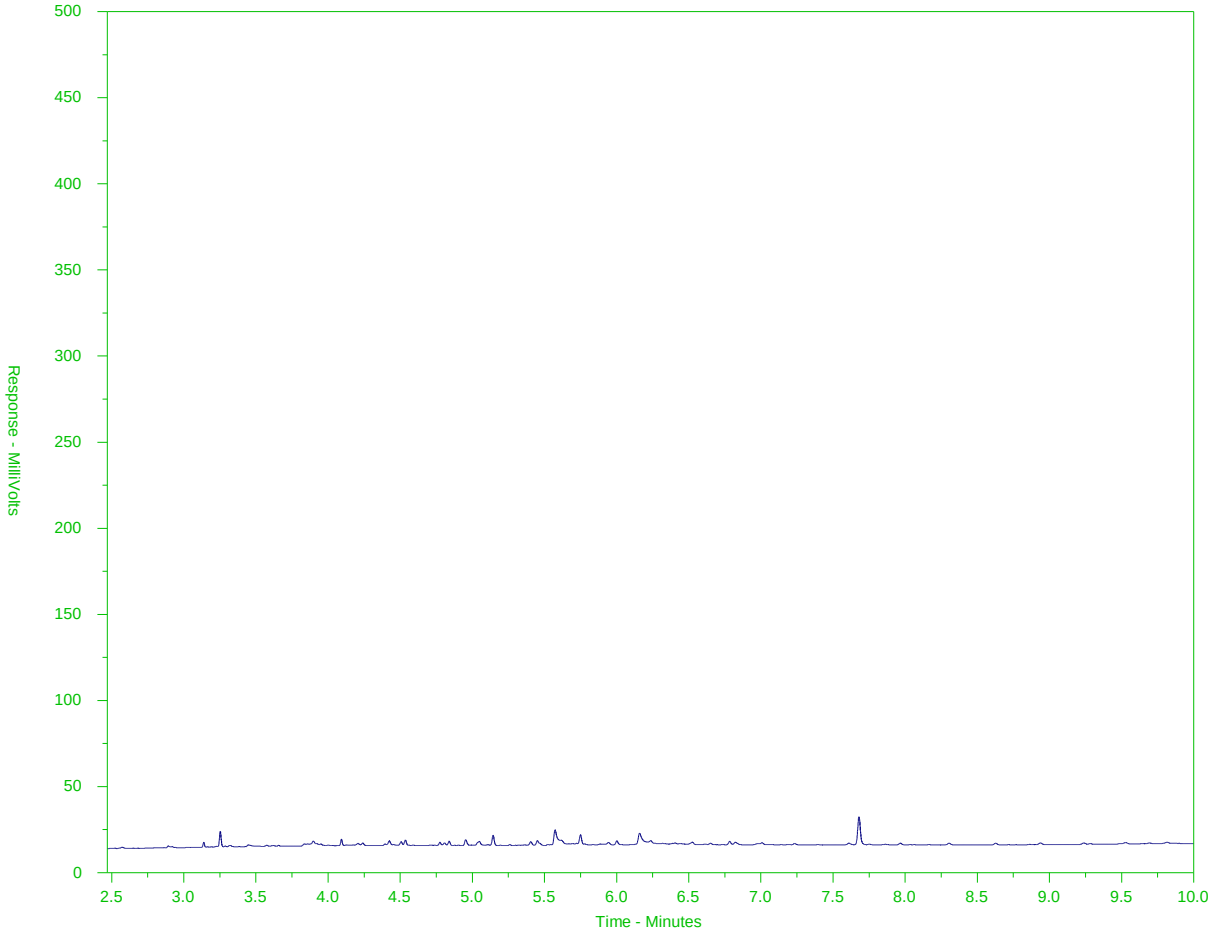
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2116893-9
Client Sample ID: GW-INT



← EPH10-19 →	← EPH19-32 →	
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

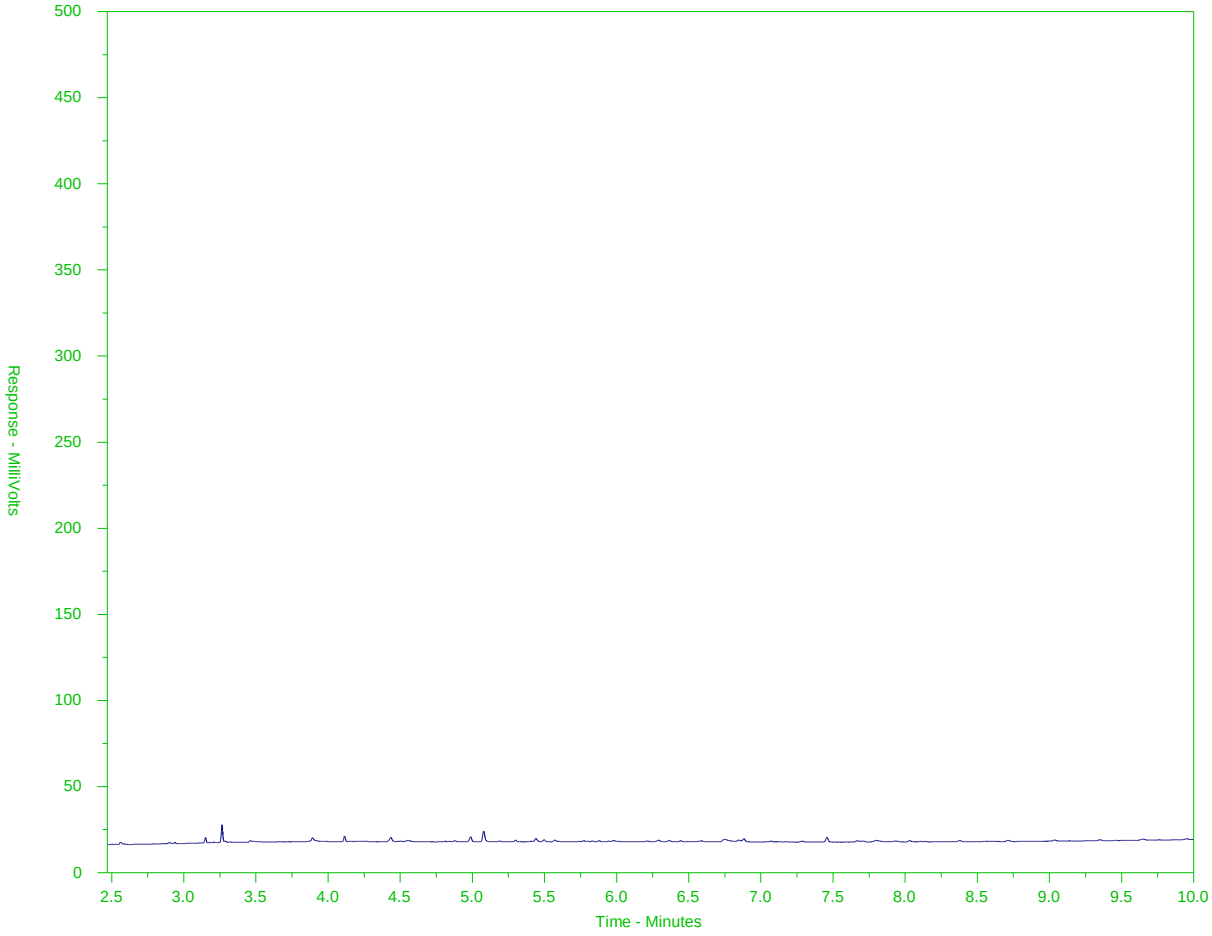
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2116893-10
Client Sample ID: DUP-GW



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

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

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2116893-COFC

COC Number: 17 - 667964

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Morrison Hershfield.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Cynthia Jones	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐
Phone:	604-454-0402.	☑ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E-100%] ☐ / Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	310 4321 Still Creek Rd.	Email 1 or Fax jgilson@morrisonhershfield.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	BC	Email 2 cajones@morrisonhershfield.com	
Postal Code:	V5C 6S7	Email 3	

Invoice To		Invoice Distribution	Analysis Request
	Same as Report To ☐ YES ☑ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☑ YES ☐ NO	Email 1 or Fax Atucker@whistler.ca	
Company:	~~Same as above~~ Resort Municipality of Whistler - Andrew Tucker	Email 2 ap@whistler.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q65605	AFE/Cost Center:	PO#:
Job #:	18001536	Major/Minor Code:	Routing Code:
PO / AFE:	723851	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact: C. Furginski	Sampler: C. Jones

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Nutrients, Anions + COD	Dissolved Metals + Mercury	Total Metals + Mercury	VOC	PAH, HEAT / LEPH / EPH	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	MW26	20-JUN-18	07:25	Water	X	X	X						4
	MW-4		08:15		X	X	X						4
	MW-2S		09:20		X	X	X						4
	MW-2D		09:45		X	X	X						4
	MW-3		10:10		X	X	X						4
	SFC-4B		10:55		X	X		X					4
	SFC-2B		11:25		X	X		X					4
	SFC-2		11:35		X	X		X					4
	GW-Int		12:15		X	X	X		X	X			8
	Dup-GW		12:30		X	X	X		X	X			8
	SFC-3		12:55					X					4
	SFC-11		13:00					X					4

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	2 coolers in shipment.
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☑ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
			2				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Cynthia Jones	Date: June 21/18	Time: 10:00	Received by:	Date:	Time:	Received by:	Date: 6/21	Time: 3:10p

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Morrison Hershfield Limited
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 26-SEP-18
Report Date: 11-OCT-18 17:52 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L2171141

Project P.O. #: 723851
Job Reference: MHG100-WHI500-VA
C of C Numbers: 17-669884
Legal Site Desc:

Carla Fuginski
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2171141-1 Water 25-SEP-18 11:30 MW-2D	L2171141-2 Water 25-SEP-18 11:30 MW-2S	L2171141-3 Water 25-SEP-18 12:30 MW-3	L2171141-4 Water 25-SEP-18 17:00 MW-4	L2171141-5 Water 25-SEP-18 10:30 MW-6
WATER						
Physical Tests	Conductivity (uS/cm)	910	282	232	200	513
	Hardness (as CaCO3) (mg/L)	383	115	69.3	86.4	89.5
	pH (pH)	6.82	7.52	6.47	6.67	6.51
	Total Suspended Solids (mg/L)	868	136	5.8	1350	303
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	233	75.6	26.1	63.0	32.6
	Ammonia, Total (as N) (mg/L)	11.4	2.95	0.654	1.21	0.0732
	Bromide (Br) (mg/L)	<0.25 DLDS	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	45.4	6.93	33.2	10.7	75.8
	Fluoride (F) (mg/L)	<0.10 DLDS	0.106	0.035	0.051	0.071
	Nitrate and Nitrite (as N) (mg/L)	<0.025	<0.0051	<0.0051	0.0688	0.608
	Nitrate (as N) (mg/L)	<0.025 DLDS	<0.0050	<0.0050	0.0653	0.608
	Nitrite (as N) (mg/L)	0.0077	<0.0010	<0.0010	0.0035	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	11.1	3.25	0.709	1.89	1.34
	Total Nitrogen (mg/L)	11.4	3.20	0.690	1.84	1.87
	Phosphorus (P)-Total (mg/L)	0.775	0.152	<0.0020	0.670	1.10
	Sulfate (SO4) (mg/L)	202	57.7	36.3	25.7	101
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)					
	Cesium (Cs)-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

Grouping	Analyte	L2171141-6 Water 25-SEP-18 14:30 SFC-2	L2171141-7 Water 25-SEP-18 14:30 SCF-2B	L2171141-8 Water 25-SEP-18 14:00 SFC3	L2171141-9 Water 25-SEP-18 12:30 SFC4B	L2171141-10 Water 25-SEP-18 14:00 SFC11
WATER						
Physical Tests	Conductivity (uS/cm)	373	1370	240	216	122
	Hardness (as CaCO3) (mg/L)	146 HTC	407 HTC	61.8 HTC	71.3 HTC	39.5 HTC
	pH (pH)	7.34	3.05	7.24	7.58	7.33
	Total Suspended Solids (mg/L)	4.6	30.2	<3.0	<3.0	<3.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	89.5	<1.0	35.6	40.6	30.1
	Ammonia, Total (as N) (mg/L)	0.239	2.47	0.115	0.102	0.0667
	Bromide (Br) (mg/L)	<0.050	<0.25 DLDS	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	18.9	13.3	26.4	19.5	8.57
	Fluoride (F) (mg/L)	0.056	1.09	0.061	0.057	0.050
	Nitrate and Nitrite (as N) (mg/L)	1.08	<0.025	0.445	0.478	0.464
	Nitrate (as N) (mg/L)	1.08	<0.025 DLDS	0.442	0.478	0.462
	Nitrite (as N) (mg/L)	0.0015	<0.0050 DLDS	0.0022	<0.0010	0.0017
	Total Kjeldahl Nitrogen (mg/L)	0.470	2.79	0.231	0.174	0.147
	Total Nitrogen (mg/L)	1.33	2.84	0.626	0.590	0.544
	Phosphorus (P)-Total (mg/L)	0.0060	0.0040	0.0213	0.0045	0.0082
	Sulfate (SO4) (mg/L)	71.8	716	38.6	33.8	15.4
Total Metals	Aluminum (Al)-Total (mg/L)	0.522	32.2	0.155	0.0896	0.175
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00022	0.00142	0.00012	<0.00010	0.00011
	Barium (Ba)-Total (mg/L)	0.0592	0.0357	0.0292	0.0174	0.0140
	Beryllium (Be)-Total (mg/L)	<0.00010	0.00092	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.024	0.027	<0.010	0.017	<0.010
	Cadmium (Cd)-Total (mg/L)	0.0000439	0.00109	0.0000554	0.0000078	0.0000179
	Calcium (Ca)-Total (mg/L)	50.8	109	20.5	24.1	12.4
	Cesium (Cs)-Total (mg/L)	0.000013	0.000163	<0.000010	<0.000010	<0.000010
	Chromium (Cr)-Total (mg/L)	0.00015	0.00313	0.00037	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)	0.00429	0.167	0.00228	0.00028	<0.00010
	Copper (Cu)-Total (mg/L)	0.00973	0.422	0.00704	0.00185	0.00154
	Iron (Fe)-Total (mg/L)	3.16	38.4	0.229	0.165	0.115
	Lead (Pb)-Total (mg/L)	<0.000050	0.000153	<0.000050	<0.000050	0.000064
	Lithium (Li)-Total (mg/L)	<0.0010	0.0116	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	4.73	32.6	2.55	2.74	2.05
	Manganese (Mn)-Total (mg/L)	0.646	7.61	0.0452	0.0961	0.00910
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.00545	0.000155	0.000806	0.000940	0.000244
	Nickel (Ni)-Total (mg/L)	0.00151	0.0733	0.00177	<0.00050	<0.00050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2171141-11	L2171141-12	L2171141-13		
Description	Water	Water	Water		
Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18		
Sampled Time	13:00	12:30			
Client ID	GW INT.	DUPLICATE - SFC-4B	L1		
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	541	214	727		
Hardness (as CaCO3) (mg/L)	180	71.0 HTC	384		
pH (pH)	6.37	7.55	6.65		
Total Suspended Solids (mg/L)	32.2	<3.0	5.0		
Anions and Nutrients					
Alkalinity, Total (as CaCO3) (mg/L)	109	35.6	110		
Ammonia, Total (as N) (mg/L)	1.10	0.0777	0.152		
Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLDS		
Chloride (Cl) (mg/L)	68.0	19.5	5.7		
Fluoride (F) (mg/L)	0.109	0.056	<0.10 DLDS		
Nitrate and Nitrite (as N) (mg/L)	<0.0051	0.471	21.9		
Nitrate (as N) (mg/L)	<0.0050	0.471	21.9		
Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0069		
Total Kjeldahl Nitrogen (mg/L)	1.20	0.189	1.27 TKNI		
Total Nitrogen (mg/L)	1.21	0.580	21.4		
Phosphorus (P)-Total (mg/L)	0.0022	0.0047	0.0459		
Sulfate (SO4) (mg/L)	65.2	33.8	192		
Total Metals					
Aluminum (Al)-Total (mg/L)		0.0904			
Antimony (Sb)-Total (mg/L)		<0.00010			
Arsenic (As)-Total (mg/L)		<0.00010			
Barium (Ba)-Total (mg/L)		0.0173			
Beryllium (Be)-Total (mg/L)		<0.00010			
Bismuth (Bi)-Total (mg/L)		<0.000050			
Boron (B)-Total (mg/L)		0.017			
Cadmium (Cd)-Total (mg/L)		0.0000073			
Calcium (Ca)-Total (mg/L)		23.9			
Cesium (Cs)-Total (mg/L)		<0.000010			
Chromium (Cr)-Total (mg/L)		<0.00010			
Cobalt (Co)-Total (mg/L)		0.00028			
Copper (Cu)-Total (mg/L)		0.00181			
Iron (Fe)-Total (mg/L)		0.163			
Lead (Pb)-Total (mg/L)		<0.000050			
Lithium (Li)-Total (mg/L)		<0.0010			
Magnesium (Mg)-Total (mg/L)		2.76			
Manganese (Mn)-Total (mg/L)		0.0951			
Mercury (Hg)-Total (mg/L)		<0.0000050			
Molybdenum (Mo)-Total (mg/L)		0.000897			
Nickel (Ni)-Total (mg/L)		<0.00050			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2171141-1 Water 25-SEP-18 11:30 MW-2D	L2171141-2 Water 25-SEP-18 11:30 MW-2S	L2171141-3 Water 25-SEP-18 12:30 MW-3	L2171141-4 Water 25-SEP-18 17:00 MW-4	L2171141-5 Water 25-SEP-18 10:30 MW-6
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Rubidium (Rb)-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)					
	Sulfur (S)-Total (mg/L)					
	Tellurium (Te)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Thorium (Th)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Tungsten (W)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-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)	0.0025	0.0068	0.0183	0.0117	0.0364
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.0142	0.00770	<0.00010	0.00477	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0354	0.0777	0.106	0.0962	0.0250
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.298	0.110	<0.010	0.033	0.018
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	0.000475	0.000215	0.0000949
	Calcium (Ca)-Dissolved (mg/L)	126	36.3	20.7	29.4	30.5
	Cesium (Cs)-Dissolved (mg/L)	0.000015	0.000015	0.000055	0.000036	0.000013
	Chromium (Cr)-Dissolved (mg/L)	0.00015	0.00024	0.00017	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.0122	0.00186	0.0156	0.0127	0.00040
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00315	0.00266	0.00350	0.00151
	Iron (Fe)-Dissolved (mg/L)	53.3	35.2	0.190	17.1	0.032
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000136	<0.000050	0.000071	<0.000050
	Lithium (Li)-Dissolved (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	L2171141-6 Water 25-SEP-18 14:30 SFC-2	L2171141-7 Water 25-SEP-18 14:30 SCF-2B	L2171141-8 Water 25-SEP-18 14:00 SFC3	L2171141-9 Water 25-SEP-18 12:30 SFC4B	L2171141-10 Water 25-SEP-18 14:00 SFC11
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	4.73	3.92	1.67	1.86	0.783
	Rubidium (Rb)-Total (mg/L)	0.00466	0.00775	0.00143	0.00173	0.00052
	Selenium (Se)-Total (mg/L)	0.000104	0.000095	0.000052	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	5.03	21.5	8.69	7.94	9.53
	Silver (Ag)-Total (mg/L)	<0.000020 DLB	<0.000020 DLB	<0.000010	<0.000010	<0.000020 DLB
	Sodium (Na)-Total (mg/L)	18.9	13.5	22.4	14.5	9.70
	Strontium (Sr)-Total (mg/L)	0.320	0.453	0.175	0.241	0.155
	Sulfur (S)-Total (mg/L)	26.7	276	14.3	12.3	5.49
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Thorium (Th)-Total (mg/L)	<0.00010	0.00281	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00115	0.00467	<0.00090 DLM	0.00140	0.00393
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)-Total (mg/L)	0.000132	0.00140	0.000041	0.000021	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00080
	Zinc (Zn)-Total (mg/L)	0.0084	0.147	0.0075	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.000060	0.000139	<0.000060	0.000091	0.000139
Dissolved Metals	Dissolved Mercury Filtration Location					
	Dissolved Metals Filtration Location					
	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Cesium (Cs)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2171141-11	L2171141-12	L2171141-13		
Description	Water	Water	Water		
Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18		
Sampled Time	13:00	12:30			
Client ID	GW INT.	DUPLICATE - SFC-4B	L1		
Grouping / **Analyte**					
WATER					
Total Metals					
Phosphorus (P)-Total (mg/L)		<0.050			
Potassium (K)-Total (mg/L)		1.84			
Rubidium (Rb)-Total (mg/L)		0.00179			
Selenium (Se)-Total (mg/L)		<0.000050			
Silicon (Si)-Total (mg/L)		7.71			
Silver (Ag)-Total (mg/L)		<0.000010			
Sodium (Na)-Total (mg/L)		14.5			
Strontium (Sr)-Total (mg/L)		0.242			
Sulfur (S)-Total (mg/L)		12.1			
Tellurium (Te)-Total (mg/L)		<0.00020			
Thallium (Tl)-Total (mg/L)		<0.000010			
Thorium (Th)-Total (mg/L)		<0.00010			
Tin (Sn)-Total (mg/L)		<0.00010			
Titanium (Ti)-Total (mg/L)		0.00159			
Tungsten (W)-Total (mg/L)		<0.00010			
Uranium (U)-Total (mg/L)		0.000021			
Vanadium (V)-Total (mg/L)		<0.00050			
Zinc (Zn)-Total (mg/L)		<0.0030			
Zirconium (Zr)-Total (mg/L)		0.000072			
Dissolved Metals					
Dissolved Mercury Filtration Location	FIELD		FIELD		
Dissolved Metals Filtration Location	FIELD		FIELD		
Aluminum (Al)-Dissolved (mg/L)	0.0212		0.0191		
Antimony (Sb)-Dissolved (mg/L)	<0.00010		0.00013		
Arsenic (As)-Dissolved (mg/L)	0.00034		0.00020		
Barium (Ba)-Dissolved (mg/L)	0.0633		0.0702		
Beryllium (Be)-Dissolved (mg/L)	<0.00010		<0.00010		
Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		
Boron (B)-Dissolved (mg/L)	0.132		0.050		
Cadmium (Cd)-Dissolved (mg/L)	0.0000246		0.0000994		
Calcium (Ca)-Dissolved (mg/L)	60.8		133		
Cesium (Cs)-Dissolved (mg/L)	<0.000010		<0.000010		
Chromium (Cr)-Dissolved (mg/L)	0.00019		0.00017		
Cobalt (Co)-Dissolved (mg/L)	0.00139		0.00182		
Copper (Cu)-Dissolved (mg/L)	0.00036		0.0192		
Iron (Fe)-Dissolved (mg/L)	18.1		0.051		
Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		
Lithium (Li)-Dissolved (mg/L)	<0.0010		<0.0010		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2171141-1 Water 25-SEP-18 11:30 MW-2D	L2171141-2 Water 25-SEP-18 11:30 MW-2S	L2171141-3 Water 25-SEP-18 12:30 MW-3	L2171141-4 Water 25-SEP-18 17:00 MW-4	L2171141-5 Water 25-SEP-18 10:30 MW-6
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	16.4	6.01	4.29	3.15	3.24
	Manganese (Mn)-Dissolved (mg/L)	4.06	1.80	4.05	1.31	0.106
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.0111	0.00380	0.000710	0.0116	0.000300
	Nickel (Ni)-Dissolved (mg/L)	0.00248	0.00051	0.00356	0.00271	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	0.089	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	20.9	7.43	4.10	3.90	3.03
	Rubidium (Rb)-Dissolved (mg/L)	0.0111	0.00438	0.0114	0.00332	0.00505
	Selenium (Se)-Dissolved (mg/L)	0.000091	0.000060	0.000064	<0.000050	0.000072
	Silicon (Si)-Dissolved (mg/L)	14.2	9.00	7.37	9.05	5.63
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLM	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	41.0	8.35	19.1	13.5	83.0
	Strontium (Sr)-Dissolved (mg/L)	0.517	0.186	0.184	0.172	0.349
	Sulfur (S)-Dissolved (mg/L)	66.8	20.4	13.3	8.87	37.0
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000086	0.000029	0.000033
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)-Dissolved (mg/L)	0.000152	0.000016	<0.000010	0.000089	0.000017
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0016	0.0042	0.0044	0.0073	0.0016
	Zirconium (Zr)-Dissolved (mg/L)	<0.000060	<0.000060	<0.000060	0.000076	<0.000060
Aggregate Organics	COD (mg/L)	37	<20	<20	34	46
Volatile Organic Compounds	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
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Chlorobenzene (mg/L)	0.0018	<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
	1,2-Dichlorobenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,3-Dichlorobenzene (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	L2171141-6	L2171141-7	L2171141-8	L2171141-9	L2171141-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18
	Sampled Time	14:30	14:30	14:00	12:30	14:00
	Client ID	SFC-2	SCF-2B	SFC3	SFC4B	SFC11
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Rubidium (Rb)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Sulfur (S)-Dissolved (mg/L)					
	Tellurium (Te)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Thorium (Th)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Tungsten (W)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					
	Zirconium (Zr)-Dissolved (mg/L)					
Aggregate Organics	COD (mg/L)	<20	<20	<20	<20	<20
Volatile Organic Compounds	Benzene (mg/L)					
	Bromodichloromethane (mg/L)					
	Bromoform (mg/L)					
	Carbon Tetrachloride (mg/L)					
	Chlorobenzene (mg/L)					
	Dibromochloromethane (mg/L)					
	Chloroethane (mg/L)					
	Chloroform (mg/L)					
	Chloromethane (mg/L)					
	1,2-Dichlorobenzene (mg/L)					
	1,3-Dichlorobenzene (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2171141-11	L2171141-12	L2171141-13		
	Description	Water	Water	Water		
	Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18		
	Sampled Time	13:00	12:30			
	Client ID	GW INT.	DUPLICATE - SFC-4B	L1		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	6.84		12.3		
	Manganese (Mn)-Dissolved (mg/L)	1.98		0.774		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050		<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000218		0.000464		
	Nickel (Ni)-Dissolved (mg/L)	0.00108		0.00241		
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050		
	Potassium (K)-Dissolved (mg/L)	6.18		4.90		
	Rubidium (Rb)-Dissolved (mg/L)	0.00429		0.00320		
	Selenium (Se)-Dissolved (mg/L)	<0.000050		0.000178		
	Silicon (Si)-Dissolved (mg/L)	8.17		11.0		
	Silver (Ag)-Dissolved (mg/L)	<0.000010		0.000011		
	Sodium (Na)-Dissolved (mg/L)	48.7		16.0		
	Strontium (Sr)-Dissolved (mg/L)	0.382		0.457		
	Sulfur (S)-Dissolved (mg/L)	22.4		67.0		
	Tellurium (Te)-Dissolved (mg/L)	<0.00020		<0.00020		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010		<0.000010		
	Thorium (Th)-Dissolved (mg/L)	<0.00010		<0.00010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010		0.00022		
	Titanium (Ti)-Dissolved (mg/L)	<0.00030		<0.00030		
	Tungsten (W)-Dissolved (mg/L)	<0.00010		<0.00010		
	Uranium (U)-Dissolved (mg/L)	<0.000010		0.000042		
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0573		0.0378		
	Zirconium (Zr)-Dissolved (mg/L)	0.000075		0.000104		
Aggregate Organics	COD (mg/L)	<20	<20	21		
Volatile Organic Compounds	Benzene (mg/L)	<0.00050		<0.00050		
	Bromodichloromethane (mg/L)	<0.0010		<0.0010		
	Bromoform (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		
	1,2-Dichlorobenzene (mg/L)	<0.00050		<0.00050		
	1,3-Dichlorobenzene (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	L2171141-1	L2171141-2	L2171141-3	L2171141-4	L2171141-5
Description	Water	Water	Water	Water	Water
Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18
Sampled Time	11:30	11:30	12:30	17:00	10:30
Client ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds 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
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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
trans-1,3-Dichloropropylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,3-Dichloropropene (cis & trans) (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 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)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene (mg/L)	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
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)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
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) (%)	94.0	96.7	97.8	98.0	96.9
Surrogate: 1,4-Difluorobenzene (SS) (%)	82.5	86.8	86.2	87.2	86.4
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	0.33
LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	0.33
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: 2-Bromobenzotrifluoride (%)	97.9	96.7	95.0	96.9	97.6
Surrogate: 3,4-Dichlorotoluene (SS) (%)	101.3	122.5	117.7	121.7	125.5

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2171141-6	L2171141-7	L2171141-8	L2171141-9	L2171141-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18
	Sampled Time	14:30	14:30	14:00	12:30	14:00
	Client ID	SFC-2	SCF-2B	SFC3	SFC4B	SFC11
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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)					
	Dichloromethane (mg/L)					
	1,2-Dichloropropane (mg/L)					
	cis-1,3-Dichloropropylene (mg/L)					
	trans-1,3-Dichloropropylene (mg/L)					
	1,3-Dichloropropene (cis & trans) (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (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)					
	Vinyl Chloride (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
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)					
	Surrogate: 2-Bromobenzotrifluoride (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2171141-11	L2171141-12	L2171141-13		
	Description	Water	Water	Water		
	Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18		
	Sampled Time	13:00	12:30			
	Client ID	GW INT.	DUPLICATE - SFC-4B	L1		
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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		
	Dichloromethane (mg/L)	<0.0050		<0.0050		
	1,2-Dichloropropane (mg/L)	<0.0010		<0.0010		
	cis-1,3-Dichloropropylene (mg/L)	<0.00050		<0.00050		
	trans-1,3-Dichloropropylene (mg/L)	<0.00050		<0.00050		
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0010		<0.0010		
	Ethylbenzene (mg/L)	<0.00050		<0.00050		
	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)	<0.00020		<0.00020		
	Tetrachloroethylene (mg/L)	<0.0010		<0.0010		
	Toluene (mg/L)	<0.00045		<0.00045		
	1,1,1-Trichloroethane (mg/L)	<0.0010		<0.0010		
	1,1,2-Trichloroethane (mg/L)	<0.00050		<0.00050		
	Trichloroethylene (mg/L)	<0.0010		<0.0010		
	Trichlorofluoromethane (mg/L)	<0.0010		<0.0010		
	Vinyl Chloride (mg/L)	<0.00040		<0.00040		
	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) (%)	96.3		98.3		
	Surrogate: 1,4-Difluorobenzene (SS) (%)	80.5		86.8		
Hydrocarbons	EPH10-19 (mg/L)	<0.25		<0.25		
	EPH19-32 (mg/L)	<0.25		<0.25		
	LEPH (mg/L)	<0.25		<0.25		
	HEPH (mg/L)	<0.25		<0.25		
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10		<0.10		
	VPH (C6-C10) (mg/L)	<0.10		<0.10		
	Surrogate: 2-Bromobenzotrifluoride (%)	99.3		94.9		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	114.9		111.8		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2171141-1 Water 25-SEP-18 11:30 MW-2D	L2171141-2 Water 25-SEP-18 11:30 MW-2S	L2171141-3 Water 25-SEP-18 12:30 MW-3	L2171141-4 Water 25-SEP-18 17:00 MW-4	L2171141-5 Water 25-SEP-18 10:30 MW-6
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Acenaphthylene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Acridine (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Anthracene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benz(a)anthracene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(a)pyrene (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Benzo(b&j)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b+j+k)fluoranthene (mg/L)	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015
	Benzo(g,h,i)perylene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(k)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Chrysene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000020 DLCI
	Dibenz(a,h)anthracene (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Fluorene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	1-Methylnaphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	2-Methylnaphthalene (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)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000023
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acridine d9 (%)	94.3	82.7	88.2	98.7	83.4
	Surrogate: Chrysene d12 (%)	97.3	83.6	92.1	95.7	83.8
	Surrogate: Naphthalene d8 (%)	93.3	92.9	89.8	104.3	91.1
	Surrogate: Phenanthrene d10 (%)	98.4	90.9	90.5	106.3	88.3

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2171141-6	L2171141-7	L2171141-8	L2171141-9	L2171141-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18	25-SEP-18
	Sampled Time	14:30	14:30	14:00	12:30	14:00
	Client ID	SFC-2	SCF-2B	SFC3	SFC4B	SFC11
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)					
	Acenaphthylene (mg/L)					
	Acridine (mg/L)					
	Anthracene (mg/L)					
	Benz(a)anthracene (mg/L)					
	Benzo(a)pyrene (mg/L)					
	Benzo(b&j)fluoranthene (mg/L)					
	Benzo(b+j+k)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)					
	1-Methylnaphthalene (mg/L)					
	2-Methylnaphthalene (mg/L)					
	Naphthalene (mg/L)					
	Phenanthrene (mg/L)					
	Pyrene (mg/L)					
	Quinoline (mg/L)					
	Surrogate: Acridine d9 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2171141-11	L2171141-12	L2171141-13		
	Description	Water	Water	Water		
	Sampled Date	25-SEP-18	25-SEP-18	25-SEP-18		
	Sampled Time	13:00	12:30			
	Client ID	GW INT.	DUPLICATE - SFC-4B	L1		
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	0.000669		<0.000010		
	Acenaphthylene (mg/L)	<0.000010		<0.000010		
	Acridine (mg/L)	<0.000020 DLCI		<0.000010		
	Anthracene (mg/L)	0.000024		<0.000010		
	Benz(a)anthracene (mg/L)	<0.000010		<0.000010		
	Benzo(a)pyrene (mg/L)	<0.0000050		<0.0000050		
	Benzo(b&j)fluoranthene (mg/L)	<0.000010		<0.000010		
	Benzo(b+j+k)fluoranthene (mg/L)	<0.000015		<0.000015		
	Benzo(g,h,i)perylene (mg/L)	<0.000010		<0.000010		
	Benzo(k)fluoranthene (mg/L)	<0.000010		<0.000010		
	Chrysene (mg/L)	<0.000020 DLCI		<0.000010		
	Dibenz(a,h)anthracene (mg/L)	<0.0000050		<0.0000050		
	Fluoranthene (mg/L)	0.000251		<0.000010		
	Fluorene (mg/L)	0.000143		<0.000010		
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000010		<0.000010		
	1-Methylnaphthalene (mg/L)	<0.000050		<0.000050		
	2-Methylnaphthalene (mg/L)	<0.000050		<0.000050		
	Naphthalene (mg/L)	<0.000050		<0.000050		
	Phenanthrene (mg/L)	0.000025		<0.000020		
	Pyrene (mg/L)	0.000139		<0.000010		
	Quinoline (mg/L)	<0.000050		<0.000050		
	Surrogate: Acridine d9 (%)	93.3		83.2		
	Surrogate: Chrysene d12 (%)	86.9		86.2		
	Surrogate: Naphthalene d8 (%)	103.6		95.0		
	Surrogate: Phenanthrene d10 (%)	97.9		92.1		

* 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	Silver (Ag)-Total	MB-LOR	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Boron (B)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2171141-1, -11, -13, -2, -3, -4, -5
Matrix Spike	Aluminum (Al)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Potassium (K)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Titanium (Ti)-Total	MS-B	L2171141-10, -12, -6, -7, -8, -9
Matrix Spike	Total Nitrogen	MS-B	L2171141-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by 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-N+N-CALC-VA	Water	Nitrite & Nitrate in Water (Calculation)	EPA 300.0

Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

Reference Information

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.

EC-SCREEN-VA Water Conductivity Screen (Internal Use Only) APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EPH-ME-FID-VA Water EPH in Water BC Lab Manual

EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. EPH results include PAHs and are therefore not equivalent to LEPH or HEPH.

F-IC-N-VA Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-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-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

LEPH/HEPH-CALC-VA Water LEPHs and HEPHs BC MOE LEPH/HEPH

LEPHw and HEPHw are measures of Light and Heavy Extractable Petroleum Hydrocarbons in water. Results are calculated by subtraction of applicable PAH concentrations from EPH10-19 and EPH19-32, as per the BC Lab Manual LEPH/HEPH calculation procedure.
LEPHw = EPH10-19 minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene.
HEPH = EPH19-32 minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

N-T-COL-VA Water Total Nitrogen in water by Colour APHA4500-P(J)/NEMI9171/USGS03-4174

This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.

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.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PAH-ME-MS-VA Water PAHs in Water EPA 3511/8270D (mod)

Reference Information

PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

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.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-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.

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. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	BC Env. Lab Manual (VH in Water)

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	BC Env. Lab Manual (VH in Solids)
VOC-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA 5021A/8260C

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

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA 5021A/8260C

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	EPA 5035A/5021A/8260C
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE VPH

VPHw measures Volatile Petroleum Hydrocarbons in water. Results are calculated by subtraction of specific Monocyclic Aromatic Hydrocarbons from VH6-10, as per the BC Lab Manual VPH calculation procedure.
VPHw = VH6-10 minus Benzene, Toluene, Ethylbenzene, Xylenes, and Styrene

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:

17-669884

Reference Information

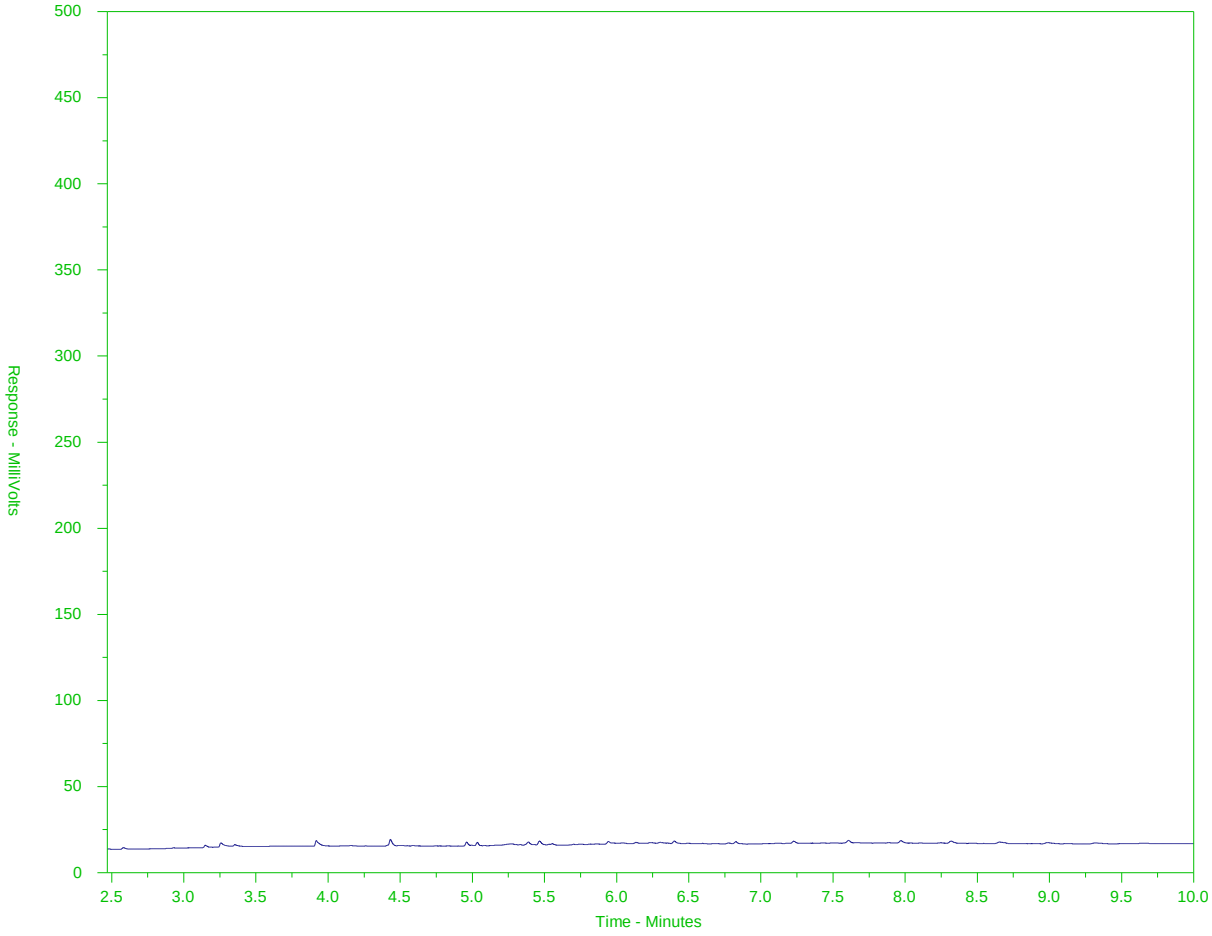
GLOSSARY OF REPORT TERMS

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.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-1
Client Sample ID: MW-2D



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

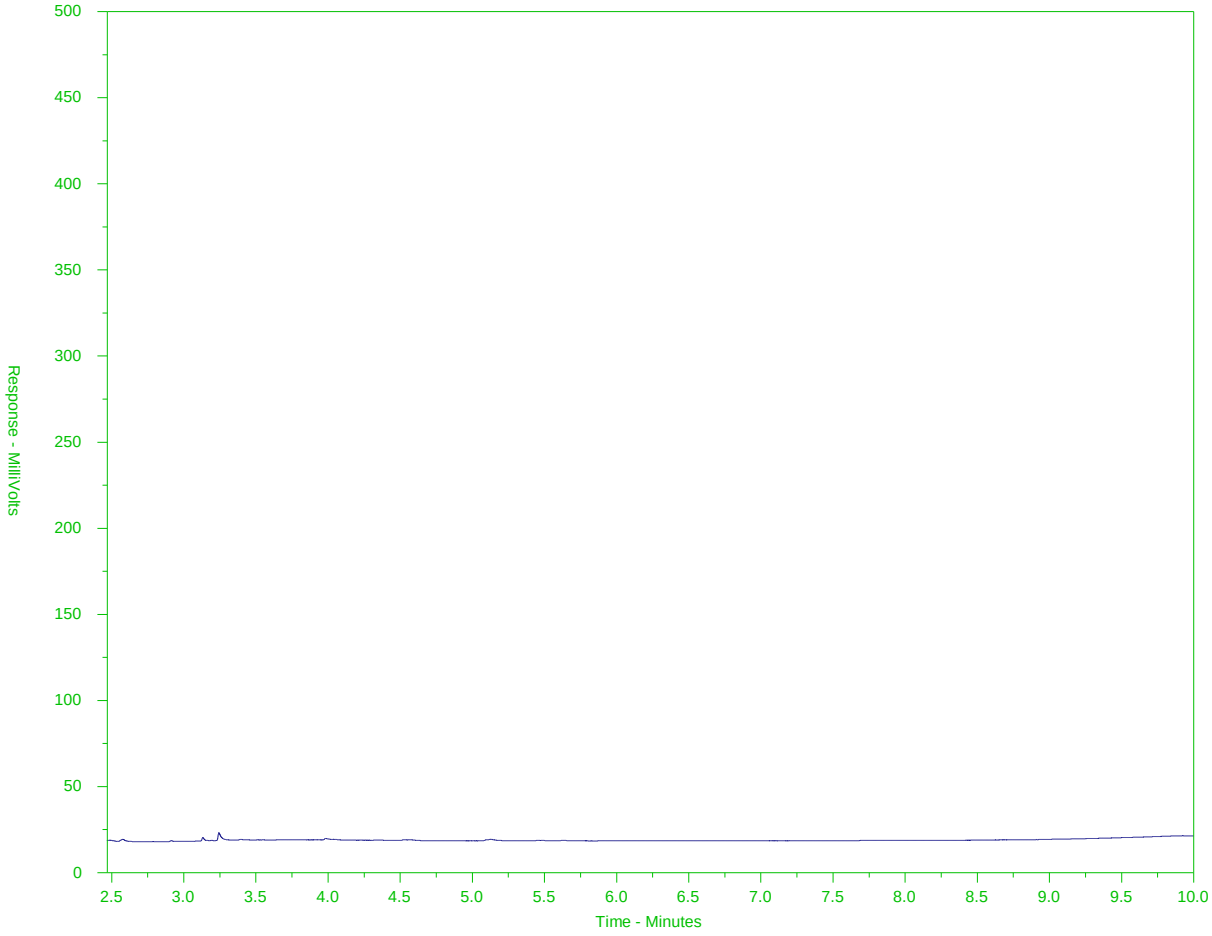
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-2
Client Sample ID: MW-2S



← EPH10-19 →		← EPH19-32 →
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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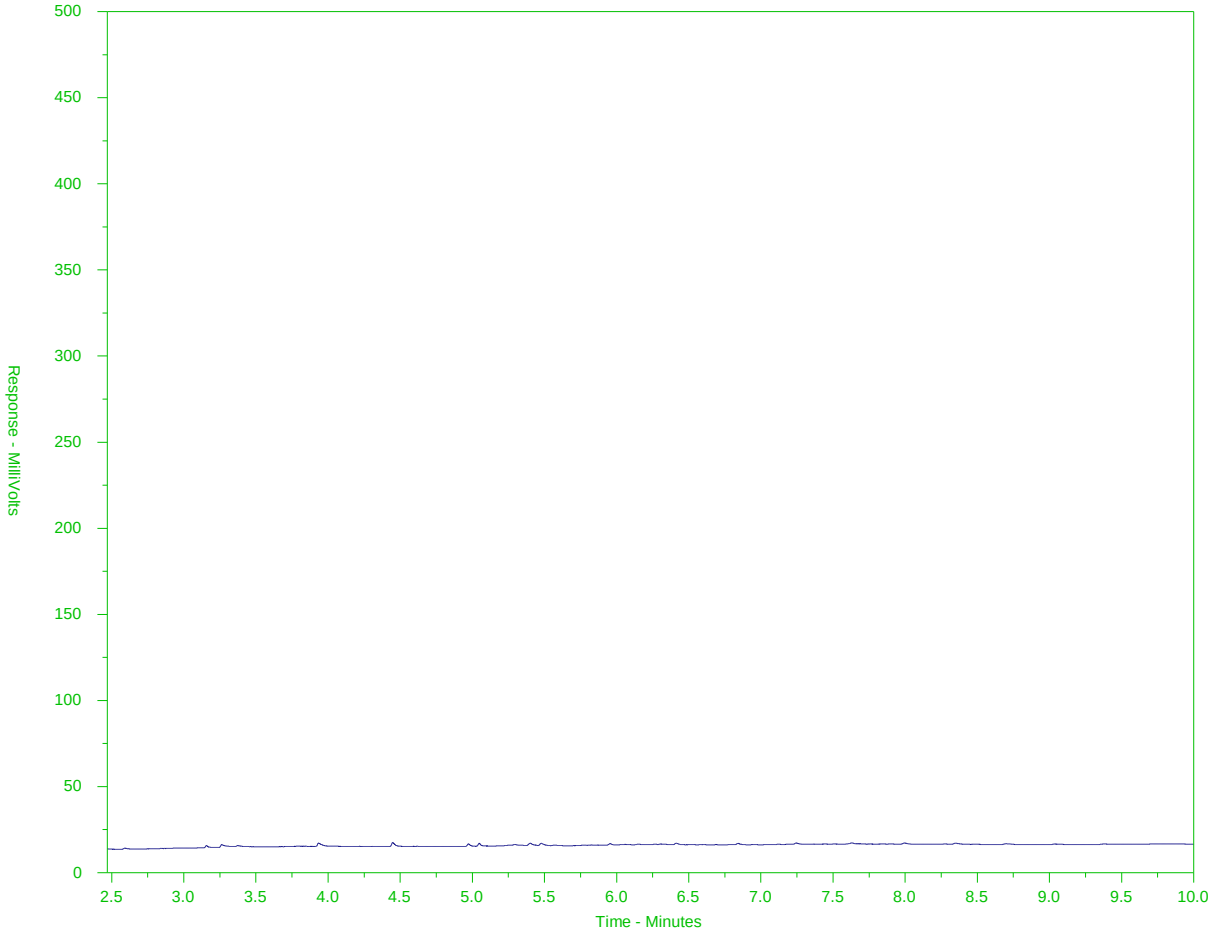
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-3
Client Sample ID: MW-3



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

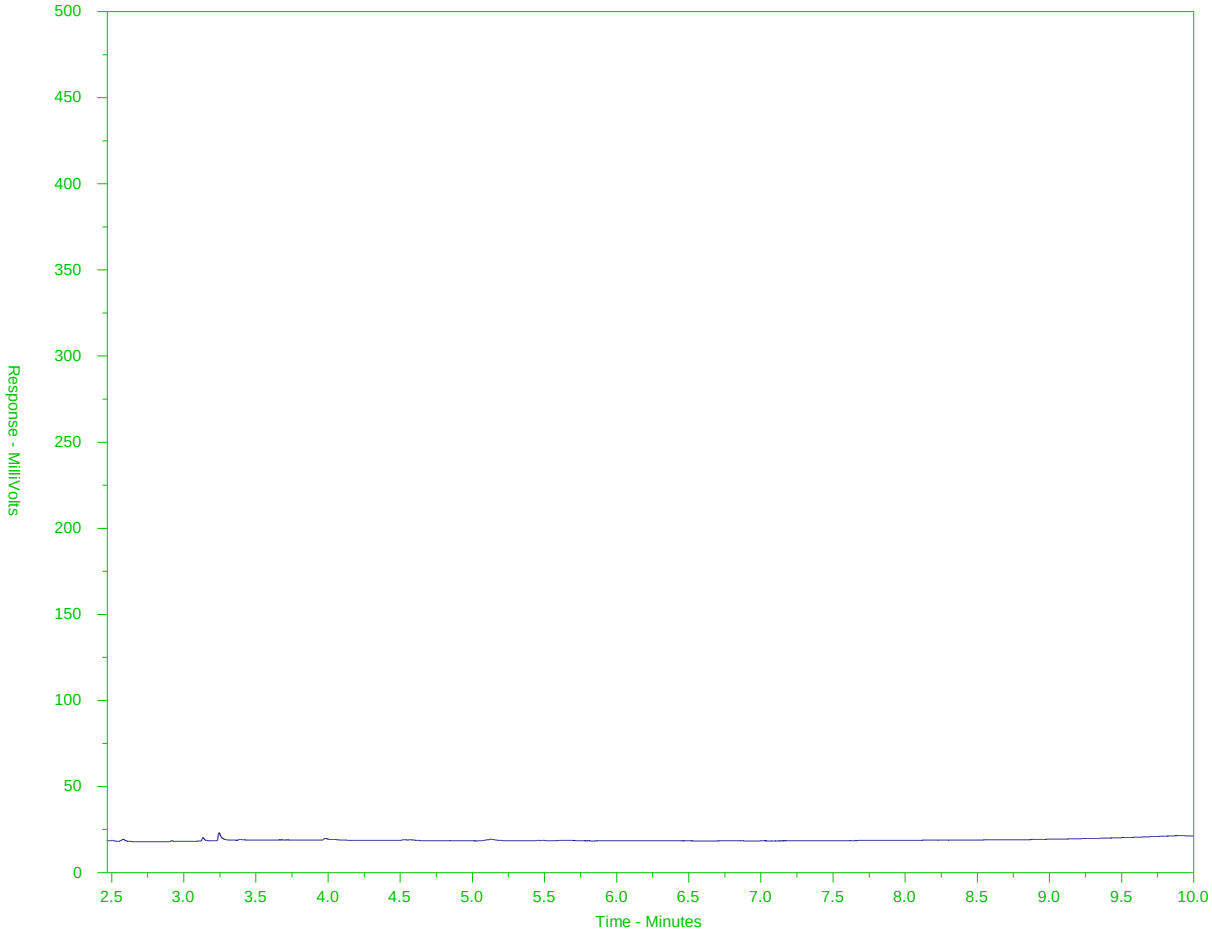
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-4
Client Sample ID: MW-4



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

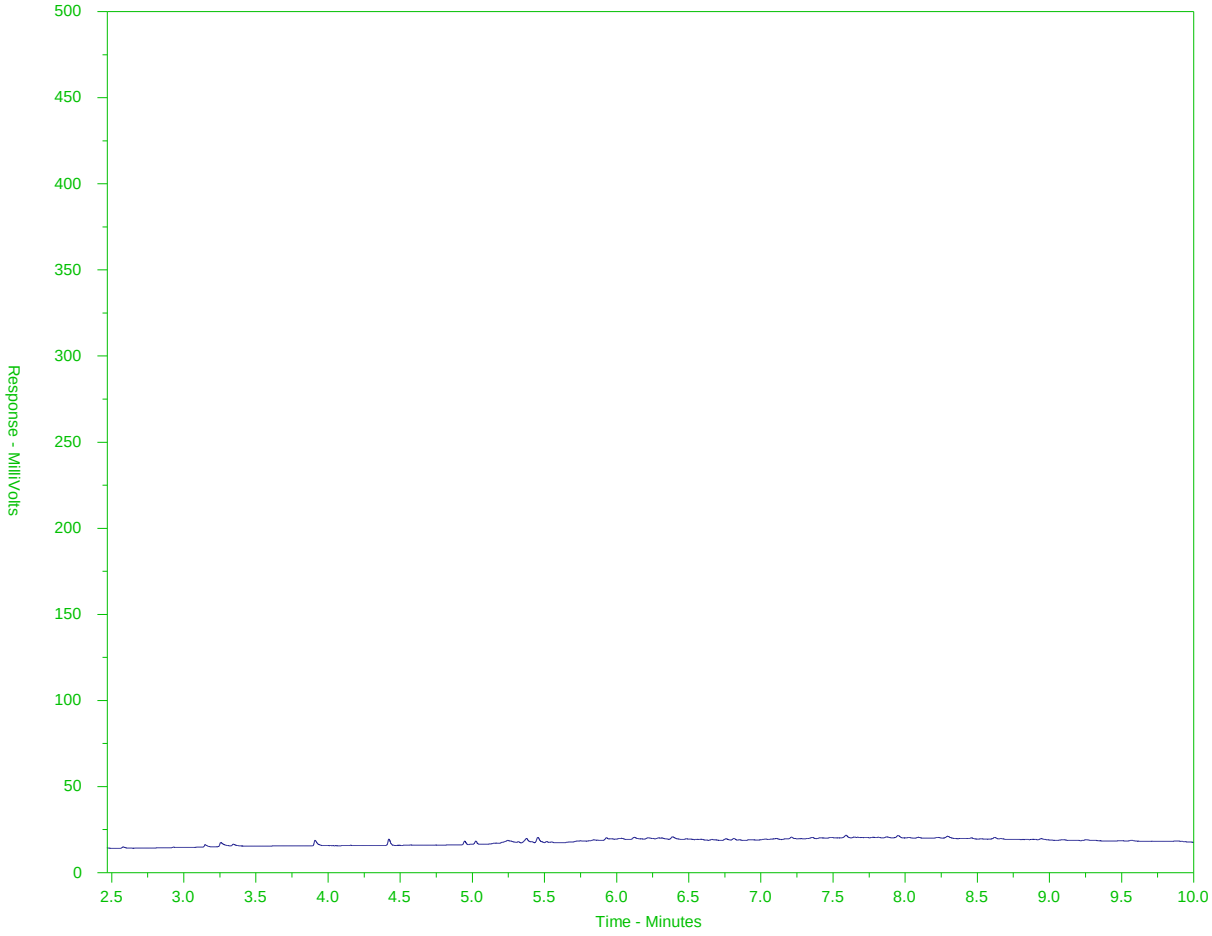
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-5
Client Sample ID: MW-6



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

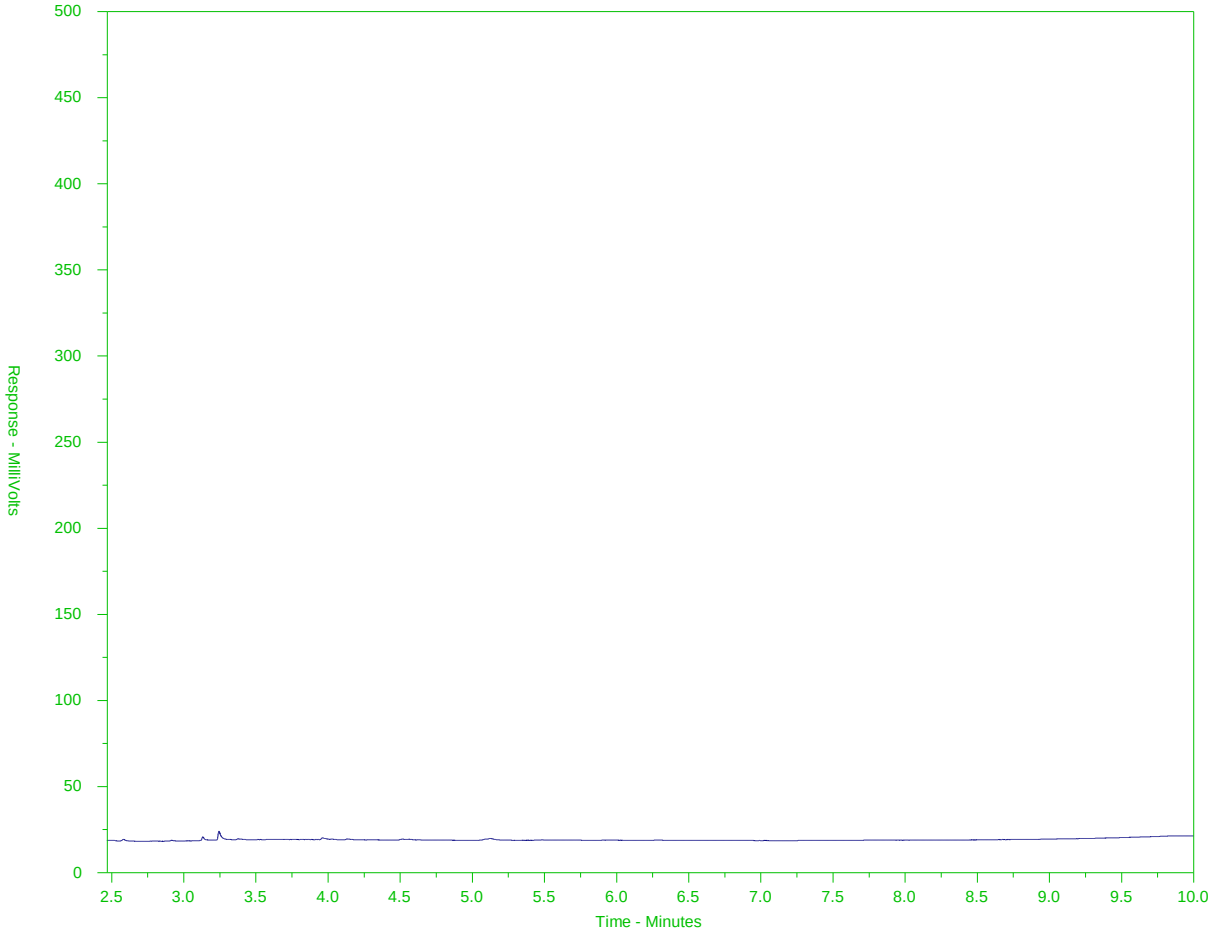
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-11
Client Sample ID: GW INT.



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

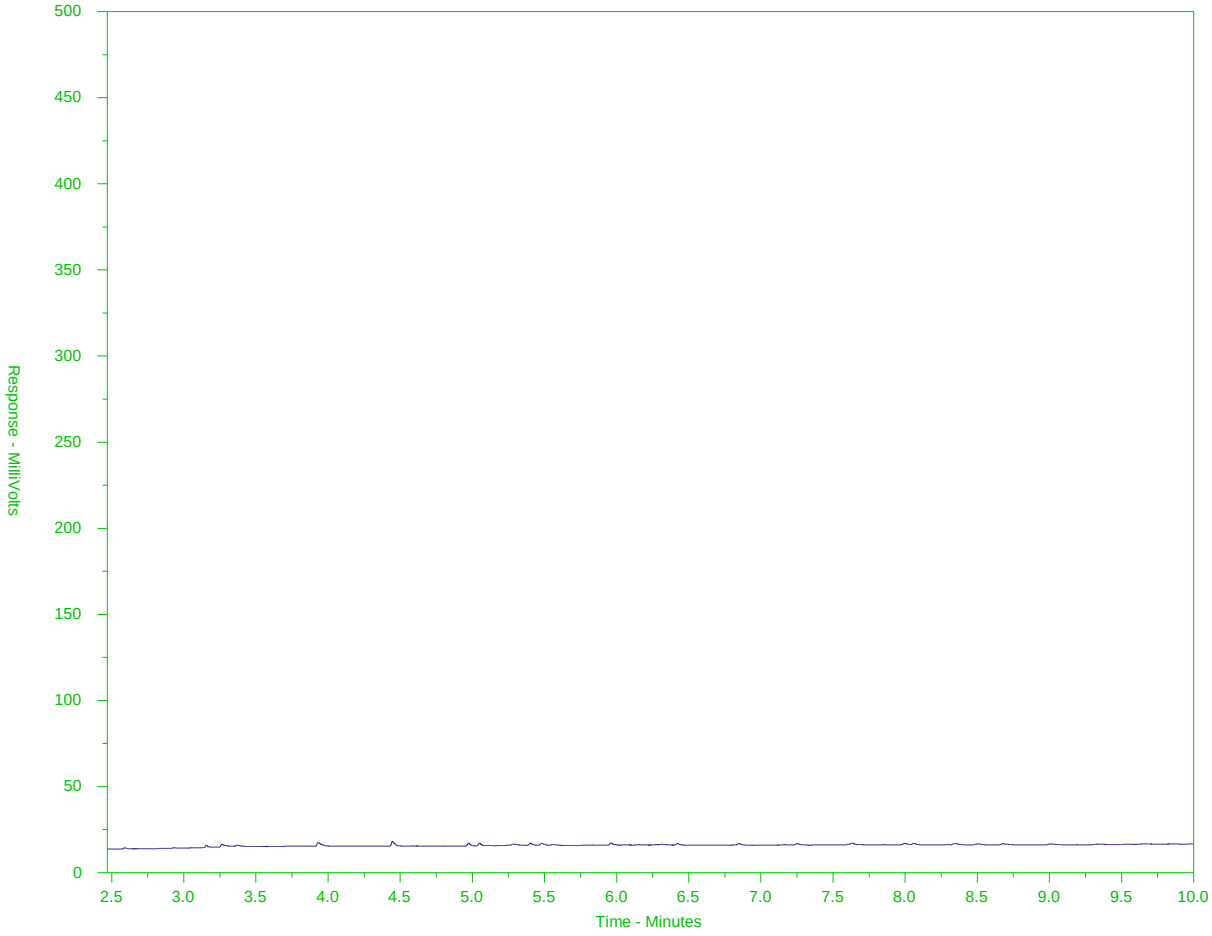
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2171141-13
Client Sample ID: L1



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

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

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2171141-COFC

COC Number: 17 - 669884

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Morrison Hershfield Ltd
Contact:	Josie Gilson
Phone:	778-837-9801
	Company address below will appear on the final report
Street:	301-4321 Still Creek Drive
City/Province:	Burnaby BC
Postal Code:	V5C 6S7

Report Format / Distribution	
Select Report Format:	☐ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	jgilson@morrisonhershfield.com
Email 2	Cajones@morrisonhershfield.com
Email 3	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Resort Municipality of Whistler (RMOW)
Contact:	Andrew Tucker

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Atucker@whistler.ca
Email 2	ap@whistler.ca

Project Information	
ALS Account # / Quote #:	Q65605
Job #:	18001536
PO / AFE:	723851
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: C. Funginski Sampler: J. Gilson

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P	P											Number of Containers
					Dissolved Metals + Mercury	Total Metals + Mercury	General Parameters	Nutrients, Anions and COD	PAH/EPH/LEPH/HEPH	VOC							
	MW-2D	Sept. 25/18	11:30	Water	R		R	R	R	R							8
	MW-2S	Sept. 25/18	11:30	Water	R		R	R	R	R							8
	MW-3	Sept. 25/18	12:30	Water	R		R	R	R	R							8
	MW-4	Sept. 25/18	17:00	Water	R		R	R	R	R							8
	MW-6	Sept. 25/18	10:30	Water	R		R	R	R	R							8
	SFC-2	Sept. 25/18	14:30	Water		R	R	R									4
	SCF-2B	Sept. 25/18	14:30	Water		R	R	R									4
	SFC-3	Sept. 25/18	14:00	Water		R	R	R									4
	SFC-4B	Sept. 25/18	12:30	Water		R	R	R									4
	SFC-11	Sept. 25/18	14:00	Water		R	R	R									4
	GW Int.	Sept. 25/18	13:00	Water	R		R	R	R	R							8
	Duplicate - SFC-4B	Sept. 25/18	12:30	Water		R	R	R									4
	L1	Sept. 25/18	12:00	Water	R		R	R	R	R							8

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

British Columbia Contaminated Sites Regulation (MAY, 2011)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☑ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2	3	16

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: J. Gilson	Date: Sept. 26, 2018	Time: 10:00	Received by:	Date:	Time:	Received by: H A	Date: 9/26	Time: 12:15P

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Morrison Hershfield Limited
ATTN: Josie Gilson
310 - 4321 Still Creek Drive
Burnaby BC V5C 6S7

Date Received: 12-DEC-18
Report Date: 19-DEC-18 12:01 (MT)
Version: FINAL

Client Phone: 604-454-0402

Certificate of Analysis

Lab Work Order #: L2209419

Project P.O. #: 723851
Job Reference: RM04-Q4
C of C Numbers: 17-810065
Legal Site Desc:

Carla Fuginski
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2209419-1	L2209419-2	L2209419-3	L2209419-4	L2209419-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
Sampled Time	09:30	09:30	10:30	10:30	11:30
Client ID	SFC-2	SFC-2B	SFC-3	SFC 11	SFC 4B
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	349	382	199	112	181
Hardness (as CaCO3) (mg/L)	127 HTC	137 HTC	40.4 HTC	32.8 HTC	63.1 HTC
pH (pH)	7.13	6.29	7.27	7.22	7.42
Total Suspended Solids (mg/L)	11.5	28.1	19.3	<3.0	3.3
Anions and Nutrients Alkalinity, Total (as CaCO3) (mg/L)	57.5	17.2	26.1	24.5	25.7
Ammonia, Total (as N) (mg/L)	0.465	0.406	0.0164	<0.0050	0.0758
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	16.1	7.25	31.0	9.67	16.2
Fluoride (F) (mg/L)	0.073	0.093	0.041	0.046	0.050
Nitrate and Nitrite (as N) (mg/L)	0.772	2.13	0.228	0.287	0.331
Nitrate (as N) (mg/L)	0.769	2.12	0.228	0.287	0.329
Nitrite (as N) (mg/L)	0.0029	0.0133	<0.0010	<0.0010	0.0015
Total Kjeldahl Nitrogen (mg/L)	0.638	1.01	0.183	<0.050	0.362
Total Nitrogen (mg/L)	1.32	2.91	0.354	0.302	0.654
Phosphorus (P)-Total (mg/L)	0.0053	0.0182	0.109	0.0156	0.151
Sulfate (SO4) (mg/L)	81.2	138	18.1	12.4	31.8
Total Metals Aluminum (Al)-Total (mg/L)	1.66	3.59	0.823	0.280	4.02
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00020	0.00025	0.00024	0.00012	0.00091
Barium (Ba)-Total (mg/L)	0.0471	0.0363	0.0234	0.0118	0.0382
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	0.031	0.029	<0.010	<0.010	0.013
Cadmium (Cd)-Total (mg/L)	0.0000827	0.000305	0.0000325	0.0000137	0.0000842
Calcium (Ca)-Total (mg/L)	43.7	44.8	13.2	10.4	19.0
Cesium (Cs)-Total (mg/L)	<0.000010	0.000014	0.000019	<0.000010	0.000082
Chromium (Cr)-Total (mg/L)	0.00030	0.00082	0.00105	0.00025	0.00255
Cobalt (Co)-Total (mg/L)	0.00846	0.0192	0.00057	0.00012	0.00484
Copper (Cu)-Total (mg/L)	0.0288	0.0640	0.00684	0.00222	0.0366
Iron (Fe)-Total (mg/L)	3.08	8.05	0.835	0.187	4.89
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000289	0.000122	0.00141
Lithium (Li)-Total (mg/L)	<0.0010	0.0014	<0.0010	<0.0010	0.0012
Magnesium (Mg)-Total (mg/L)	4.36	6.03	1.82	1.68	3.81
Manganese (Mn)-Total (mg/L)	0.770	1.43	0.0304	0.00842	0.338
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.00308	0.000178	0.000754	0.000246	0.00126
Nickel (Ni)-Total (mg/L)	0.00398	0.0100	0.00079	<0.00050	0.00380

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2209419-6	L2209419-7	L2209419-8	L2209419-9	L2209419-10
Description	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
Sampled Time	13:00	13:00	14:00	15:00	16:00
Client ID	MW 2S	MW 2D	MW 3	MW 4	MW 6
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	433	989	266	289	479
Hardness (as CaCO3) (mg/L)	147	353	65.9	101	88.5
pH (pH)	6.81	6.79	6.40	6.62	6.80
Total Suspended Solids (mg/L)	145	350	27.7	689	65.5
Anions and Nutrients Alkalinity, Total (as CaCO3) (mg/L)	107	261	27.8	83.4	34.5
Ammonia, Total (as N) (mg/L)	4.31	10.9 DLDS	0.540	1.58	0.0311
Bromide (Br) (mg/L)	0.121	<0.25 DLDS	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	17.4	45.3 DLDS	40.4	16.9	53.4
Fluoride (F) (mg/L)	0.134	<0.10 DLDS	0.033	0.057	0.074
Nitrate and Nitrite (as N) (mg/L)	0.0072	<0.025 DLDS	0.293	0.0202	0.282
Nitrate (as N) (mg/L)	0.0072	<0.025 DLDS	0.292	0.0202	0.282
Nitrite (as N) (mg/L)	<0.0010	<0.0050 DLDS	0.0011	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	4.85	11.5	0.626	1.92	0.294
Total Nitrogen (mg/L)	4.83	12.1	0.863	1.94	0.582
Phosphorus (P)-Total (mg/L)	0.168	0.320	0.0024	0.526	0.260
Sulfate (SO4) (mg/L)	80.9	193	32.3	33.0	106
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)					
Cesium (Cs)-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	L2209419-11	L2209419-12			
	Description	Ground Water	Ground Water			
	Sampled Date	11-DEC-18	11-DEC-18			
	Sampled Time	16:30	16:00			
	Client ID	GW INTER.	MW6 - DUPLICATE			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	745	483			
	Hardness (as CaCO3) (mg/L)	238	92.6			
	pH (pH)	6.59	6.84			
	Total Suspended Solids (mg/L)	327	79.1			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	103	34.6			
	Ammonia, Total (as N) (mg/L)	0.899	0.0315			
	Bromide (Br) (mg/L)	<0.25 DLDS	0.057			
	Chloride (Cl) (mg/L)	65.3	53.5			
	Fluoride (F) (mg/L)	<0.10 DLDS	0.073			
	Nitrate and Nitrite (as N) (mg/L)	<0.025	0.288			
	Nitrate (as N) (mg/L)	<0.025 DLDS	0.288			
	Nitrite (as N) (mg/L)	0.0062	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	1.35	0.321			
	Total Nitrogen (mg/L)	1.29	0.553			
	Phosphorus (P)-Total (mg/L)	0.447	0.274			
	Sulfate (SO4) (mg/L)	169	104			
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)					
	Cesium (Cs)-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

Grouping	Analyte	L2209419-1 Surface Water 11-DEC-18 09:30 SFC-2	L2209419-2 Surface Water 11-DEC-18 09:30 SFC-2B	L2209419-3 Surface Water 11-DEC-18 10:30 SFC-3	L2209419-4 Surface Water 11-DEC-18 10:30 SFC 11	L2209419-5 Surface Water 11-DEC-18 11:30 SFC 4B
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	0.127	<0.050	0.196
	Potassium (K)-Total (mg/L)	3.88	3.60	1.52	0.747	1.81
	Rubidium (Rb)-Total (mg/L)	0.00397	0.00422	0.00141	0.00057	0.00285
	Selenium (Se)-Total (mg/L)	0.000098	0.000052	0.000058	<0.000050	0.000096
	Silicon (Si)-Total (mg/L)	4.94	7.08	6.63	7.90	9.27
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000033
	Sodium (Na)-Total (mg/L)	14.0	8.11	20.5	7.30	9.96
	Strontium (Sr)-Total (mg/L)	0.215	0.181	0.103	0.118	0.153
	Sulfur (S)-Total (mg/L)	29.0	48.9	5.82	3.75	10.5
	Tellurium (Te)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000013
	Thorium (Th)-Total (mg/L)	<0.00010	0.00028	<0.00010	<0.00010	0.00016
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00060 DLM	<0.0018 DLM	0.0242	0.00807	0.128
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00010
	Uranium (U)-Total (mg/L)	0.000112	0.000167	0.000036	<0.000010	0.000159
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00154	0.00102	0.00756
	Zinc (Zn)-Total (mg/L)	0.0173	0.0506	0.0061	<0.0030	0.0189
	Zirconium (Zr)-Total (mg/L)	<0.000060	<0.000060	0.000225	0.000203	0.000204
Dissolved Metals	Dissolved Mercury Filtration Location					
	Dissolved Metals Filtration Location					
	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Cesium (Cs)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2209419-6 Ground Water 11-DEC-18 13:00 MW 2S	L2209419-7 Ground Water 11-DEC-18 13:00 MW 2D	L2209419-8 Ground Water 11-DEC-18 14:00 MW 3	L2209419-9 Ground Water 11-DEC-18 15:00 MW 4	L2209419-10 Ground Water 11-DEC-18 16:00 MW 6
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Rubidium (Rb)-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)					
	Sulfur (S)-Total (mg/L)					
	Tellurium (Te)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Thorium (Th)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Tungsten (W)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-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)	0.0034	0.0035	0.0237	0.0303	0.0184
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00787	0.0135	<0.00010	0.00581	0.00011
	Barium (Ba)-Dissolved (mg/L)	0.114	0.0355	0.0969	0.120	0.0296
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.115	0.250	<0.010	0.043	0.015
	Cadmium (Cd)-Dissolved (mg/L)	0.0000051	<0.0000050	0.000383	0.000112	0.0000575
	Calcium (Ca)-Dissolved (mg/L)	46.0	116	19.8	32.7	29.5
	Cesium (Cs)-Dissolved (mg/L)	0.000022	0.000020	0.000070	0.000036	0.000012
	Chromium (Cr)-Dissolved (mg/L)	0.00013	0.00023	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00242	0.0121	0.0129	0.0195	0.00060
	Copper (Cu)-Dissolved (mg/L)	0.00021	<0.00020	0.00416	0.00990	0.00582
	Iron (Fe)-Dissolved (mg/L)	44.6	52.9	0.624	30.7	0.013
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000377	0.000260
	Lithium (Li)-Dissolved (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	L2209419-11	L2209419-12			
	Description	Ground Water	Ground Water			
	Sampled Date	11-DEC-18	11-DEC-18			
	Sampled Time	16:30	16:00			
	Client ID	GW INTER.	MW6 - DUPLICATE			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Rubidium (Rb)-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)					
	Sulfur (S)-Total (mg/L)					
	Tellurium (Te)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Thorium (Th)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Tungsten (W)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0376	0.0184			
	Antimony (Sb)-Dissolved (mg/L)	0.00024	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00055	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.0809	0.0279			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.124	0.014			
	Cadmium (Cd)-Dissolved (mg/L)	0.0000436	0.0000621			
	Calcium (Ca)-Dissolved (mg/L)	80.9	31.1			
	Cesium (Cs)-Dissolved (mg/L)	0.000022	0.000012			
	Chromium (Cr)-Dissolved (mg/L)	0.00068	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.00453	0.00062			
	Copper (Cu)-Dissolved (mg/L)	0.00042	0.00159			
	Iron (Fe)-Dissolved (mg/L)	22.3	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (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	L2209419-1	L2209419-2	L2209419-3	L2209419-4	L2209419-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
Sampled Time	09:30	09:30	10:30	10:30	11:30
Client ID	SFC-2	SFC-2B	SFC-3	SFC 11	SFC 4B
Grouping / **Analyte**					
WATER					
Dissolved Metals Magnesium (Mg)-Dissolved (mg/L)					
Manganese (Mn)-Dissolved (mg/L)					
Mercury (Hg)-Dissolved (mg/L)					
Molybdenum (Mo)-Dissolved (mg/L)					
Nickel (Ni)-Dissolved (mg/L)					
Phosphorus (P)-Dissolved (mg/L)					
Potassium (K)-Dissolved (mg/L)					
Rubidium (Rb)-Dissolved (mg/L)					
Selenium (Se)-Dissolved (mg/L)					
Silicon (Si)-Dissolved (mg/L)					
Silver (Ag)-Dissolved (mg/L)					
Sodium (Na)-Dissolved (mg/L)					
Strontium (Sr)-Dissolved (mg/L)					
Sulfur (S)-Dissolved (mg/L)					
Tellurium (Te)-Dissolved (mg/L)					
Thallium (Tl)-Dissolved (mg/L)					
Thorium (Th)-Dissolved (mg/L)					
Tin (Sn)-Dissolved (mg/L)					
Titanium (Ti)-Dissolved (mg/L)					
Tungsten (W)-Dissolved (mg/L)					
Uranium (U)-Dissolved (mg/L)					
Vanadium (V)-Dissolved (mg/L)					
Zinc (Zn)-Dissolved (mg/L)					
Zirconium (Zr)-Dissolved (mg/L)					
Aggregate Organics COD (mg/L)	<20	<20	<20	<20	20
Volatile Organic Compounds Benzene (mg/L)					
Bromodichloromethane (mg/L)					
Bromoform (mg/L)					
Carbon Tetrachloride (mg/L)					
Chlorobenzene (mg/L)					
Dibromochloromethane (mg/L)					
Chloroethane (mg/L)					
Chloroform (mg/L)					
Chloromethane (mg/L)					
1,2-Dichlorobenzene (mg/L)					
1,3-Dichlorobenzene (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2209419-6	L2209419-7	L2209419-8	L2209419-9	L2209419-10
Description	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
Sampled Time	13:00	13:00	14:00	15:00	16:00
Client ID	MW 2S	MW 2D	MW 3	MW 4	MW 6
Grouping / **Analyte**					
WATER					
Dissolved Metals					
Magnesium (Mg)-Dissolved (mg/L)	7.83	15.4	3.99	4.59	3.60
Manganese (Mn)-Dissolved (mg/L)	2.24	3.76	2.68	1.85	0.166
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00388	0.0123	0.000485	0.0104	0.000773
Nickel (Ni)-Dissolved (mg/L)	0.00104	0.00242	0.00245	0.00288	<0.00050
Phosphorus (P)-Dissolved (mg/L)	0.052	0.108	<0.050	<0.050	0.061
Potassium (K)-Dissolved (mg/L)	9.00	19.8	3.99	4.87	2.97
Rubidium (Rb)-Dissolved (mg/L)	0.00636	0.0118	0.0125	0.00361	0.00493
Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000082	<0.000050	<0.000050	0.000052
Silicon (Si)-Dissolved (mg/L)	9.80	14.1	7.38	8.82	5.81
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	13.1	36.8	20.4	13.4	58.8
Strontium (Sr)-Dissolved (mg/L)	0.261	0.530	0.151	0.202	0.263
Sulfur (S)-Dissolved (mg/L)	27.3	64.7	9.94	10.6	34.9
Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000148	0.000022	0.000037
Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved (mg/L)	0.000037	0.000169	<0.000010	0.000145	0.000021
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0077	0.0033	0.0056	0.0121	0.0063
Zirconium (Zr)-Dissolved (mg/L)	<0.000060	<0.000060	<0.000060	0.000068	<0.000060
Aggregate Organics					
COD (mg/L)	37	46	<20	35	<20
Volatile Organic Compounds					
Benzene (mg/L)					
Bromodichloromethane (mg/L)					
Bromoform (mg/L)					
Carbon Tetrachloride (mg/L)					
Chlorobenzene (mg/L)					
Dibromochloromethane (mg/L)					
Chloroethane (mg/L)					
Chloroform (mg/L)					
Chloromethane (mg/L)					
1,2-Dichlorobenzene (mg/L)					
1,3-Dichlorobenzene (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-11	L2209419-12			
	Description	Ground Water	Ground Water			
	Sampled Date	11-DEC-18	11-DEC-18			
	Sampled Time	16:30	16:00			
	Client ID	GW INTER.	MW6 - DUPLICATE			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	8.86	3.65			
	Manganese (Mn)-Dissolved (mg/L)	2.30	0.166			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000497	0.000641			
	Nickel (Ni)-Dissolved (mg/L)	0.00227	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	0.056			
	Potassium (K)-Dissolved (mg/L)	4.98	2.97			
	Rubidium (Rb)-Dissolved (mg/L)	0.00403	0.00498			
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Dissolved (mg/L)	7.70	5.71			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	37.7	59.7			
	Strontium (Sr)-Dissolved (mg/L)	0.510	0.271			
	Sulfur (S)-Dissolved (mg/L)	57.7	33.4			
	Tellurium (Te)-Dissolved (mg/L)	<0.00020	<0.00020			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000039			
	Thorium (Th)-Dissolved (mg/L)	<0.00010	<0.00010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00060 DLM	<0.00030			
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010			
	Uranium (U)-Dissolved (mg/L)	0.000032	0.000019			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0395	<0.0010			
	Zirconium (Zr)-Dissolved (mg/L)	0.000124	<0.000060			
Aggregate Organics	COD (mg/L)	32	<20			
Volatile Organic Compounds	Benzene (mg/L)	<0.00050				
	Bromodichloromethane (mg/L)	<0.0010				
	Bromoform (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				
	1,2-Dichlorobenzene (mg/L)	<0.00050				
	1,3-Dichlorobenzene (mg/L)	<0.0010				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-1	L2209419-2	L2209419-3	L2209419-4	L2209419-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
	Sampled Time	09:30	09:30	10:30	10:30	11:30
	Client ID	SFC-2	SFC-2B	SFC-3	SFC 11	SFC 4B
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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)					
	Dichloromethane (mg/L)					
	1,2-Dichloropropane (mg/L)					
	cis-1,3-Dichloropropylene (mg/L)					
	trans-1,3-Dichloropropylene (mg/L)					
	1,3-Dichloropropene (cis & trans) (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (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)					
	Vinyl Chloride (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
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)					
	Surrogate: 2-Bromobenzotrifluoride (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-6	L2209419-7	L2209419-8	L2209419-9	L2209419-10
	Description	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
	Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
	Sampled Time	13:00	13:00	14:00	15:00	16:00
	Client ID	MW 2S	MW 2D	MW 3	MW 4	MW 6
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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)					
	Dichloromethane (mg/L)					
	1,2-Dichloropropane (mg/L)					
	cis-1,3-Dichloropropylene (mg/L)					
	trans-1,3-Dichloropropylene (mg/L)					
	1,3-Dichloropropene (cis & trans) (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (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)					
	Vinyl Chloride (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
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)					
	Surrogate: 2-Bromobenzotrifluoride (%)					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-11	L2209419-12			
	Description	Ground Water	Ground Water			
	Sampled Date	11-DEC-18	11-DEC-18			
	Sampled Time	16:30	16:00			
	Client ID	GW INTER.	MW6 - DUPLICATE			
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	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				
	Dichloromethane (mg/L)	<0.0050				
	1,2-Dichloropropane (mg/L)	<0.0010				
	cis-1,3-Dichloropropylene (mg/L)	<0.00050				
	trans-1,3-Dichloropropylene (mg/L)	<0.00050				
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0010				
	Ethylbenzene (mg/L)	<0.00050				
	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)	<0.00020				
	Tetrachloroethylene (mg/L)	<0.0010				
	Toluene (mg/L)	<0.00045				
	1,1,1-Trichloroethane (mg/L)	<0.0010				
	1,1,2-Trichloroethane (mg/L)	<0.00050				
	Trichloroethylene (mg/L)	<0.0010				
	Trichlorofluoromethane (mg/L)	<0.0010				
	Vinyl Chloride (mg/L)	<0.00040				
	ortho-Xylene (mg/L)	<0.00050				
	meta- & para-Xylene (mg/L)	<0.00050				
	Xylenes (mg/L)	<0.00075				
	Surrogate: 4-Bromofluorobenzene (SS) (%)	108.5				
	Surrogate: 1,4-Difluorobenzene (SS) (%)	92.6				
Hydrocarbons	EPH10-19 (mg/L)	<0.25				
	EPH19-32 (mg/L)	<0.25				
	LEPH (mg/L)	<0.25				
	HEPH (mg/L)	<0.25				
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10				
	VPH (C6-C10) (mg/L)	<0.10				
	Surrogate: 2-Bromobenzotrifluoride (%)	96.6				
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	91.2				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-1	L2209419-2	L2209419-3	L2209419-4	L2209419-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
	Sampled Time	09:30	09:30	10:30	10:30	11:30
	Client ID	SFC-2	SFC-2B	SFC-3	SFC 11	SFC 4B
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)					
	Acenaphthylene (mg/L)					
	Acridine (mg/L)					
	Anthracene (mg/L)					
	Benz(a)anthracene (mg/L)					
	Benzo(a)pyrene (mg/L)					
	Benzo(b&j)fluoranthene (mg/L)					
	Benzo(b+j+k)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)					
	1-Methylnaphthalene (mg/L)					
	2-Methylnaphthalene (mg/L)					
	Naphthalene (mg/L)					
	Phenanthrene (mg/L)					
	Pyrene (mg/L)					
	Quinoline (mg/L)					
	Surrogate: Acridine d9 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-6	L2209419-7	L2209419-8	L2209419-9	L2209419-10
	Description	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
	Sampled Date	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18	11-DEC-18
	Sampled Time	13:00	13:00	14:00	15:00	16:00
	Client ID	MW 2S	MW 2D	MW 3	MW 4	MW 6
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)					
	Acenaphthylene (mg/L)					
	Acridine (mg/L)					
	Anthracene (mg/L)					
	Benz(a)anthracene (mg/L)					
	Benzo(a)pyrene (mg/L)					
	Benzo(b&j)fluoranthene (mg/L)					
	Benzo(b+j+k)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)					
	1-Methylnaphthalene (mg/L)					
	2-Methylnaphthalene (mg/L)					
	Naphthalene (mg/L)					
	Phenanthrene (mg/L)					
	Pyrene (mg/L)					
	Quinoline (mg/L)					
	Surrogate: Acridine d9 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2209419-11	L2209419-12			
	Description	Ground Water	Ground Water			
	Sampled Date	11-DEC-18	11-DEC-18			
	Sampled Time	16:30	16:00			
	Client ID	GW INTER.	MW6 - DUPLICATE			
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	0.000707				
	Acenaphthylene (mg/L)	<0.000010				
	Acridine (mg/L)	0.000020				
	Anthracene (mg/L)	0.000026				
	Benz(a)anthracene (mg/L)	0.000010				
	Benzo(a)pyrene (mg/L)	0.0000084				
	Benzo(b&j)fluoranthene (mg/L)	0.000012				
	Benzo(b+j+k)fluoranthene (mg/L)	<0.000015				
	Benzo(g,h,i)perylene (mg/L)	<0.000010				
	Benzo(k)fluoranthene (mg/L)	<0.000010				
	Chrysene (mg/L)	<0.000020 DLCI				
	Dibenz(a,h)anthracene (mg/L)	<0.0000050				
	Fluoranthene (mg/L)	0.000165				
	Fluorene (mg/L)	0.000192				
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000010				
	1-Methylnaphthalene (mg/L)	<0.000050				
	2-Methylnaphthalene (mg/L)	<0.000050				
	Naphthalene (mg/L)	<0.000050				
	Phenanthrene (mg/L)	0.000023				
	Pyrene (mg/L)	0.000086				
	Quinoline (mg/L)	<0.000050				
	Surrogate: Acridine d9 (%)	100.8				
	Surrogate: Chrysene d12 (%)	107.1				
	Surrogate: Naphthalene d8 (%)	105.6				
	Surrogate: Phenanthrene d10 (%)	104.0				

* 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)
Laboratory Control Sample	Trichlorofluoromethane	LCS-ND	L2209419-11
Laboratory Control Sample	trans-1,3-Dichloropropylene	LCS-ND	L2209419-11
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2209419-10, -11, -12, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2209419-1, -2, -3, -4, -5
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2209419-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Total	MS-B	L2209419-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Total	MS-B	L2209419-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Total	MS-B	L2209419-1, -2, -3, -4, -5
Matrix Spike	Phosphorus (P)-Total	MS-B	L2209419-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L2209419-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by 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-N+N-CALC-VA	Water	Nitrite & Nitrate in Water (Calculation)	EPA 300.0
Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
EPH-ME-FID-VA	Water	EPH in Water	BC Lab Manual
EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. EPH results include PAHs and are therefore not equivalent to LEPH or HEPH.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

HARDNESS-CALC-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-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LEPH/HEPH

LEPHw and HEPHw are measures of Light and Heavy Extractable Petroleum Hydrocarbons in water. Results are calculated by subtraction of applicable PAH concentrations from EPH10-19 and EPH19-32, as per the BC Lab Manual LEPH/HEPH calculation procedure.

LEPHw = EPH10-19 minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene.

HEPHw = EPH19-32 minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

N-T-COL-VA	Water	Total Nitrogen in water by Colour	APHA4500-P(J)/NEMI9171/USGS03-4174

This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.

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.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PAH-ME-MS-VA	Water	PAHs in Water	EPA 3511/8270D (mod)

PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

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.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-F-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.

Reference Information

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. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	BC Env. Lab Manual (VH in Water)

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	BC Env. Lab Manual (VH in Solids)
VOC-HSMS-VA	Water	VOCs in water by Headspace GCMS	EPA 5021A/8260C

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

VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA 5021A/8260C

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	EPA 5035A/5021A/8260C
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE VPH

VPHw measures Volatile Petroleum Hydrocarbons in water. Results are calculated by subtraction of specific Monocyclic Aromatic Hydrocarbons from VH6-10, as per the BC Lab Manual VPH calculation procedure.
VPHw = VH6-10 minus Benzene, Toluene, Ethylbenzene, Xylenes, and Styrene

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:

17-810065

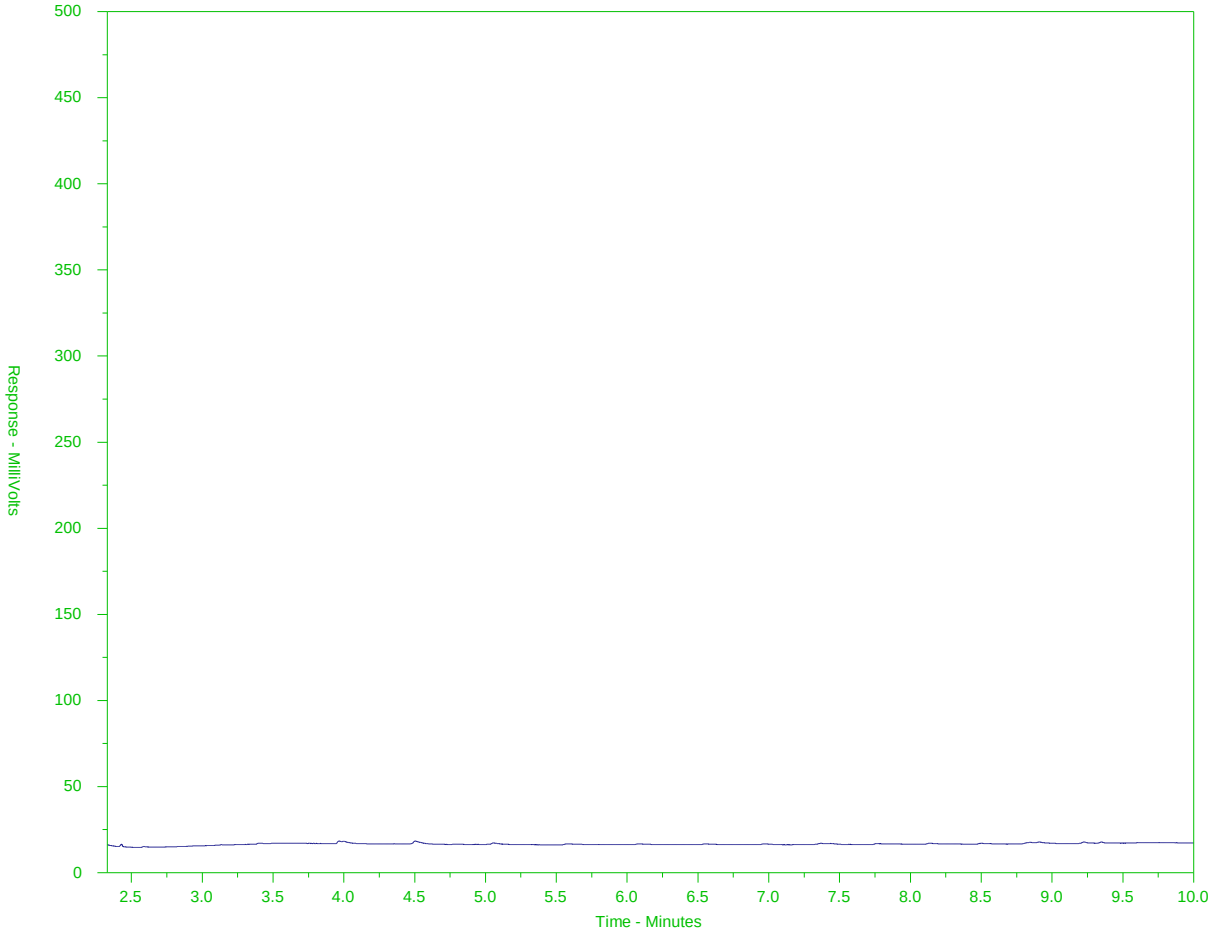
GLOSSARY OF REPORT TERMS

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.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2209419-11
Client Sample ID: GW INTER.



← EPH10-19 →		← EPH19-32 →
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 BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

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, but general patterns and distributions will remain similar.

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

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2209419-COFC

COC Number: 17 - 810065

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Morrison Hershfield Ltd.	Select Report Format: [X] PDF [X] EXCEL [ ] EDD (DIGITAL)	Regular [R] [X] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Josie Gilson	Quality Control (QC) Report with Report [X] YES [ ] NO	PRIORITY (Business Days): 4 day [P4-20%] [ ]; 3 day [P3-25%] [ ]; 2 day [P2-50%] [ ]
Phone:	778-837-9801	[X] Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E - 100%] [ ]; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] [ ]
	Company address below will appear on the final report	Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
Street:	310 - 4321 Still Creek Drive	Email 1 or Fax jgilson@morrisonhershfield.com	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
City/Province:	Burnaby, BC	Email 2	For tests that can not be performed according to the service level selected, you will be contacted.
Postal Code:	V5C 6S7	Email 3	

Invoice To		Invoice Distribution	
	Same as Report To [ ] YES [X] NO		
	Copy of Invoice with Report [ ] YES [ ] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
Company:	Resort Municipality of Whistler	Email 1 or Fax	atucker@whistler.ca
Contact:	Andrew Tucker / Accounts Payable	Email 2	ap@whistler.ca

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	RMOW-Q4	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact: C. Fuginski	Sampler: J. Gilson

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Nutrients, Anion + Cond	General	Total Metals	Dissolved Metals	VOC's	PAH / LEPH / HEPH	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	SFC-2	11-Dec-18	9:30 AM	Surf. Water	4	X	X	X					
	SFC-2B		9:30 AM		4	X	X	X					
	SFC-3		10:30 AM		4	X	X	X					
	SFC 11		10:30 AM		4	X	X	X					
	SFC 4B		11:30 AM		4	X	X	X					
	MW 2S		1 pm	Groundwater	4	X	X		X				
	MW 2D		1 pm		4	X	X		X				
	MW 3		2 pm		4	X	X		X				
	MW 4		3 pm		4	X	X		X				
	MW 6		4 pm		4	X	X		X				
	GW Inter.		4:30 pm		8	X	X		X	X	X		
	MW6 - Duplicate		4 pm		4	X	X		X				

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? [ ] YES [X] NO	- Dissolved metals were filtered
Are samples for human consumption/ use? [ ] YES [X] NO	- All preservatives were pre-loaded by lab.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	[ ]	SIF Observations	Yes [ ]	No	[ ]
Ice Packs	[ ] Ice Cubes [ ]	Custody seal intact	Yes [ ]	No	[ ]
Cooling Initiated	[ ]				

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				8	7	4	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
J. Gilson	Dec. 12/18					JC	DEC 12 2018	850AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form

APPENDIX B: 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		Conductivity	Temp	pH	D.O.	ORP	Comments
		mASML	mASML	m below top of well riser	mASL		uS/cm	C		mg/l		
MW2S	20-Mar-18	603.84	604.94	5.95	598.99		265.9	7.4	6.88	2.10	10.6	Tubing replaced
MW2D	20-Mar-18	603.84	604.9	5.97	598.93		750.0	7.5	6.61	2.64	32.0	
MW3	20-Mar-18	600.61	601.47	1.43	600.04		172.3	7.0	5.68	2.53	219.1	
MW4	20-Mar-18	596.54	677.54	4.2	673.34		311.7	7.7	6.64	2.63	19.7	
MW6	20-Mar-18	610.88	610.88	9.14	601.74		527.0	6.7	6.02	6.21	189.2	
SFC2	20-Mar-18						237.9	6.1	6.47	9.34	165.7	
SFC2B	20-Mar-18						335.4	5.2	4.69	8.60	208.2	
SFC3	20-Mar-18						265.8	4.0	6.93	12.64	187.7	
SFC11	20-Mar-18						80.1	3.5	7.15	12.85	170.4	
SFC4B	20-Mar-18						169.2	4.3	6.67	12.66	180.5	
Leachate Manhole	20-Mar-18						201.0	4.3	6.82	11.05	28.2	
GW Interceptor	20-Mar-18						743.0	8.1	6.60	2.95	41.7	Duplicate sample
MW2D	20-Jun-18	603.84	604.9	6.415	598.485		705	9	6.43	4.91	117.3	
MW2S	20-Jun-18	603.84	604.94	6.355	598.585		245.7	9.2	6.41	4.98	153.8	
MW3	20-Jun-18	600.61	601.47		601.47		153	9.2	6.51	4.7	145.8	
MW4	20-Jun-18	596.54	677.54	4.75	672.79		321.7	8.7	6.4	3.38	150.3	
MW6	20-Jun-18	610.88	610.88	5.3	605.58		481.7	9	5.87	11.57	226.7	
SFC2	20-Jun-18						226.4	8.6	5.92	7.63	203.8	Orange algae. Some flow.
SFC2B	20-Jun-18						1052	15	3.29	1.84	272.6	Bottom coated in orange algae. Small trickle flow.
SFC3	20-Jun-18						166.2	9.9	5.6	11.26	167.6	Brown algae on bottom, water flowing clear.
SFC11	20-Jun-18						82.5	7.3	6.26	10.84	178.3	Flowing. Brown algae on bottom.
SFC4B	20-Jun-18						167.3	9.5	6.77	10.4	176.2	Running clear, can see bottom. Some flow. Little to no algae.
GW Interceptor	20-Jun-18						668	12.2	6.11	0.91	120	Water appeared clear. No odour, no sheen.
MW2D	25-Sep-18	603.84	604.9	6.63	598.27		734	8.3	6.57	1.65	22.2	
MW2S	25-Sep-18	603.84	604.94	6.58	598.36		258.8	8.3	6.73	2.77	23.4	
MW3	25-Sep-18	600.61	601.47	1.68	599.79		176.6	9.9	6.05	2.75	166.2	
MW4	25-Sep-18	596.54	677.54	4.32	673.22		190.4	9.8	6.54	6.04	155.1	Removed old tubing.
MW6	25-Sep-18	610.88	610.88	4.87	606.01		386.2	10.1	6.08	3.57	324	
SFC2	25-Sep-18						283.9	10	6.72	8.11	189.2	
SFC2B	25-Sep-18						1029	11	3.23	2.76	262.8	Minimal flow. Sample taken from a pool.

Well ID	Date	Ground Surface Elevation	Top of Well Riser Elevation	Depth to Water	Static Water Level Elevation		Conductivity	Temp	pH	D.O.	ORP	Comments
		mASML	mASML	m below top of well riser	mASL		uS/cm	C		mg/l		
SFC3	25-Sep-18						172.4	8.7	6.88	10.02	137.5	
SFC11	25-Sep-18						85.5	8.3	6.77	10.78	148.5	
SFC4B	25-Sep-18						161.3	9.4	6.01	10.92	328.2	Duplicate sample.
GW Interceptor	25-Sep-18						438.9	10.6	6.01	1.07	193.9	
Leachate Manhole	25-Sep-18						568	12.3	6.26	3.35	110.2	
MW2D	11-Dec-18	603.84	604.9	5.99	598.91		715	7.2	6.39	2.99	32.9	
MW2S	11-Dec-18	603.84	604.94	5.94	599		349.8	6.8	6.08	3.96	-5.8	
MW3	11-Dec-18	600.61	601.47	1.37	600.1		183.5	8.7	6.27	4.51	77.5	
MW4	11-Dec-18	596.54	677.54	1.24	676.3		217.4	5.2	6.41	4.23	-6.9	Tubing replaced
MW6	11-Dec-18	610.88	610.88	4.98	605.9		307.4	8	6.33	5.35	60.7	Duplicate sample. Some grit/sand and small amounts of surface water may have gone down the well due to well cap.
SFC2	11-Dec-18						227	7.2	6.56	8.38	24.9	Lots of orange algae.
SFC2B	11-Dec-18						209.6	1.1	5.97	8.15	95	Lots of orange algae.
SFC3	11-Dec-18						115.9	3.8	6.56	11.3	6.57	Running clear, little to no algae.
SFC11	11-Dec-18						63.6	4.3	6.71	11.25	61	Running clear, some green algae along bottom.
SFC4B	11-Dec-18						102.2	2.8	6.87	11.39	40.2	
GW Interceptor	11-Dec-18						302.2	3.7	6.32	8.71	19.6	Very low water level. Required two grabs to fill all of the sample bottles.
Leachate Manhole	11-Dec-18											Not sampled.