MORRISON HERSHFIELD

Resort Municipality of Whistler
Landfill Annual Monitoring Report
2022

Presented to:

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WHISTLER

Report No. **210016800**

March 2023

February 27, 2023

Ministry of Environment
Coast Region
200, 10470 152nd Street,
Surrey, BC, V3R 0Y3

To Whom it May Concern:

Re: Resort Municipality of Whistler Landfill Annual Monitoring Report, 2022

Please accept our submission of the *Resort Municipality of Whistler Landfill Annual Monitoring Report, 2022*. The report presents the results and a summary of environmental issues and actions taken based on the surface water, groundwater, and landfill gas monitoring data collected in 2022, and has been completed to meet the requirements as set out in Section 3.31 of the 2005 Whistler Landfill Operational Certificate (MR-04693).

If you have any further questions or concerns, please contact me at 604-203-1783.

Yours truly,

Ian McKeachie
Resort Municipality of Whistler

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1. INTRODUCTION

This annual report incorporates monitoring data collected in 2022 for the Resort Municipality of Whistler (RMOW) former landfill site, located approximately 8 km west of Whistler Village and 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 were 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 2022 monitoring program and presents a summary of the findings.

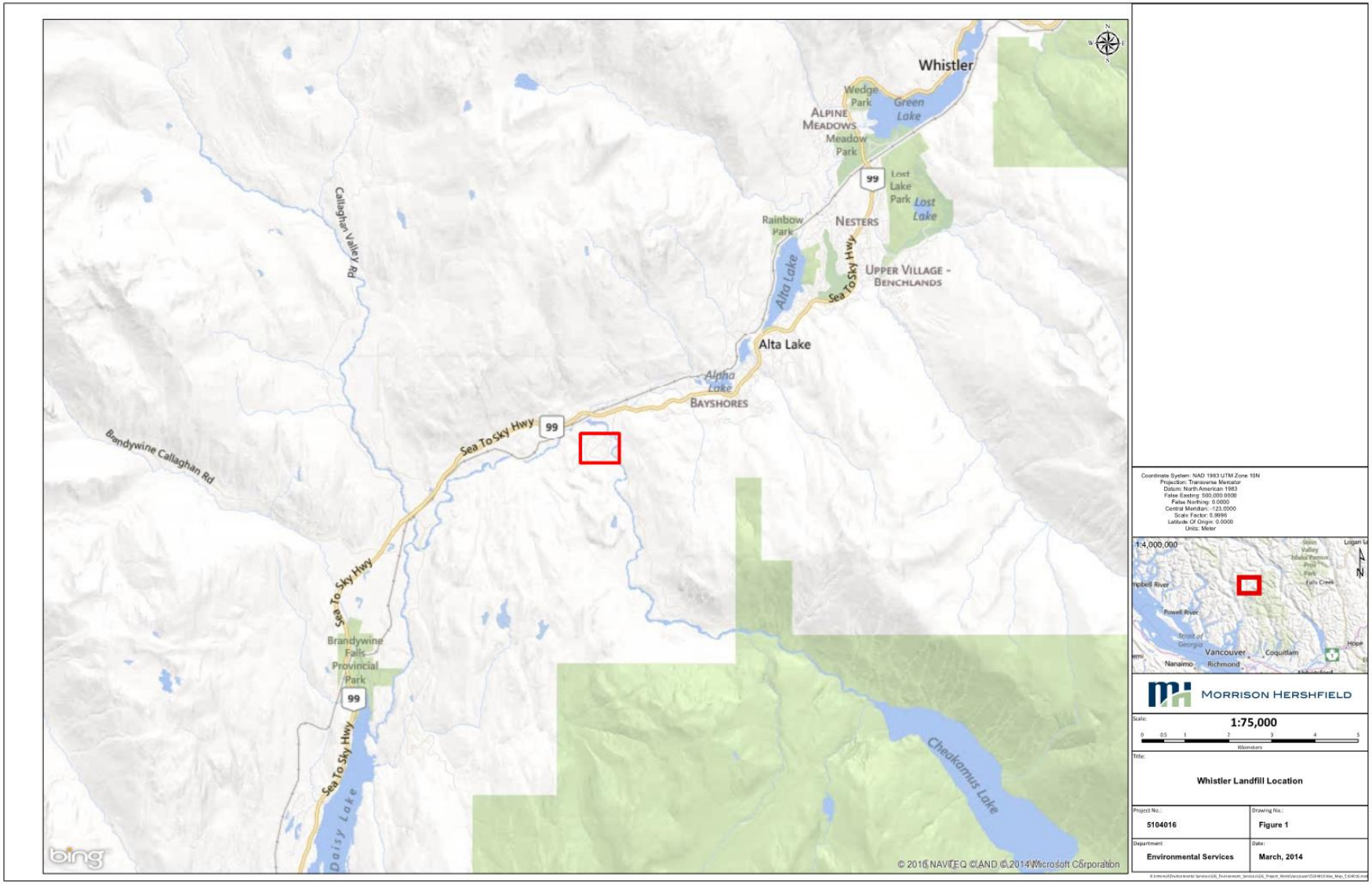

Figure 1: Whistler Closed Landfill Location

1.1 Program Objectives

The overall objective of the Whistler landfill monitoring program is identification of potential effects to the surrounding environment as a result of leachate or landfill gas (LFG) escaping the collection systems. Three distinct facets of the former landfill site were assessed: on-site surface water, groundwater, and migration of 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:

- Reporting of monitoring data collected in 2022; and
- Summary of maintenance activities that were completed on site in 2022, as well as any planned activities in 2023.

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 on the perimeter of the site, 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°C. Temperature ranges seasonally in Whistler with the coldest monthly typically being December, with an average temperature of -2.8°C (1981-2010). The warmest month with the highest average temperature is typically August, with an average temperature of 16.5°C (1981-2010). On average, November is the wettest month, but over the year an average of 1,228 mm of precipitation falls. The precipitation can be further divided into an average of 856 mm of rainfall, and 419 cm of snowfall (Environment and Climate Change Canada, 2023).

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

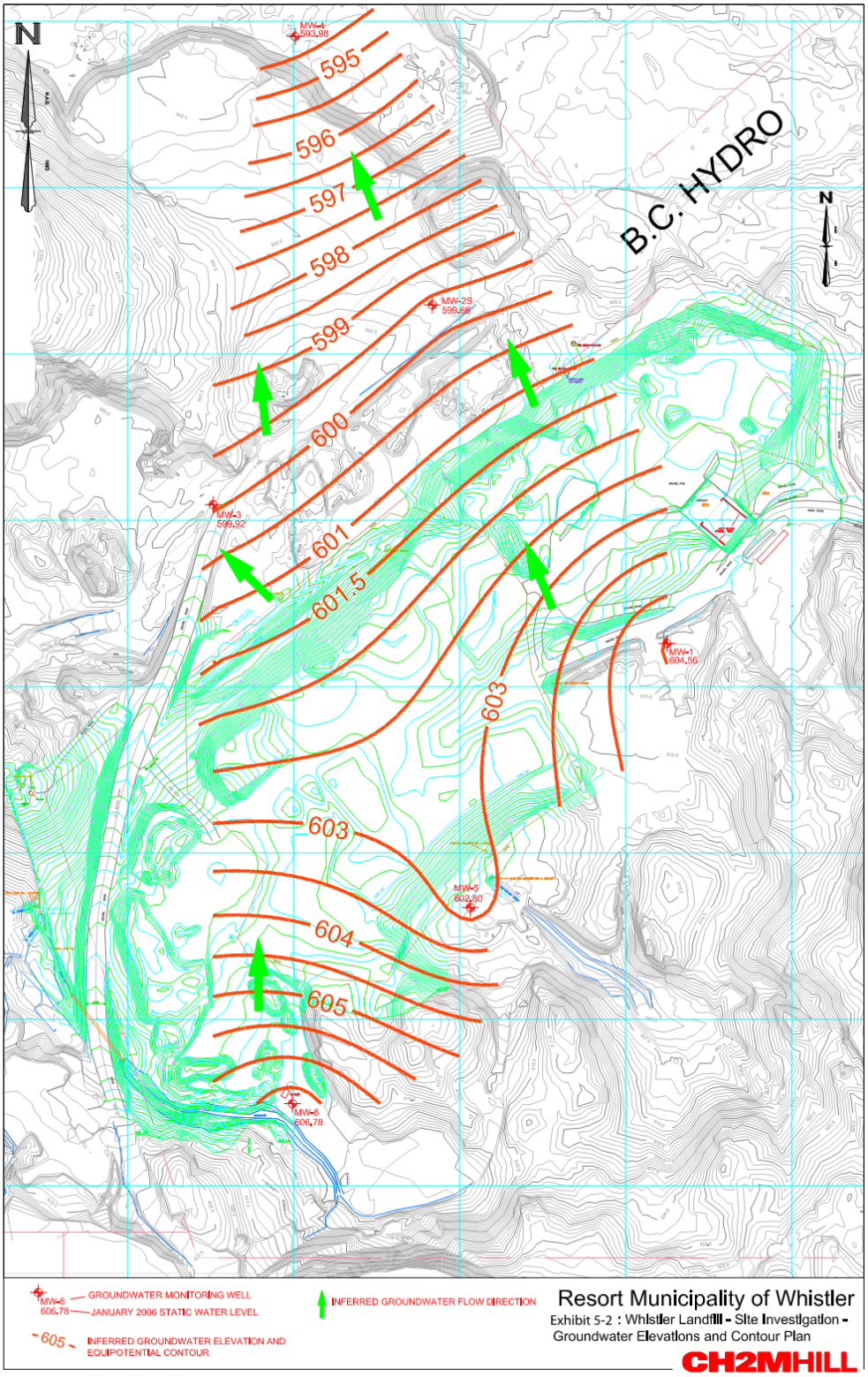

Figure 2: Groundwater Elevations and Flow Pattern at the Former Whistler Landfill Site (from CH2M Hill. 2006a)

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 2020 (Morrison Hershfield, 2020)
- Resort Municipality of Whistler Landfill Revised Monitoring Program (Morrison Hershfield, 2021)
- Whistler Landfill Gas Wellfield Investigation Report (ISWM Consulting Ltd., 2021)

Monitoring and reporting requirements established in the Closure Plan (CH2MHill 2008c) and the 2012 Revised Monitoring Program (Morrison Hershfield) were amended in the 2021 Revised Monitoring Program (Morrison Hershfield) based on a review of long-term monitoring data. The 2021 Revised Monitoring Program that was approved and implemented in November 2021 involves a reduction in the groundwater and surface water monitoring frequency from quarterly to semi-annually. A summary of the revised monitoring programs is provided in Table 1.

Table 1: Monitoring Program Summary for Groundwater, Surface Water, Leachate

Monitoring Program	Sampling Locations	Event 1 (Spring)	Event 2 (Fall)	Standards for Results Comparison (as per Landfill Closure Plan)	Guidelines for Results Discussion Comparison	Reporting Requirements
Groundwater	MW-2D MW-2S MW-3 MW-4 MW-6	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Dissolved Metals, VOCs, PAHs, and Hydrocarbons.	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Dissolved Metals, VOCs, PAHs, and Hydrocarbons.	BC Contaminated Sites Regulation, Column II, Freshwater Aquatic Life	BC Approved and Working Criteria for Water Quality	Annually
Surface Water	SFC-2 SFC-2B SFC-3 SFC-4B SFC-11	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Total Metals. *Visual Assessment:* Assess the algal moss growth in the surface water streams.	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Total Metals. *Visual Assessment:* Assess the algal moss growth in the surface water streams.	BC Contaminated Sites Regulation, Column II, Freshwater Aquatic Life	BC Approved and Working Criteria for Water Quality	Annually
Leachate	L1 (Leachate Collection Manhole)	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Dissolved Metals, VOCs, PAHs, and Hydrocarbons.	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Dissolved Metals, VOCs, PAHs, and Hydrocarbons.	BC Contaminated Sites Regulation, Column II, Freshwater Aquatic Life	BC Approved and Working Criteria for Water Quality	Annually
Groundwater Interceptor	GW Int (Upstream of Leachate Pump Station)	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Dissolved Metals, VOCs, PAHs, and Hydrocarbons.	*Field Measurements:* Temperature, pH, D.O., Conductivity, and ORP. *Laboratory Analysis:* Physical parameters, Anions & Nutrients, COD, Dissolved Metals, VOCs, PAHs, and Hydrocarbons.	BC Contaminated Sites Regulation, Column II, Freshwater Aquatic Life	BC Approved and Working Criteria for Water Quality	Annually

4. METHODOLOGY

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

The various leachate, groundwater, surface water and 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 200 mm diameter header approximately 800 m 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., MP14). 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.

Groundwater and surface water sampling was conducted semi-annually in accordance with the 2021 Revised Monitoring Program. All sampling events are tracked and reported based on a calendar year. The first sampling event in 2022 was completed in the Spring (Q1) and the last was completed in the Fall (Q3).

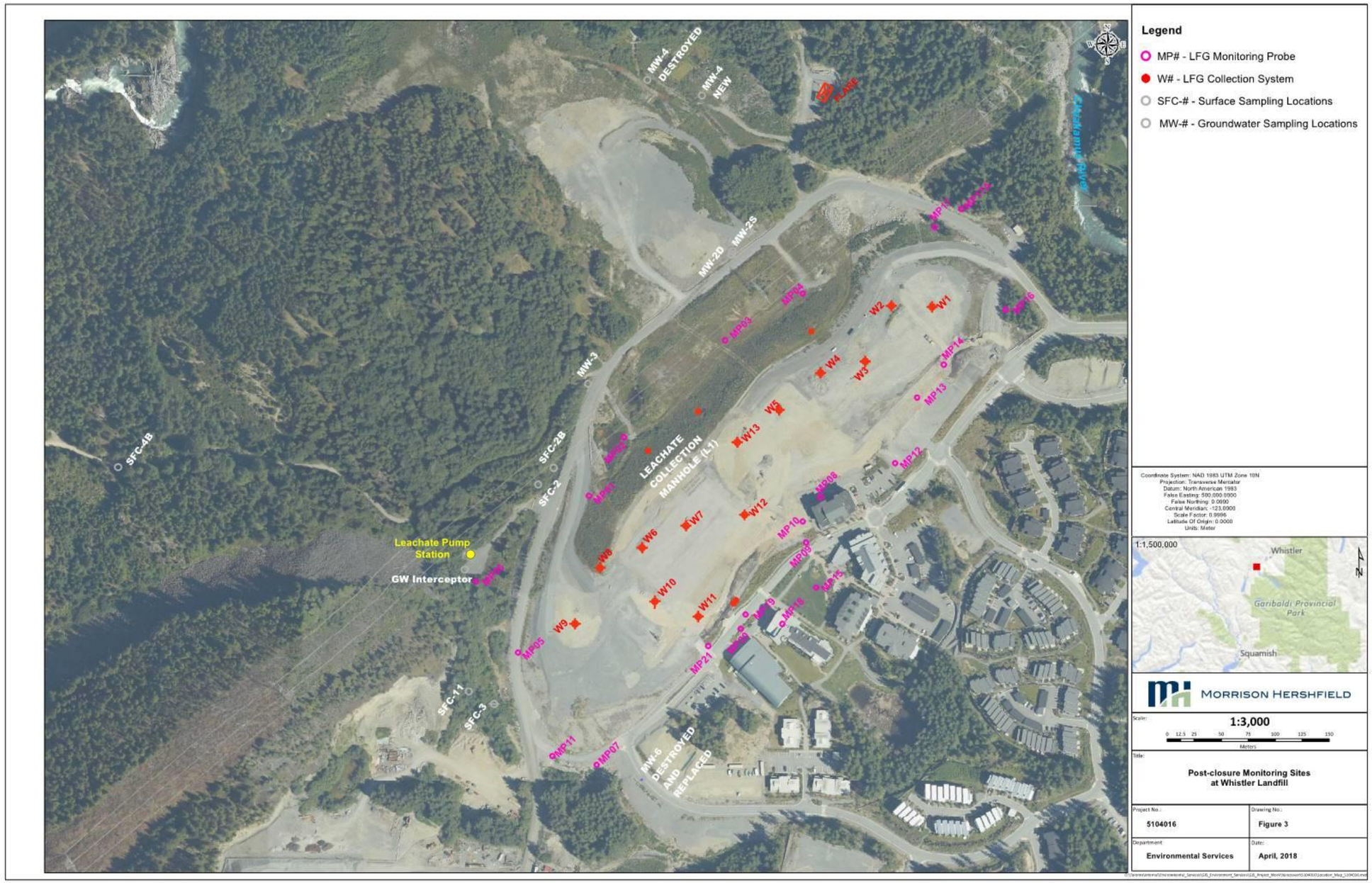

Figure 3: Post-Closure Monitoring Sites at the Closed Whistler Landfill

The 2022 leachate, groundwater, and surface water monitoring program was completed by Morrison Hershfield staff. Samples were collected on the dates shown in Table 2.

Table 2: 2022 Semi-annual Sample Collection Dates

Sample Collection Dates 2022	
Quarter 1 (Q1 2022)	March 17, 2022
Quarter 3 (Q3 2022)	September 7, 2022

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 (typically 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 (WWTP). For monitoring purposes, the leachate quality is tested as part of this monitoring program. The monitoring results help to determine source concentrations prior to any migrations and an indication for when in the future leachate treatment will no longer be required. Table 3 provides a summary of groundwater wells monitored in 2022.

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 from the Leachate Manhole during the first quarter sampling event. In addition to submitting the sample for laboratory analysis, standard leachate field parameters were measured during the sampling event. The field parameters measured include pH, temperature, dissolved oxygen, and conductivity. Field parameters were measured using a YSI model 556 multi-probe meter. A sample could not be collected from this location during the third quarter sampling event due to the low water levels in the manhole. Complete laboratory results can be found in Appendix A.

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 WWTP for treatment.

The GW Interceptor is located down-gradient from the unlined Construction and Demolition (C&D) waste cell and was (presumably) installed to minimize the potential for off-site effects 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 sampling event in 2022. Complete laboratory results can be found in Appendix A.

Table 3: 2022 Leachate Monitoring Events and Locations

Site	Site Description	Q1	Q3
Leachate Manhole	Access point manhole to leachate collection system	✔	
GW Int	Down-gradient collection pipe	✔	✔

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 effects of residential and commercial development from effects 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 other wells are down-gradient of the landfill footprint. Table 4 provides a summary of groundwater wells monitored in 2022.

Table 4: 2022 Groundwater Monitoring Events and Locations

Site	Site Description	Q1	Q3
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). A sample could not be collected from MW-4 during the third quarter sampling event due to an obstruction in the well. Laboratory analyses for all 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 (no static water level could be measured in MW-4 in Q3 because the obstruction was located above the groundwater elevation in this well).

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 last amended in July of 2021 with changes to strengthen and streamline the process of compliance verification and enforcement. 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 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

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. A sample could not be collected from SFC-2B in the third quarter of 2022 due to dry conditions; no visible surface water was present along the SFC-2B channel at the time of this sampling event. SFC-2 is located approximately 10 m downstream of SFC-2B. The source of the water in SFC-2 appears to be from a culvert that extends under the landfill in the direction of Athlete's Village. However, the Athlete's Village Pre-Design Report completed by KWL Associates Ltd. in November 2006 indicates that the culvert under the landfill has collapsed. The well was intended to maintain the groundwater table at pre-development elevations. Therefore, it is suspected that the culvert is collecting groundwater, and potentially leachate, which is being transported down-gradient to the outlet at SFC-2. Although the source of water in SFC-2 is expected to be groundwater, the site is still considered a surface water site since samples are collected from the location where the water daylights into a creek.

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

SFC-3 is located in a perimeter watercourse cross-gradient of the furthest south section of the landfill. SFC-11 is also located cross-gradient from the landfill in a tributary that originates from the southwest. The watershed for these locations do not include the landfill area (Figure 3). SFC-3 and SFC-11 are cross-gradient of the landfill and provide indicators of surface water conditions prior to any landfill related impacts.

Surface water samples were collected using the techniques outlined in CH2M Hill (2008c). Photo documentation is collected at each site for all sampling events. The photos are used to assess algae growth in the watercourses. Table 5 provides a summary of the surface water sites sampled in 2022. 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 5: 2022 Surface Water Monitoring Events and Locations

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

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 single 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 the detailed 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 snowpack, at least one month apart. Standard monitoring procedures were followed for LFG monitoring.

The following data was collected:

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

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. A concentration of 5% methane in the air is "the lower explosive limit" and concentrations equal to or greater than the LEL are considered hazardous (BC Ministry of Environment, 1996). Other parameters measured at the flare station are obtained from the programmable logic controller. The data gathered are important for assessing the overall function of the LFGCS, 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 LFGCS 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.

4.1.5 Settlement & Erosion

During the sampling events observations of any major erosion, slope instability or settlement on the closed landfill are noted if observed.

4.2 Quality Assurance and Quality Control

In addition to using an accredited laboratory, 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 of the Q1 and Q3 surface and groundwater sampling events, a travel blank was submitted for analysis. Travel blanks are used to confirm that the samples have not been contaminated during transportation from the site to the laboratory. Duplicate samples were also collected from one monitoring location during each sampling event. The samples were transported in laboratory supplied coolers, remained closed, and were only reopened in the laboratory for analysis.

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 effect 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:

- 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 8 and Table 9. Detailed laboratory results can be found in Appendix A.

The following summarizes the groundwater exceedances of the standards and the guidelines for 2022.

BC Contaminated Sites Regulation, Schedule 3.2 Aquatic Life

- No parameters exceeded the standards in 2022.

BC Ambient Water Quality Guidelines

- Alkalinity was outside of the guideline range at MW-6 in Q1.
- Arsenic concentrations exceeded the guideline at MW-2D and MW-2S in Q1 and Q3.
- Cobalt concentrations exceeded the guideline at MW-2D in Q1 and Q3, and at MW-3 and MW-4[1] in Q1.
- Iron concentrations exceeded the guideline at MW-2D and MW-2S in Q1 and Q3, at MW-3 in Q1, and at MW-6 in Q3.
- Manganese concentrations exceeded the guideline at MW-3 in Q1 and Q3, and at MW-4[1] in Q1.
- Silver concentrations exceeded the guideline at MW-2S in Q3.
- Chlorobenzene concentrations exceeded the guideline at MW-2D in Q1 and Q3.

5.1.1 Discussion

The pH at MW-3 increased compared to 2021, bringing the parameter within the guideline range in 2022.

Indicator metals, iron and manganese, were elevated at the wells down-gradient of the landfill (MW-2D, MW-2S, MW-3 and MW-4[1]), but did not exceed the BCCSR standards in 2022. These indicator parameters were consistently elevated relative to background concentrations, which suggests MW-2D, MW-2S, MW-3 and MW-4[1] have been influenced by landfill leachate. This finding is consistent with previous years (2018 – 2021).

MW-6, located up-gradient of the landfill mass and considered representative of local background conditions, had elevated levels of alkalinity (in Q1, not elevated at other wells in 2022) and iron (in Q3, also elevated at MW-2D and MW-2S in 2022). MW-6 had intermittently elevated iron levels in previous years (e.g., 2021), suggesting elevated background iron concentrations in the area, although the iron concentrations at MW-6 are substantially lower than other groundwater locations with iron exceedances on the site.

[1] Only one sampling event (Q1) could be conducted at MW-4 in 2022.

5.2 Surface Water

There are surface water monitoring locations both cross-gradient and down-gradient of the landfill. Sample locations SFC-3 and SFC-11 are cross-gradient of the landfill and represent surface water conditions prior to confluence with water impacted by the landfill area. SFC-4B is the furthest down-gradient and the closest monitoring point to the Cheakamus River.

Algae growth at the surface water sample locations was generally consistent with previous sample years. An orange algal layer was present on the watercourse bed materials for each sample event at SFC-2, although visibility was lower at SFC-2 during the Q1 event due to increased turbidity at this location. Algae increased at SFC-2 in Q3 compared to Q1. Orange algae was evident at SFC-2B in Q1; although no water was present at the SFC-2B location during the Q3 sample event, some areas of orange colouration were visible in the mud and dry channel bed in the SFC-2B area. Downstream at SFC-4B there is some algae visible, which increased later in the year in Q3 sampling event. Generally, there was little or no orange algae during any of the sampling events at SFC-3 and SFC-11.

A summary of the surface water monitoring results in comparison to the applicable standards and guidelines are provided in Table 10. Detailed laboratory results can be found in Appendix A.

The following summarizes the surface water exceedances of the standards and the guidelines for 2022.

BC Contaminated Sites Regulation, Schedule 3.2 Aquatic Life

- Copper concentrations exceeded the standard at SFC-2B[2] in Q1, and at SFC-11 in Q1 for a consecutive year (but no subsequent quarters)..

BC Ambient Water Quality Guidelines

- Aluminum concentrations exceeded the guideline at SFC-3 in Q1 and Q3, and at SFC-2, SFC-2B[2], SFC-4B, and SFC-11 in Q1.
- Chromium concentrations exceeded the guideline at SFC-2B[2] and SFC-11 in Q1.
- Copper concentrations exceeded the guideline in Q1 only at SFC-2, SFC-2B[2], SFC-3, SFC-4B, and SFC-11.
- Iron concentrations exceeded the guideline at SFC-2B[2], SFC-4B and SFC-11 in Q1 only, and in SFC-2 and SFC-3 in both Q1 and Q3.

5.2.1 Discussion

The pH at SFC-2B increased compared to 2021, bringing the parameter within the guideline range in 2022. Alkalinity and cobalt concentrations decreased compared to 2021 and were within guidelines for all sampling events in 2022. The manganese and nickel concentrations at

[2] Only one sampling event (Q1) could be conducted at SFC-2B in 2022.

SFC-2B decreased compared to Q3 of 2021 and were within guidelines in Q1 of 2022, although no sample could be collected in Q3.

Indicators of leachate influenced groundwater quality are regularly above the guidelines immediately down-gradient of the landfill footprint at SFC-2B and SFC-2. The levels of these parameters are generally greatest at SFC-2B and decrease incrementally further downstream at SFC-2 and SFC-4B.

Copper concentration was elevated above the BCCSR standards at SFC-11 during the Q1 sampling event. The copper concentration at SFC-11 was below the standard for the second sampling event in 2022.

Hardness, conductivity, sulfate, iron and manganese were consistently elevated at SFC-2B and SFC-2 relative to cross-gradient concentrations, with the exception of iron at SFC-11 which was higher than SFC-2 during the Q1 event. In general, this trend suggests that SFC-2B and SFC-2 are influenced by landfill leachate. However, elevated concentrations of iron at SFC-11 as well as other metals such as aluminum and copper that were observed at SFC-4B were also occasionally observed at cross-gradient locations SFC-3 and/or SFC-11. This suggests that surface water quality may be influenced by areas other than the landfill at these locations. At sample location SFC-11, suspended solids levels recorded during the Q1 event were higher than normal (30 mg/L compared to < 3 mg/L in Q3) which likely contributed to the higher metals concentrations (copper, aluminum, chromium, and iron) at this location.

The concentration of copper at sample location SFC-2B was in exceedance of the BCCSR standards for more than two sampling events in a row (Q1, Q2, and Q3 of 2021, and Q1 of 2022), which as per the Closure Plan indicates that contingency planning should be initiated. This is consistent with the outcome of 2021 and 2020 monitoring, so the assessment of the environmental risks established in 2020 was updated based on monitoring results and conditions observed in 2022, the findings of which are discussed below. There were three key areas that were assessed: 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.
>
> Furthermore, a trend analysis was conducted in 2019 (using data from 2010-2018) which presented summary tables for key parameters, two of which are presented below for metals in Table 6 and Table 7 below. The data summary tables, although not specific to copper, indicate the significant attenuation and dilution between sample site SFC-2B and SFC-2, as well as SFC-2 and SFC-4B. (Morrison Hershfield, 2019)

Table 6 Total Iron Summary for Surface Water (2010 – 2018)

Sample Location	Mean (mg/L)	Minimum (mg/L)	Maximum (mg/L)
SFC2B	32.3	0.480	130
SFC2	3.40	0.057	8.43
SFC3	1.94	0.09	30.3
SFC4	1.02	0.062	4.89
SFC11	0.454	0.028	8.68

Table 7 Total Manganese Summary for Surface Water (2010 – 2018)

Sample Location	Mean (mg/L)	Minimum (mg/L)	Maximum (mg/L)
SFC2B	4.65	0.539	11.0
SFC2	1.27	0.010	3.36
SFC4	0.296	0.0001	1.08
SFC3	0.149	0.011	2.01
SFC11	0.016	0.002	0.236

Flow: SFC-2B is a drainage feature that is often dry or only standing water during Q3 sampling events (as was the case in Q3 of 2022). Throughout the year the flow contribution to the downstream environment in SFC-2 and SFC-4B is very minimal.

Habitat: A formal fish habitat assessment has not been completed at SFC-2B, however there have been no observations of fish or other aquatic life at this site. SFC-2B is dense with vegetation, has intermittent flow, and the pH is not considered ideal for aquatic species (generally too low). 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 this location supports fish.

5.3 Leachate & Groundwater Interceptor

A summary of the leachate monitoring results in comparison to the applicable standards and guidelines are provided in Table 11 and Table 12. Detailed laboratory results can be found in Appendix A.

The following summarizes the leachate exceedances of the standards and the guidelines for 2022.

BC Contaminated Sites Regulation, Schedule 3.2 Aquatic Life

- No parameters exceeded the standards in 2022.

BC Ambient Water Quality Guidelines

- Copper concentrations exceeded the guideline at the Leachate Manhole in Q1[3].
- Iron concentrations exceeded the guideline at the Groundwater Interceptor in Q1 and Q3.

[3] Only one sampling event (Q1) could be conducted at the Leachate Manhole in 2022.

- Zinc concentrations exceeded the guideline at the Leachate Manhole in Q1[3].
- Fluoranthene concentrations exceeded the guideline at the Groundwater Interceptor in Q1.
- Pyrene concentrations exceeded the guideline at the Groundwater Interceptor in Q1.

5.3.1 Discussion

The concentrations of copper and zinc were higher at the Leachate Manhole than at the Groundwater Interceptor in Q1 of 2022. Concentrations of indicator parameters (conductivity, hardness, and sulfate) as well as iron at the Groundwater Interceptor were generally higher than the Leachate Manhole in Q1 of 2022, which is consistent with results from 2021. Concentrations of some polycyclic aromatic hydrocarbons (PAHs) were also higher at the Groundwater Interceptor than at the Leachate Manhole. In particular, measurable concentrations of fluoranthene and pyrene were found in all quarters in the Groundwater Interceptor.

5.4 Landfill Gas

Testing was performed monthly during the months without snow cover (May – November). During the months with snowpack (January – April and– December) testing was completed weekly. A summary of the landfill gas monitoring results is provided in Table 13.

On January 28th, methane was detected in trace amounts at monitoring point (MP) #12 and #14, northeast of the site. Remedial action was taken immediately. The flare flow was increased, vacuum to Well #11 was reduced and the off-site migration resolved.

On December 30th, trace amounts of methane were again detected at MP #12 and #14. It was discovered that a breaker for the main heat trace cable had been tripped. The breaker was re-set, and following an overnight thaw, sampling was completed the following day with no methane detected at any MPs. Based on 2022 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, with the exception of these two events.

5.4.1 Maintenance Activities

Routine maintenance of monitoring probes and vertical wells were completed on as needed basis during monitoring activities by Norseman Engineering.

- On January 28, 2022, trace methane was detected at monitoring points #12 and #14. The flare flow was increased, the vacuum to Well #11 was reduced, and the offsite migration was eliminated. Adjustments to the flare and wells continued to be made in winter 2022 and were effective at containing offsite migration. No further offsite migration was recorded in winter 2022.
- In April 2022, a Methane Emission Scan was conducted for the entire landfill by iSWM Consulting. It was determined that there was a “hot spot” in area 8, approximately 50 m northeast of extraction Well #1, suspected to be caused by

improper installation of the PVC pipe for Well #1 resulting in restriction of the well vacuum. Norseman Engineering repaired the well and increased the vacuum, following which surface methane emissions at the hot spot were tested. Results indicated that the hot spot had been eliminated; however, in May, wells #3 and #5 were adjusted to increase vacuum in the hot spot area to prevent any recurrence.

- On June 23, 2022, the vacuum to the south wells was noticed to be zero, so the low spot on the LFG transmission line was pumped out using a 1.25 in. diameter PVC flex hose to remove condensate, which gradually accumulates throughout the year and causes oscillations in the vacuum and flow to the flare. Pumping was continuous for over two minutes, for removal of several hundred liters of liquid. Successful pumping was confirmed with flare start-up; no oscillations in the flow or vacuum were detected. Subsequent monitoring point testing completed on June 27 indicated no off-site landfill gas migration as a result of condensate accumulation, and that the vacuum had steadied at a higher rate. Two previous attempts had been made unsuccessfully to pump out the LFG transmission line, however, the sizing of the PVC flex hose used for the pump out was not correct; in the first case the hose was too large to allow sufficient suction (1.5 in. diameter), and in the second it was too small and not stiff enough to feed to a sufficient depth in the pipe (1 in. diameter).
- The June pump out of the LFG transmission line improved the vacuum in wells #11 and #12, so in July the vacuum at these wells was reduced accordingly.
- In July, the methane content at the flare was lower (24%) compared to June (28%), likely as a result of improved flow following LFG transmission line pump out and the hot, dry weather reducing landfill moisture. The flare flow was reduced in order to improve the methane content going into the fall. Readings in August indicated that the methane content of the flare had increased to 31%, which is a desirable level approaching winter; the methane content was increased to maintain this level.
- In October, methane content at the flare was measured at 36%, and the flare flow was again increased slightly to maintain methane at this level going into winter.
- In November, methane content at the flare was measured at 31%. During this visit, operational issues were encountered with the flare, and it went out during the visit. Norseman re-lit the flare but encountered problems with use of the pilot; although the reason for the problem was unclear, it was suspected to be related the spark plug, so a new spark plug was obtained to be kept on hand in case of future issues. Methane content stayed relatively constant at 30% until a cold and snowy period starting around December 15.
- Due to heavy snow and poor road conditions affecting the availability of rental equipment, the originally scheduled December 23 site visit was delayed to December 30. At the December 30 visit, it was noted that there was no flame, and the blower was operating with no flow of gas delivered to the flare. It was discovered that the breaker to a heat trace cable had tripped. The issue was corrected, and the system but it was expected to take a day for the heat trace to thaw the system, so it was re-started in order to restore flow to the flare and to keep

methane levels at monitoring points down. Norseman returned the following day to restart the system normally following thaw.

- Well testing could not be conducted until there was flow, and therefore vacuum, restored to the field. During testing on December 30, it was found that there was a small amount of methane detected at monitoring points #12 and #14 at the level of about 1%, likely due to the fact that there had been no flow to the flare for several days. However, after flare operation was re-established successfully, testing on December 31 showed that methane at these monitoring points had dropped back to zero.

5.5 Settlement & Erosion

During the 2022 sampling events there were no major settlement areas or areas of erosion identified.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Groundwater, Surface Water & Leachate

6.1.1 Monitoring

Data from the 2022 monitoring results are generally consistent with the results from previous years' monitoring, including elevated copper concentrations at SFC-2B (although only one sample could be collected at this location in 2022).

Overall, we have recommended continued monitoring according to the bi-annual program implemented in 2021

Groundwater

- Indicators of leachate influenced groundwater quality are present in locations down-gradient of the landfill mass (MW-2S / MW-2D and MW-3), and further down-gradient of the landfill (MW-4).
- Metals such as arsenic, silver, cobalt, iron, and manganese continue to exceed the guidelines.
- Chlorobenzene concentrations exceeded guidelines at MW-2D.
- Down-gradient of the landfill there are no groundwater points of diversion / users.

Based on the elements noted above, continued monitoring of groundwater in 2023 is recommended and required as per the Closure Plan.

Surface Water

- Surface water samples at SFC-2B continued to exceed the standard for copper, a trend also observed in 2021, 2020, 2018, and 2017. Based on the analysis of potential impact to human health and the environment from the zone of influence, flow and habitat value, it was decided that contingency planning is not warranted for SFC-2B at this time. No new actions are required at SFC-2B. Surface water sampled at SFC-11 exceeded the standard for copper.
- Hardness, conductivity, sulfate, copper, and manganese were regularly elevated at SFC-2B and SFC-2 relative to cross-gradient concentrations. This is consistent with historic sampling events and suggests that these locations are influenced by landfill leachate.
- Iron concentrations were occasionally elevated at SFC-4B and at cross-gradient locations SFC-3 and SFC-11, which suggests that there may be some surface water quality influence at these locations that is unrelated to the landfill site.

- Surface water sampling location SFC-4B is the nearest to the Cheakamus River, therefore this location provides the best indication of potential effects to receiving water quality resulting from the site, and all BC CSR standards were met at this location. Continued surface water monitoring in 2023 is recommended and required as per the Closure Plan.

Leachate

- Copper, iron, and zinc continue to exceed the guidelines.
- Pyrene and fluoranthene continued to exceed guidelines at the Groundwater Interceptor location in Q1, but returned to acceptable levels in Q2

Continued monitoring is recommended in 2023 for leachate to assist in determining source concentrations of contaminants of concern and when in the future leachate treatment will no longer be required.

6.1.2 Maintenance

There are no recommended maintenance activities for 2023.

6.2 Landfill Gas

6.2.1 Monitoring & Maintenance

As per recommendations from 2021, site investigations were conducted in 2022 for assessment of fugitive methane emissions, as well as wellfield inspection and cleanup. A full letter report on these field programs is available (ISWM Consulting Ltd., 2021). The major conclusions and recommendations of this program were as follows:

- Investigations showed that the Whistler Landfill closure system is effectively eliminating methane emissions from this site. The estimated methane emission rate is considered very low with no risk to vegetation and/or public.
- During the methane emission surface scan in April 2022, a methane emission hotspot was identified in the same approximate location as in 2021, 50 m northeast of Well #1. Well inspection identified improper installation of the 2” PVC pipe which then restricted the vacuum. A recommendation was made to shorten the 2” PVC pipe in Well #1. Repairs to Well #1 were completed and during subsequent testing, the hot spot appeared to have been corrected.
- In November 2022, the flare failed and needed to be relit manually. A replacement spark plug was obtained to have onsite in case of recurrence.
- A heat trace breaker was tripped in December 2022, causing flow to the flare to stop, which was identified during a site visit on December 30. The flare was relit, and the system run in a test mode using a manual override until the heat trace could re-thaw the system overnight. Well testing on December 30 indicated trace methane in wells #12 and #14, but normal operation was resumed on December 31 and well-testing following day indicated that methane levels at all wells had reduced back to zero.

6.3 Settlement & Erosion

6.3.1 Monitoring & Maintenance

Continued monitoring for any settlement or erosions issues is recommended to continue in 2023. No maintenance activities are recommended at this time.

7. DISCLAIMER

RMOW retained Morrison Hershfield to conduct the work described in this report, and this report has been prepared solely for this purpose.

Morrison Hershfield does not accept responsibility for the use of this report for any purpose other than that stated above and does not accept responsibility to any third party for the use, in whole or in part, of the contents of this document. This report should be understood in its entirety, since sections taken out of context could lead to misinterpretation.

This report does not constitute a legal opinion, and the report was prepared for the sole benefit of RMOW. Any use by RMOW, its sub-consultants or any third party, or any reliance on or decisions based on this document, are the responsibility of the user or third party.

8. CLOSURE

We trust the information presented in this report meets your requirements. If you have any further questions or need additional details, please do not hesitate to contact one of the undersigned.

Forms verifying the competency of the team and disclosure of any potential conflicts of interest have been provided in Appendix C.

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TABLE 8: 2022 GROUNDWATER QUALITY - GENERAL CHEMISTRY AND DISSOLVED METALS

				Sample ID	MW-2D		MW-2S		MW-3		MW-4	MW-6	
				Date Sampled	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	17-Mar-22	7-Sep-22
				Quarter	Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q1	Q3
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW***	**BCAWWQG-FAL****									
Field Parameters													
Field Conductivity	uS/cm	-	-	-	731.0	710.0	259.4	241.5	123.3	88.8	367.8	606.0	462.5
Temperature	C	-	-	-	6.8	9.1	6.7	9	6.9	8.8	7.7	7.3	10.7
pH	-	-	-	-	6.8	6.76	6.86	6.95	6.17	6.26	6.19	6.64	6.52
Dissolved Oxygen	mg/L	-	-	-	3.32	2.71	2.82	3.54	1.97	1.52	6.19	8.15	2.87
Oxidation Reduction Potential	-	-	-	-	86.1	107.9	86.3	96.1	116.4	132.1	98.2	159.7	117.3
General Chemistry													
Conductivity	uS/cm	2	-	-	958	958	281	324	173	125	398	865	637
Hardness (as CaCO3)	mg/L	0.5	-	-	323	312	100	93.0	46.7	31.8	148	172	110
pH	pH	0.1	-	6.5 - 9.0	7.14	6.77	7.17	6.86	6.86	6.70	7.01	6.98	7.01
Total Suspended Solids	mg/L	3	-	-	89.5	82.8	53.5	32.0	7.7	4.8	143	160	191
COD	mg/L	20	-	-	45	42	<20	37	<20	16	58	31	73
Anions and Nutrients													
Alkalinity, Total (as CaCO3)	mg/L	1.0	-	Ca based <10 @ Ca < 4 mg/L 10-20 @ Ca 5-8 mg/L >20 @ Ca > 8 mg/L	316	301	90.2	96.9	28.9	30.7	141	17.8	51.9
Ammonia, Total (as N)	mg/L	0.0050	pH & Temp based 1.31 @ pH >= 8.5 3.7 @ pH 8.0-8.5 11.3 @ pH 7.5-8.0 18.5 @ pH 7.0-7.5 18.4 @ pH < 7.0	pH & Temp based 0.681 - 28.7	14.5	14.3	3.19	3.64	0.435	0.315	2.22	<0.0050	0.0219
Bromide (Br)	mg/L	0.050	-	-	<0.250	<0.250	<0.050	<0.050	<0.050	<0.050	0.054	<0.250	<0.250
Chloride (Cl)	mg/L	0.50	1500	600	56.2	47.6	9.87	8.71	12.9	7.59	20.2	200	116
Fluoride (F)	mg/L	0.020	H based 2 @ H < 50 3 @ H >= 50	H based 0.4 @ H < 10 Equation @ H > 10	<0.100	<0.100	0.095	0.132	0.022	0.020	0.033	<0.100	<0.100
Nitrate and Nitrite (as N)	mg/L	0.0051	400	-	<0.0255	<0.0255	0.0068	0.0226	0.745	0.505	0.0430	0.265	0.115
Nitrate (as N)	mg/L	0.0050	400	33	<0.0250	<0.0250	0.0068	0.0226	0.745	0.505	0.0430	0.265	0.115
Nitrite (as N)	mg/L	0.0010	Cl based 0.2 @ Cl < 2 mg/L 0.4 @ Cl 2-4 mg/L 0.6 @ Cl 4-6 mg/L 0.8 @ Cl 6-8 mg/L 1.0 @ Cl 8-10 mg/L 1.2 @ Cl > 10 mg/L	Cl based 0.06 @ Cl < 2 mg/L 0.12 @ Cl 2-4 mg/L 0.18 @ Cl 4-6 mg/L 0.24 @ Cl 6-8 mg/L 0.30 @ Cl 8-10 mg/L 0.60 @ Cl > 10 mg/L	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	14.0	14.8	3.31	3.50	0.594	0.406	2.38	0.680	0.729
Total Nitrogen	mg/L	0.030	-	-	14.7	14.6	3.32	3.53	1.19	0.486	2.31	0.880	0.989
Phosphorus (P)-Total	mg/L	0.0020	-	15	0.115	0.0972	0.0496	0.0665	0.0046	0.0094	0.0881	0.942	1.14
Sulfate (SO4)	mg/L	0.30	H based 1280 @ H <= 30 2180 @ H 31-75 3090 @ H 76-180 4290 @ H >180	H based 128 @ H <= 30 218 @ H 31-75 309 @ H 76-180 429 @ H >180	117	130	36.1	52.2	33.7	16.2	39.4	83.5	77.6
Dissolved Metals													
Aluminum (Al)-Dissolved	mg/L	0.0010	-	pH based 0.1 @ pH >= 6.5 Equation @ pH < 6.5	0.0032	0.0100	0.0029	0.0083	0.0195	0.0135	<0.0010	0.0078	0.0127
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
Arsenic (As)-Dissolved	mg/L	0.00010	0.05	0.005	0.0130	0.0135	0.00658	0.00658	<0.00010	<0.00010	<0.00010	<0.00010	0.00045
Barium (Ba)-Dissolved	mg/L	0.00010	10	1	0.0450	0.0445	0.0794	0.0765	0.0613	0.0617	0.160	0.0429	0.0433
Beryllium (Be)-Dissolved	mg/L	0.00010	0.0015	0.00013	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000020	<0.000100	<0.000100
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
Boron (B)-Dissolved	mg/L	0.010	12	1.2	0.238	0.211	0.085	0.074	<0.010	<0.010	0.066	0.013	0.012
Cadmium (Cd)-Dissolved	mg/L	0.0000050	H based 0.0005 @ H <30 0.0015 @ H 30-<90 0.0025 @ H 90-<150 0.0035 @ H 150-<210 0.004 @ H >= 210	H based 0.00002 @ H < 7 Equation @ H > 7	0.0000068	<0.0000100	<0.0000050	<0.0000050	0.000266	0.0000788	0.000508	0.0000370	0.0000225
Calcium (Ca)-Dissolved	mg/L	0.050	-	-	109	105	32.1	30.0	14.2	9.80	48.2	58.9	37.2
Cesium (Cs)-Dissolved	mg/L	0.000010	-	-	0.000021	0.000017	0.000014	0.000014	0.000040	0.000032	0.000039	0.000012	<0.000010
Chromium (Cr)-Dissolved	mg/L	0.00010	0.01	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.00010	0.04	0.004	0.0106	0.0104	0.00188	0.00161	0.0102	0.00128	0.0251	<0.00010	0.00104
Copper (Cu)-Dissolved	mg/L	0.00020	H based 0.02 @ H < 50 0.03 @ H 50 - <75 0.04 @ H 75 - <100 0.05 @ H 100 - < 125 0.06 @ H 125 - <150 0.07 @ H 150 - < 175 0.08 @ H 175 - <200 0.09 @ H >= 200	H based (0.094(H)+2) / 1000	0.0193	<0.00020	0.00366	<0.00020	0.00361	0.00124	0.00073	0.00093	0.00119
Iron (Fe)-Dissolved	mg/L	0.010	-	0.35	49.1	47.5	33.5	29.8	0.690	0.046	0.019	0.015	2.14
Lead (Pb)-Dissolved	mg/L	0.000050	H based 0.04 @ H <50 0.05 @ H 50 - <100 0.06 @ H 100 - <200 110 @ H 200 - <300 160 @ H >= 300	0.003	0.000064	<0.000050	0.000117	<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	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.0050	-	-	12.3	12.0	4.87	4.40	2.73	1.78	6.96	6.09	4.10
Manganese (Mn)-Dissolved	mg/L	0.00010	-	H based 0.01102*H +0.54	3.05	3.02	1.21	1.11	1.92	0.927	2.44	0.00644	0.127
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
Molybdenum (Mo)-Dissolved	mg/L	0.000050	10	2	0.0129	0.0123	0.00382	0.00401	0.000617	0.000704	0.00163	0.00150	0.00226
Nickel (Ni)-Dissolved	mg/L	0.00050	H based 0.25 @ H < 60 0.65 @ H 60 - <120 1.1 @ H 120 - < 180 1.5 @ H >= 180	0.025	0.00222	0.00206	0.00066	0.00053	0.00143	<0.00050	0.00274	<0.00050	<0.00050
Phosphorus (P)-Dissolved	mg/L	0.050	-	-	0.102	0.094	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	0.050	-	-	20.1	20.3	6.38	6.56	2.03	2.68	6.10	3.80	4.13
Rubidium (Rb)-Dissolved	mg/L	0.00020	-	-	0.0114	0.0113	0.00409	0.00404	0.00695	0.00656	0.00431	0.00573	0.00485
Selenium (Se)-Dissolved	mg/L	0.000050	0.02	0.002	0.000095	0.000072	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved	mg/L	0.050	-	-	13.4	13.7	8.16	8.54	6.18	6.08	9.95	5.41	6.15
Silver (Ag)-Dissolved	mg/L	0.000010	H based 0.0005 @ H <= 100 0.015 @ H > 100	0.00005	<0.000010	0.000016	<0.000010	0.000096	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	0.050	-	-	40.3	40.9	6.84	8.19	10.3	7.22	16.1	88.5	75.9
Strontium (Sr)-Dissolved	mg/L	0.00020	-	-	0.555	0.549	0.188	0.183	0.0916	0.0940	0.278	0.668	0.383
Sulfur (S)-Dissolved	mg/L	0.50	-	-	40.6	44.2	12.0	16.3	10.7	5.04	12.5	29.9	26.8
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
Thallium (Tl)-Dissolved	mg/L	0.000010	0.003	0.0008	0.000031	<0.000010	<0.000010	<0.000010	0.000081	0.000040	0.000029	0.000029	0.000024
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
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
Titanium (Ti)-Dissolved	mg/L	0.00030	1	-	<0.00030	<0.00030	<0.00030	<0.00030	<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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved	mg/L	0.000010	0.085	0.0085	0.000130	0.000134	0.000014	0.000010	<0.000010	<0.000010	0.000040	<0.000010	0.000019
Vanadium (V)-Dissolved	mg/L	0.00050	-		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.0010	H based 0.075 @ H <90 0.15 @ H 90 -<100 0.9 @ H 100 - <200 1.65 @ H 200 - <300 2.4 @ H 300 - <400	H based 0.033 @ H =< 90 Equation @ H > 90	0.0039	0.0011	0.0068	0.0032	0.0051	0.0018	0.0027	<0.0010	0.0011
Zirconium (Zr)-Dissolved	mg/L	0.000060	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00030	<0.00020	<0.00020

***Standard: British Columbia Contaminated Sites Regulation (July, 2021) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (August, 2019) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 9: 2022 GROUNDWATER QUALITY - PETROLEUM HYDROCARBONS

				Sample ID	MW-2D		MW-2S		MW-3		MW-4	MW-6	
				Date Sampled	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	17-Mar-22	7-Sep-22
				Quarter	Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q1	Q3
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
Bromodichloromethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bromoform	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
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
Chlorobenzene	mg/L	0.0010	0.013	0.0013	0.00211	0.0023	<0.00050	<0.00050	<0.00050	<0.00050	0.00055	<0.00050	<0.00050
Dibromochloromethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chloroethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chloroform	mg/L	0.0010	0.02	0.0018	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chloromethane	mg/L	0.0050	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
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
1,3-Dichlorobenzene	mg/L	0.0010	1.5	0.15	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,4-Dichlorobenzene	mg/L	0.0010	0.26	0.026	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1-Dichloroethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,2-Dichloroethane	mg/L	0.0010	1	0.1	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1-Dichloroethylene	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cis-1,2-Dichloroethylene	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
trans-1,2-Dichloroethylene	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Dichloromethane	mg/L	0.0050	0.98	0.0981	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
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
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
1,3-Dichloropropene (cis & trans)	mg/L	0.0010	-	-	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Ethylbenzene	mg/L	0.0010	2	0.2	<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
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
1,1,1,2-Tetrachloroethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
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
Tetrachloroethylene	mg/L	0.0010	1.1	0.11	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.00045	0.005	0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
1,1,1-Trichloroethane	mg/L	0.0010	-	11.1	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,1,2-Trichloroethane	mg/L	0.00050	-	0.021	<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	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Trichlorofluoromethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Vinyl Chloride	mg/L	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	-	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
meta- & para-Xylene	mg/L	0.00050	-	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes	mg/L	0.00075	0.3	0.03	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
4-Bromofluorobenzene (SS)	%	Surrogate	-	-	87.3	88.4	84.8	91.4	83.2	87.5	83.8	98.0	85.9
1,4-Difluorobenzene (SS)	%	Surrogate	-	-	96.9	101	95.3	101	94.3	102	96.3	94.3	101
Hydrocarbons													
EPH10-19	mg/L	0.25	5	-	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
EPH19-32	mg/L	0.25	-	-	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
LEPH	mg/L	0.25	0.5	-	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
HEPH	mg/L	0.25	-	-	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Volatile Hydrocarbons (VH6-10)	mg/L	0.10	15	-	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
VPH (C6-C10)	mg/L	0.10	1.5	-	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
2-Bromobenzotrifluoride	%	Surrogate	-	-	105	79.0	97.7	83.9	95.3	82.5	92.8	97.3	86.0
3,4-Dichlorotoluene (SS)	%	Surrogate	-	-	114	79.2	126	89.5	114	93.2	120	126	76.1
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
Acenaphthylene	mg/L	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
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
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
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
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
Benzo(b+j+k)fluoranthene	mg/L	0.000015	-	-	<0.000015	<0.000015	<0.000015	<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
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
Chrysene	mg/L	0.000010	0.001	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
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
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
Fluorene	mg/L	0.000010	0.12	0.012	<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
1-Methylnaphthalene	mg/L	0.000050	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
2-Methylnaphthalene	mg/L	0.000050	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Naphthalene	mg/L	0.000050	0.01	0.001	<0.0000050	<0.000050	<0.0000050	<0.000050	<0.0000050	<0.000050	<0.0000050	<0.0000050	<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
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	<0.000010
Quinoline	mg/L	0.000050	0.034	0.0034	<0.0000050	<0.000050	<0.0000050	<0.000050	<0.0000050	<0.000050	<0.0000050	<0.0000050	<0.000050
Acridine d9	%	Surrogate	-	-									
Chrysene d12	%	Surrogate	-	-	106	100	110	99.6	101	98.1	98.8	100	101
Naphthalene d8	%	Surrogate	-	-	98.8	95.4	101	97.5	97.6	91.2	93.3	99.6	95.6
Phenanthrene d10	%	Surrogate	-	-	106	106	111	109	102	102	95.6	102	106

***Standard: British Columbia Contaminated Sites Regulation (July, 2021) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (August, 2019) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 10: 2022 SURFACE WATER QUALITY - GENERAL CHEMISTRY AND METALS

				Sample ID	SFC-2		SFC-2B	SFC-3		SFC-4B		SFC-11	
				Date Sampled	17-Mar-22	7-Sep-22	17-Mar-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22
				Quarter	Q1	Q3	Q1	Q1	Q3	Q1	Q3	Q1	Q3
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW***	**BCAWWQG-FAL****									
Field Parameters													
Field Conductivity	uS/cm	-	-	-	203.9	203.6	184.2	163.3	98	133.3	210.9	17.8	98.3
Temperature	C	-	-	-	5.5	9.4	3.6	3.3	10.1	3.8	11.1	3.1	6.8
pH	pH	-	-	-	6.56	6.75	5.86	7.26	6.82	7.2	7.17	7.23	6.56
Dissolved Oxygen	mg/L	-	-	-	10.82	6.19	10.03	13.7	4.66	13.76	7.27	14.53	7.54
Oxidation Reduction Potential	-	-	-	-	132.9	122.3	149.2	107.6	85.9	138.6	100.5	105.2	95.8
General Chemistry													
Conductivity	uS/cm	2	-	-	307	287	293	278	134	211	278	82.1	147
Hardness (as CaCO3)	mg/L	0.5	-	-	99.6	102	114	46.1	46.2	55.6	92.7	31.1	52.0
pH	pH	0.1	-	6.5 - 9.0	7.42	7.32	6.68	7.31	7.32	7.44	7.53	7.25	7.25
Total Suspended Solids	mg/L	3	-	-	15.5	6.4	30.8	12.4	12.2	8.4	<3.0	30.0	<3.0
COD	mg/L	20	-	-	56	12	<20	<20	12	<20	<10	<20	<10
Anions and Nutrients													
Alkalinity, Total (as CaCO3)	mg/L	1.0	-	Ca based <10 @ Ca < 4 mg/L 10-20 @ Ca 5-8 mg/L >20 @ Ca > 8 mg/L	45.0	60.8	15.8	25.7	35.5	29.9	46.4	23.0	32.8
Ammonia, Total (as N)	mg/L	0.0050	pH & Temp based 1.31 @ pH >= 8.5 3.7 @ pH 8.0-8.5 11.3 @ pH 7.5-8.0 18.5 @ pH 7.0-7.5 18.4 @ pH < 7.0	pH & Temp based 0.681 - 28.7	0.171	0.304	0.160	0.0056	0.0122	0.0510	0.0060	<0.0050	0.0064
Bromide (Br)	mg/L	0.050	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.076	<0.050	<0.050
Chloride (Cl)	mg/L	0.50	1500	600	24.3	22.6	3.19	54.2	10.9	26.3	36.5	3.98	12.4
Fluoride (F)	mg/L	0.020	H based 2 @ H < 50 3 @ H >= 50	H based 0.4 @ H < 10 Equation @ H > 10	0.083	0.039	0.127	0.049	0.043	0.061	0.051	0.057	0.043
Nitrate and Nitrite (as N)	mg/L	0.0051	400	-	1.83	0.282	5.24	0.332	0.0516	0.562	0.309	0.418	0.614
Nitrate (as N)	mg/L	0.0050	400	33	1.83	0.282	5.24	0.332	0.0516	0.561	0.309	0.416	0.614
Nitrite (as N)	mg/L	0.0010	Cl based 0.2 @ Cl < 2 mg/L 0.4 @ Cl 2-4 mg/L 0.6 @ Cl 4-6 mg/L 0.8 @ Cl 6-8 mg/L 1.0 @ Cl 8-10 mg/L 1.2 @ Cl > 10 mg/L	Cl based 0.06 @ Cl < 2 mg/L 0.12 @ Cl 2-4 mg/L 0.18 @ Cl 4-6 mg/L 0.24 @ Cl 6-8 mg/L 0.30 @ Cl 8-10 mg/L 0.60 @ Cl > 10 mg/L	0.0016	<0.0010	0.0053	<0.0010	<0.0010	0.0013	<0.0010	0.0021	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	0.476	0.372	0.828	0.134	0.180	0.176	0.079	0.141	0.117
Total Nitrogen	mg/L	0.030	-	-	2.05	0.651	5.60	0.419	0.135	0.666	0.352	0.500	0.624
Phosphorus (P)-Total	mg/L	0.0020	-	15	0.0335	0.0044	0.0822	0.0700	0.0261	0.0353	<0.0020	0.0929	0.0091
Sulfate (SO4)	mg/L	0.30	H based 1280 @ H <= 30 2180 @ H 31-75 3090 @ H 76-180 4290 @ H >180	H based 128 @ H <= 30 218 @ H 31-75 309 @ H 76-180 429 @ H >180	56.5	41.5	92.9	20.2	12.9	27.7	29.6	9.86	16.9
Total Metals													
Aluminum (Al)-Total	mg/L	0.0010	-	pH based 0.1 @ pH >= 6.5 Equation @ pH < 6.5	1.47	0.0823	3.59	1.83	0.102	1.13	0.0177	3.62	0.0297
Antimony (Sb)-Total	mg/L	0.00010	0.09	-	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	mg/L	0.00010	0.05	0.005	0.00019	0.00012	0.00032	0.00029	0.00020	0.00021	<0.00010	0.00049	<0.00010
Barium (Ba)-Total	mg/L	0.00010	10	1	0.0309	0.0570	0.0202	0.0316	0.0170	0.0230	0.0201	0.0339	0.0124
Beryllium (Be)-Total	mg/L	0.00010	0.0015	0.00013	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Total	mg/L	0.000050	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	0.010	12	1.2	0.016	0.033	0.015	<0.010	<0.010	0.014	0.033	<0.010	0.010
Cadmium (Cd)-Total	mg/L	0.0000050	H based 0.0005 @ H <30 0.0015 @ H 30-<90 0.0025 @ H 90-<150 0.0035 @ H 150-<210 0.004 @ H >= 210	H based 0.00002 @ H < 7 mg/L Equation @ H > 7 mg/L	0.0000632	0.0000287	0.000160	0.0000689	0.0000136	0.0000349	<0.0000050	0.0000358	0.0000167
Calcium (Ca)-Total	mg/L	0.050	-	-	34.4	35.7	38.3	15.0	14.9	18.7	32.3	8.52	16.9
Cesium (Cs)-Total	mg/L	0.000010	-	-	<0.000010	0.000010	<0.000010	0.000051	<0.000010	0.000034	<0.000010	0.000100	<0.000010
Chromium (Cr)-Total	mg/L	0.00010	0.01	0.001	<0.00050	<0.00050	0.00104	0.00084	<0.00050	<0.00050	<0.00050	0.00153	<0.00050
Cobalt (Co)-Total	mg/L	0.00010	0.04	0.11	0.00645	0.00434	0.0157	0.00093	0.00085	0.00143	0.00024	0.00137	<0.00010
Copper (Cu)-Total	mg/L	0.00020	H based 0.02 @ H < 50 0.03 @ H 50 - <75 0.04 @ H 75 - <100 0.05 @ H 100 - < 125 0.06 @ H 125 - <150 0.07 @ H 150 - < 175 0.08 @ H 175 - <200 0.09 @ H >= 200	H based (0.094(H)+2) / 1000	0.0348	0.00209	0.0931	0.0125	0.00118	0.0129	0.00064	0.0252	<0.00050
Iron (Fe)-Total	mg/L	0.010	-	0.35	2.71	2.87	7.36	1.56	1.40	1.38	0.099	2.97	0.034
Lead (Pb)-Total	mg/L	0.000050	H based 0.04 @ H <50 0.05 @ H 50 - <100 0.06 @ H 100 - <200 110 @ H 200 - <300 160 @ H >= 300	0.003	<0.000050	<0.000050	<0.000050	0.000756	<0.000050	0.000393	<0.000050	0.00135	<0.000050
Lithium (Li)-Total	mg/L	0.0010	-	-	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	<0.0010
Magnesium (Mg)-Total	mg/L	0.0050	-	-	3.34	3.12	4.41	2.09	2.19	2.16	2.92	2.38	2.37
Manganese (Mn)-Total	mg/L	0.00010	-	H based 0.01102*H +0.54	0.311	1.17	0.450	0.0692	0.161	0.144	0.132	0.0812	0.00801
Mercury (Hg)-Total	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
Molybdenum (Mo)-Total	mg/L	0.000050	10	2	0.00410	0.00228	0.000322	0.00163	0.000243	0.00127	0.000523	0.000627	0.000169
Nickel (Ni)-Total	mg/L	0.00050	H based 0.25 @ H < 60 0.65 @ H 60 - <120 1.1 @ H 120 - < 180 1.5 @ H >= 180	0.025	0.00336	0.00072	0.00849	0.00113	<0.00050	0.00120	<0.00050	0.00156	<0.00050
Phosphorus (P)-Total	mg/L	0.050	-	-	<0.050	<0.050	0.110	0.079	<0.050	<0.050	<0.050	0.110	<0.050
Potassium (K)-Total	mg/L	0.050	-	-	3.14	3.42	2.26	1.68	0.722	1.55	1.91	1.11	0.798
Rubidium (Rb)-Total	mg/L	0.00020	-	-	0.00268	0.00373	0.00196	0.00207	0.00071	0.00174	0.00175	0.00229	0.00042
Selenium (Se)-Total	mg/L	0.000050	0.02	0.002	0.000098	0.000051	0.000080	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total	mg/L	0.050	-	-	4.75	4.61	7.24	7.32	9.48	6.74	7.39	9.98	10.8
Silver (Ag)-Total	mg/L	0.000010	H based 0.0005 @ H <= 100 0.015 @ H > 100	0.00005	<0.000010	<0.000010	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	0.000016	<0.000010
Sodium (Na)-Total	mg/L	0.050	-	-	12.4	13.6	4.56	32.2	7.21	15.7	15.6	6.25	7.83
Strontium (Sr)-Total	mg/L	0.00020	-	-	0.167	0.231	0.134	0.107	0.175	0.135	0.366	0.0896	0.217
Sulfur (S)-Total	mg/L	0.50	-	-	18.9	14.8	32.2	6.66	4.14	9.28	9.80	3.01	5.61
Tellurium (Te)-Total	mg/L	0.00020	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	0.000010	0.003	0.0008	<0.000010	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000016	<0.000010
Thorium (Th)-Total	mg/L	0.00010	-	-	0.00012	<0.00010	0.00046	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
Tin (Sn)-Total	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	0.00030	1	-	0.00110	<0.00030	0.00162	0.0648	0.00267	0.0305	<0.00030	0.121	<0.00090
Tungsten (W)-Total	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	0.000010	0.085	0.0085	0.000101	0.000015	0.000183	0.000050	<0.000010	0.000037	<0.000010	0.000061	<0.000010
Vanadium (V)-Total	mg/L	0.00050	-		<0.00050	<0.00050	<0.00050	0.00318	0.00051	0.00164	<0.00050	0.00574	0.00058
Zinc (Zn)-Total	mg/L	0.0010	H based 0.075 @ H <90 0.15 @ H 90 -<100 0.9 @ H 100 - <200 1.65 @ H 200 - <300 2.4 @ H 300 - <400	H based 0.033 @ H =< 90 Equation @ H > 90	0.0128	0.0036	0.0343	0.0123	<0.0030	0.0075	<0.0030	0.0136	<0.0030
Zirconium (Zr)-Total	mg/L	0.000060	-	-	<0.00020	<0.00020	<0.00020	0.00046	<0.00020	0.00039	<0.00020	0.00079	<0.00020

***Standard: British Columbia Contaminated Sites Regulation (July, 2021) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (August, 2019) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 11: 2022 LEACHATE MANHOLE/GW INTERCEPTOR WATER QUALITY - GENERAL CHEMISTRY AND METALS

				Sample ID	LEACHATE MANHOLE	GW INTERCEPTOR	
				Date Sampled	17-Mar-22	17-Mar-22	7-Sep-22
				Quarter	Q1	Q1	Q3
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW***	**BCAWWQG-FAL****			
Field Parameters							
Field Conductivity	uS/cm	-	-	-	140.2	713.0	520.0
Temperature	C	-	-	-	3.4	7.8	9.9
pH	-	-	-	-	6.98	6.5	6.27
Dissolved Oxygen	mg/L	-	-	-	10.6	1.56	0.99
Oxidation Reduction Potential	-	-	-	-	89.3	147.2	166.3
General Chemistry							
Conductivity	uS/cm	2	-	-	221	951	665
Hardness (as CaCO3)	mg/L	0.5	-	-	91.0	341	176
pH	pH	0.1	-	6.5 - 9.0	7.30	7.11	6.77
Total Suspended Solids	mg/L	3	-	-	3.3	32.3	64.2
COD	mg/L	20	-	-	24	26	46
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	mg/L	1.0	-	Ca based <10 @ Ca < 4 mg/L 10-20 @ Ca 5-8 mg/L >20 @ Ca > 8 mg/L	43.9	161	130
Ammonia, Total (as N)	mg/L	0.0050	pH & Temp based 1.31 @ pH >= 8.5 3.7 @ pH 8.0-8.5 11.3 @ pH 7.5-8.0 18.5 @ pH 7.0-7.5 18.4 @ pH < 7.0	pH & Temp based 0.681 - 28.7	0.0082	1.22	0.963
Bromide (Br)	mg/L	0.050	-	-	<0.050	<0.250	<0.250
Chloride (Cl)	mg/L	0.50	1500	600	1.51	106	95.0
Fluoride (F)	mg/L	0.020	H based 2 @ H < 50 3 @ H >= 50	H based 0.4 @ H < 10 Equation @ H > 10	0.021	0.128	<0.100
Nitrate and Nitrite (as N)	mg/L	0.0051	400	-	8.58	<0.0255	<0.0255
Nitrate (as N)	mg/L	0.0050	400	33	8.58	<0.0250	<0.0250
Nitrite (as N)	mg/L	0.0010	Cl based 0.2 @ Cl < 2 mg/L 0.4 @ Cl 2-4 mg/L 0.6 @ Cl 4-6 mg/L 0.8 @ Cl 6-8 mg/L 1.0 @ Cl 8-10 mg/L 1.2 @ Cl > 10 mg/L	Cl based 0.06 @ Cl < 2 mg/L 0.12 @ Cl 2-4 mg/L 0.18 @ Cl 4-6 mg/L 0.24 @ Cl 6-8 mg/L 0.30 @ Cl 8-10 mg/L 0.60 @ Cl > 10 mg/L	<0.0010	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	0.950	1.34	1.48
Total Nitrogen	mg/L	0.030	-	-	8.70	1.32	1.28
Phosphorus (P)-Total	mg/L	0.0020	-	15	0.0466	0.0246	0.0843
Sulfate (SO4)	mg/L	0.30	H based 1280 @ H <= 30 2180 @ H 31-75 3090 @ H 76-180 4290 @ H >180	H based 128 @ H <= 30 218 @ H 31-75 309 @ H 76-180 429 @ H >180	26.7	184	64.8
Dissolved Metals							
Aluminum (Al)-Dissolved	mg/L	0.0010	-	pH based 0.1 @ pH >= 6.5 Equation @ pH < 6.5	0.0486	0.0307	0.0388
Antimony (Sb)-Dissolved	mg/L	0.00010	0.09	-	0.00017	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.00010	0.05	0.005	0.00019	0.00048	0.00040
Barium (Ba)-Dissolved	mg/L	0.00010	10	1	0.0152	0.0818	0.0595
Beryllium (Be)-Dissolved	mg/L	0.00010	0.0015	0.00013	<0.000100	<0.000100	<0.000100
Bismuth (Bi)-Dissolved	mg/L	0.000050	-	-	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	0.010	12	1.2	0.011	0.190	0.110
Cadmium (Cd)-Dissolved	mg/L	0.0000050	H based 0.0005 @ H <30 0.0015 @ H 30-<90 0.0025 @ H 90-<150 0.0035 @ H 150-<210 0.004 @ H >= 210	H based 0.00002 @ H < 7 mg/L Equation @ H > 7 mg/L	0.0000453	<0.0000050	0.0000051
Calcium (Ca)-Dissolved	mg/L	0.050	-	-	32.8	120	60.7
Cesium (Cs)-Dissolved	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.000010
Chromium (Cr)-Dissolved	mg/L	0.00010	0.01	0.001	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.00010	0.04	0.004	0.00015	0.00290	0.00084
Copper (Cu)-Dissolved	mg/L	0.00020	H based 0.02 @ H < 50 0.03 @ H 50 - <75 0.04 @ H 75 - <100 0.05 @ H 100 - < 125 0.06 @ H 125 - <150 0.07 @ H 150 - < 175 0.08 @ H 175 - <200 0.09 @ H >= 200	H based (0.094(H)+2) / 1000	0.0345	<0.00020	<0.00020
Iron (Fe)-Dissolved	mg/L	0.010	-	0.35	0.030	25.3	19.8
Lead (Pb)-Dissolved	mg/L	0.000050	H based 0.04 @ H <50 0.05 @ H 50 - <100 0.06 @ H 100 - <200 110 @ H 200 - <300 160 @ H >= 300	0.003	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	mg/L	0.0010	-	-	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.0050	-	-	2.22	9.98	5.90

				Sample ID	LEACHATE MANHOLE	GW INTERCEPTOR	
				Date Sampled	17-Mar-22	17-Mar-22	7-Sep-22
				Quarter	Q1	Q1	Q3
Analyte	**Units**	**LOR**	**Sch. 3.2 Water FAW***	**BCAWWQG-FAL****			
Manganese (Mn)-Dissolved	mg/L	0.00010	-	H based 0.01102*H +0.54	0.00188	2.32	1.70
Mercury (Hg)-Dissolved	mg/L	0.0000050	0.00025	0.00001	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.000050	10	2	0.000214	0.000447	0.000566
Nickel (Ni)-Dissolved	mg/L	0.00050	H based 0.25 @ H < 60 0.65 @ H 60 - <120 1.1 @ H 120 - < 180 1.5 @ H >= 180	0.025	0.00205	0.00220	0.00087
Phosphorus (P)-Dissolved	mg/L	0.050	-	-	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	0.050	-	-	1.54	6.72	5.53
Rubidium (Rb)-Dissolved	mg/L	0.00020	-	-	0.00095	0.00468	0.00383
Selenium (Se)-Dissolved	mg/L	0.000050	0.02	0.002	0.000142	<0.000050	<0.000050
Silicon (Si)-Dissolved	mg/L	0.050	-	-	7.05	8.72	8.50
Silver (Ag)-Dissolved	mg/L	0.000010	H based 0.0005 @ H <= 100 0.015 @ H > 100	0.00005	0.000021	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	0.050	-	-	3.26	54.7	52.6
Strontium (Sr)-Dissolved	mg/L	0.00020	-	-	0.117	0.742	0.442
Sulfur (S)-Dissolved	mg/L	0.50	-	-	8.92	66.1	21.3
Tellurium (Te)-Dissolved	mg/L	0.00020	-	-	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved	mg/L	0.000010	0.003	0.0008	0.000028	<0.000010	<0.000010
Thorium (Th)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.00030	1		0.00032	0.00034	0.00033
Tungsten (W)-Dissolved	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved	mg/L	0.000010	0.085	0.0085	0.000014	0.000019	0.000014
Vanadium (V)-Dissolved	mg/L	0.00050	-		<0.00050	<0.00050	0.00067
Zinc (Zn)-Dissolved	mg/L	0.0010	H based 0.075 @ H <90 0.15 @ H 90 -<100 0.9 @ H 100 - <200 1.65 @ H 200 - <300 2.4 @ H 300 - <400	H based 0.033 @ H =< 90 Equation @ H > 90	0.0435	0.0076	0.0118
Zirconium (Zr)-Dissolved	mg/L	0.000060	-	-	<0.00020	<0.00020	<0.00020

***Standard: British Columbia Contaminated Sites Regulation (July, 2021) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (August, 2019) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 12: 2022 LEACHATE MANHOLE/GW INTERCEPTOR WATER QUALITY - PETROLEUM HYDROCARBONS

				Sample ID	LEACHATE MANHOLE	GW INTERCEPTOR	
				Date Sampled	17-Mar-22	24-Mar-21	7-Sep-22
				Quarter	Q1	Q1	Q3
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
Bromodichloromethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
Bromoform	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
Carbon Tetrachloride	mg/L	0.00050	0.13	0.0133	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.0010	0.013	0.0013	<0.00050	<0.00050	<0.00050
Dibromochloromethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
Chloroethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
Chloroform	mg/L	0.0010	0.02	0.0018	<0.00050	<0.00050	<0.00050
Chloromethane	mg/L	0.0050	-	-	<0.0000050	<0.0000050	<0.0000050
1,2-Dichlorobenzene	mg/L	0.00050	0.007	0.0007	<0.00050	<0.00050	<0.00050
1,3-Dichlorobenzene	mg/L	0.0010	1.5	0.15	<0.00050	<0.00050	<0.00050
1,4-Dichlorobenzene	mg/L	0.0010	0.26	0.026	<0.00050	<0.00050	<0.00050
1,1-Dichloroethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
1,2-Dichloroethane	mg/L	0.0010	1	0.1	<0.00050	<0.00050	<0.00050
1,1-Dichloroethylene	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
cis-1,2-Dichloroethylene	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
trans-1,2-Dichloroethylene	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
Dichloromethane	mg/L	0.0050	0.98	0.0981	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
cis-1,3-Dichloropropylene	mg/L	0.00050	-	-	<0.00050	<0.00050	<0.00050
trans-1,3-Dichloropropylene	mg/L	0.00050	-	-	<0.00050	<0.00050	<0.00050
1,3-Dichloropropene (cis & trans)	mg/L	0.0010	-	-	<0.00075	<0.00075	<0.00075
Ethylbenzene	mg/L	0.00050	2	0.2	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	mg/L	0.00050	34	3.4	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.00050	0.72	0.072	<0.00050	<0.00050	<0.00050
1,1,1,2-Tetrachloroethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
1,1,2,2-Tetrachloroethane	mg/L	0.00020	-	-	<0.00020	<0.00020	<0.00020
Tetrachloroethylene	mg/L	0.0010	1.1	0.11	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.00045	0.005	0.0005	<0.00040	<0.00040	<0.00040
1,1,1-Trichloroethane	mg/L	0.0010	-	11.1	<0.00050	<0.00050	<0.00050
1,1,2-Trichloroethane	mg/L	0.00050	-	-	<0.00050	<0.00050	<0.00050
Trichloroethylene	mg/L	0.0010	0.2	0.021	<0.00050	<0.00050	<0.00050
Trichlorofluoromethane	mg/L	0.0010	-	-	<0.00050	<0.00050	<0.00050
Vinyl Chloride	mg/L	0.00040	-	-	<0.00040	<0.00040	<0.00040
ortho-Xylene	mg/L	0.00050	-	0.03	<0.00030	<0.00030	<0.00030
meta- & para-Xylene	mg/L	0.00050	-	0.03	<0.00040	<0.00040	<0.00040
Xylenes	mg/L	0.00075	0.3	0.03	<0.00050	<0.00050	<0.00050
4-Bromofluorobenzene (SS)	%	Surrogate	-	-	93.2	96.8	86.0
1,4-Difluorobenzene (SS)	%	Surrogate	-	-	94.2	95.1	102
Hydrocarbons							
EPH10-19	mg/L	0.25	5	-	<0.250	<0.250	<0.250
EPH19-32	mg/L	0.25	-	-	<0.250	<0.250	<0.250
LEPH	mg/L	0.25	0.5	-	<0.250	<0.250	<0.250
HEPH	mg/L	0.25	-	-	<0.250	<0.250	<0.250
Volatile Hydrocarbons (VH6-10)	mg/L	0.10	15	-	<0.100	<0.100	<0.100
VPH (C6-C10)	mg/L	0.10	1.5	-	<0.100	<0.100	<0.100
2-Bromobenzotrifluoride	%	Surrogate	-	-	95.5	103	85.3
3,4-Dichlorotoluene (SS)	%	Surrogate	-	-	123	122	87.7
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	0.000010	0.06	0.006	<0.000010	0.00126	0.000649
Acenaphthylene	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.000010
Acridine	mg/L	0.000010	0.0005	0.00005	<0.000010	<0.000010	<0.014
Anthracene	mg/L	0.000010	0.001	0.0001	<0.000010	0.000042	0.000015
Benz(a)anthracene	mg/L	0.000010	0.001	0.0001	<0.000010	<0.000010	<0.000010
Benzo(a)pyrene	mg/L	0.0000050	0.0001	0.00001	<0.0000050	<0.0000050	0.0000053
Benzo(b&j)fluoranthene	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.011
Benzo(b+j+k)fluoranthene	mg/L	0.000015	-	-	<0.000015	<0.000015	<0.000015
Benzo(g,h,i)perylene	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.000010
Benzo(k)fluoranthene	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.000010
Chrysene	mg/L	0.000010	0.001	-	<0.000010	<0.000010	<0.000010
Dibenz(a,h)anthracene	mg/L	0.0000050	-	-	<0.0000050	<0.0000050	<0.0000050
Fluoranthene	mg/L	0.000010	0.002	0.0002	<0.000010	0.000266	0.000163
Fluorene	mg/L	0.000010	0.12	0.012	<0.000010	0.000371	0.000074
Indeno(1,2,3-c,d)pyrene	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.000010
1-Methylnaphthalene	mg/L	0.000050	-	-	<0.000010	<0.000010	<0.000010
2-Methylnaphthalene	mg/L	0.000050	-	-	<0.000010	<0.000010	<0.000010
Naphthalene	mg/L	0.000050	0.01	0.001	<0.000050	<0.000050	<0.000050
Phenanthrene	mg/L	0.000020	0.003	0.0003	<0.000020	<0.000020	0.000028
Pyrene	mg/L	0.000010	0.0002	0.00002	<0.000010	0.000144	0.000090
Quinoline	mg/L	0.000050	0.034	0.0034	<0.000050	<0.000050	<0.000050
Acridine d9	%	Surrogate	-	-			
Chrysene d12	%	Surrogate	-	-	97.8	109	104
Naphthalene d8	%	Surrogate	-	-	109	122	94.0
Phenanthrene d10	%	Surrogate	-	-	105	120	106

***Standard: British Columbia Contaminated Sites Regulation (July, 2021) - Schedule 3.2 Water Standards Freshwater Aquatic Life**

****Guideline: British Columbia Approved and Working Water Quality Guidelines (August, 2019) - BCAWWQG - Freshwater Aquatic Life**

Color Key: Exceeds Standard and Guideline | Exceeds Guideline

MORRISON HERSHFIELD

TABLE 13: 2022 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
5-Jan-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Jan-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-Jan-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Jan-22	0	0	0	0	0	0	0	0	0	0	0	Trace	0	Trace	0	0	0	0	0	0	0
4-Feb-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Feb-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Feb-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Feb-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-May-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Jul-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Aug-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Oct-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Nov-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Dec-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Dec-22	0	0	0	0	0	0	0	0	0	0	0	Trace	0	Trace	0	0	0	0	0	0	0
31-Dec-22	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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A5644**	Page	: 1 of 5
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Emily Peets	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604-454-0402	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 18-Mar-2022 09:30
PO	: 726379	Date Analysis Commenced	: 19-Mar-2022
C-O-C number	: 17-663028	Issue Date	: 11-Apr-2022 11:13
Sampler	: ----		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SFC-2	SFC-2B	SFC-3	SFC-4B	SFC-11
					Client sampling date / time	17-Mar-2022 11:50	17-Mar-2022 12:00	17-Mar-2022 12:30	17-Mar-2022 14:15	17-Mar-2022 12:35
						VA22A5644-001	VA22A5644-002	VA22A5644-003	VA22A5644-004	VA22A5644-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		45.0	15.8	25.7	29.9	23.0
conductivity	----	E100	2.0	µS/cm		307	293	278	211	82.1
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		99.6	114	46.1	55.6	31.1
pH	----	E108	0.10	pH units		7.42	6.68	7.31	7.44	7.25
solids, total suspended [TSS]	----	E160	3.0	mg/L		15.5	30.8	12.4	8.4	30.0
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.171	0.160	0.0056	0.0510	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		24.3	3.19	54.2	26.3	3.98
fluoride	16984-48-8	E235.F	0.020	mg/L		0.083	0.127	0.049	0.061	0.057
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.476	0.828	0.134	0.176	0.141
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		1.83	5.24	0.332	0.561	0.416
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		1.83	5.24	0.332	0.562	0.418
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0016	0.0053	<0.0010	0.0013	0.0021
nitrogen, total	7727-37-9	E366	0.030	mg/L		2.05	5.60	0.419	0.666	0.500
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0335	0.0822	0.0700	0.0353	0.0929
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		56.5	92.9	20.2	27.7	9.86
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		1.47	3.59	1.83	1.13	3.62
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	0.00014	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00019	0.00032	0.00029	0.00021	0.00049
barium, total	7440-39-3	E420	0.00010	mg/L		0.0309	0.0202	0.0316	0.0230	0.0339
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		0.016	0.015	<0.010	0.014	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000632	0.000160	0.0000689	0.0000349	0.0000358
calcium, total	7440-70-2	E420	0.050	mg/L		34.4	38.3	15.0	18.7	8.52
cesium, total	7440-46-2	E420	0.000010	mg/L		<0.000010	<0.000010	0.000051	0.000034	0.000100
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	0.00104	0.00084	<0.00050	0.00153
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00645	0.0157	0.00093	0.00143	0.00137

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SFC-2	SFC-2B	SFC-3	SFC-4B	SFC-11
					Client sampling date / time	17-Mar-2022 11:50	17-Mar-2022 12:00	17-Mar-2022 12:30	17-Mar-2022 14:15	17-Mar-2022 12:35
						VA22A5644-001	VA22A5644-002	VA22A5644-003	VA22A5644-004	VA22A5644-005
						Result	Result	Result	Result	Result
Total Metals										
copper, total	7440-50-8	E420	0.00050	mg/L		0.0348	0.0931	0.0125	0.0129	0.0252
iron, total	7439-89-6	E420	0.010	mg/L		2.71	7.36	1.56	1.38	2.97
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	0.000756	0.000393	0.00135
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	0.0012	<0.0010	<0.0010	0.0020
magnesium, total	7439-95-4	E420	0.0050	mg/L		3.34	4.41	2.09	2.16	2.38
manganese, total	7439-96-5	E420	0.00010	mg/L		0.311	0.450	0.0692	0.144	0.0812
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00410	0.000322	0.00163	0.00127	0.000627
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00336	0.00849	0.00113	0.00120	0.00156
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	0.110	0.079	<0.050	0.110
potassium, total	7440-09-7	E420	0.050	mg/L		3.14	2.26	1.68	1.55	1.11
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00268	0.00196	0.00207	0.00174	0.00229
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000098	0.000080	<0.000050	<0.000050	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L		4.75	7.24	7.32	6.74	9.98
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	0.000011	<0.000010	0.000016
sodium, total	7440-23-5	E420	0.050	mg/L		12.4	4.56	32.2	15.7	6.25
strontium, total	7440-24-6	E420	0.00020	mg/L		0.167	0.134	0.107	0.135	0.0896
sulfur, total	7704-34-9	E420	0.50	mg/L		18.9	32.2	6.66	9.28	3.01
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	0.000016
thorium, total	7440-29-1	E420	0.00010	mg/L		0.00012	0.00046	<0.00010	<0.00010	0.00012
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00110	0.00162	0.0648	0.0305	0.121
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000101	0.000183	0.000050	0.000037	0.000061
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	0.00318	0.00164	0.00574
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0128	0.0343	0.0123	0.0075	0.0136
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	0.00046	0.00039	0.00079
Aggregate Organics										
chemical oxygen demand [COD]	----	E559	20	mg/L		56	<20	<20	<20	<20

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A5644**	Page	: 1 of 17
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Emily Peets	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 18-Mar-2022 09:30
PO	: 726379	Issue Date	: 11-Apr-2022 11:12
C-O-C number	: 17-663028		
Sampler	: ----		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SFC-11	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SFC-2	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SFC-2B	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SFC-3	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) SFC-4B	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-11	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-2	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-2B	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-3	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-4B	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-11	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-2	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-2B	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-3	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-4B	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-11	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-2	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-2B	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-3	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-4B	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-11	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-2	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-2B	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-3	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-4B	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-11	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-2	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-2B	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-3	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-4B	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SFC-11	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SFC-2	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SFC-2B	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SFC-3	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SFC-4B	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-11	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-2	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-2B	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-3	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-4B	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SFC-11	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SFC-2	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SFC-2B	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) SFC-3	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) SFC-4B	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-11	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-2	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-2B	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-3	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-4B	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) SFC-11	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) SFC-2	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SFC-2B	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SFC-3	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
SFC-4B	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-11	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-2	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-2B	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-3	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-4B	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
SFC-11	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE SFC-2	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SFC-2B	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SFC-3	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SFC-4B	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE SFC-4B	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	45 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-11	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	47 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-3	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	47 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-2	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-2B	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	48 hrs	× EHTR-FM

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE										
SFC-11	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SFC-2	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SFC-2B	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SFC-3	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SFC-4B	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SFC-11	E508	17-Mar-2022	----	----	----		23-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SFC-2	E508	17-Mar-2022	----	----	----		23-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SFC-2B	E508	17-Mar-2022	----	----	----		23-Mar-2022	28 days	6 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SFC-3	E508	17-Mar-2022	----	----	----		23-Mar-2022	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SFC-4B	E508	17-Mar-2022	----	----	----		23-Mar-2022	28 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-11	E420	17-Mar-2022	----	----	----		01-Apr-2022	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-2	E420	17-Mar-2022	----	----	----		01-Apr-2022	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-2B	E420	17-Mar-2022	----	----	----		01-Apr-2022	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-3	E420	17-Mar-2022	----	----	----		01-Apr-2022	180 days	15 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-4B	E420	17-Mar-2022	----	----	----		01-Apr-2022	180 days	15 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	437071	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Conductivity in Water	E100	437072	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
pH by Meter	E108	437070	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	440529	1	6	16.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	446890	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	438706	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	437071	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Conductivity in Water	E100	437072	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
pH by Meter	E108	437070	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	440529	1	6	16.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	446890	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	438706	2	40	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	437071	1	18	5.5	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Conductivity in Water	E100	437072	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	440529	1	6	16.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	446890	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	438706	2	40	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Mercury in Water by CVAAS	E508	440529	1	6	16.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	446890	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Chemical Oxygen Demand by Colourimetry	E559 Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A5644**	Page	: 1 of 14
Client	: Morrison Hershfield Limited	Laboratory	: Vancouver - Environmental
Contact	: Emily Peets	Account Manager	: Carla Fuginski
Address	: 8001 Hwy 99 Whistler BC Canada V0N 1B8	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 18-Mar-2022 09:30
PO	: 726379	Date Analysis Commenced	: 19-Mar-2022
C-O-C number	: 17-663028	Issue Date	: 11-Apr-2022 11:12
Sampler	: ----		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 437070)											
VA22A5638-003	Anonymous	pH	----	E108	0.10	pH units	6.86	6.85	0.190%	4%	----
Physical Tests (QC Lot: 437071)											
VA22A5638-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	28.9	29.0	0.345%	20%	----
Physical Tests (QC Lot: 437072)											
VA22A5638-003	Anonymous	conductivity	----	E100	2.0	µS/cm	173	174	0.346%	10%	----
Physical Tests (QC Lot: 438706)											
VA22A5602-006	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 439447)											
VA22A5558-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	37.2	36.0	3.28%	20%	----
Anions and Nutrients (QC Lot: 437073)											
VA22A5638-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437074)											
VA22A5638-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	56.2	54.4	3.08%	20%	----
Anions and Nutrients (QC Lot: 437075)											
VA22A5638-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437076)											
VA22A5638-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437077)											
VA22A5638-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437078)											
VA22A5638-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	117	116	0.461%	20%	----
Anions and Nutrients (QC Lot: 448665)											
VA22A5638-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.250	mg/L	14.0	14.5	3.36%	20%	----
Anions and Nutrients (QC Lot: 448666)											
VA22A5638-001	Anonymous	nitrogen, total	7727-37-9	E366	0.300	mg/L	14.7	15.5	5.45%	20%	----
Anions and Nutrients (QC Lot: 448667)											
VA22A5638-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.115	0.114	0.0012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 448668)											
VA22A5638-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	14.5	14.5	0.176%	20%	----
Total Metals (QC Lot: 440529)											
VA22A5644-001	SFC-2	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 446890)											
VA22A5644-001	SFC-2	aluminum, total	7429-90-5	E420	0.0030	mg/L	1.47	1.50	1.94%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00019	0.00020	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0309	0.0302	2.18%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.016	0.016	0.000006	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000632	0.0000670	5.81%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	34.4	35.5	3.08%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00645	0.00660	2.31%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.0348	0.0350	0.646%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	2.71	2.76	1.62%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	3.34	3.39	1.51%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.311	0.330	6.06%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00410	0.00406	0.937%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00336	0.00334	0.00001	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	3.14	3.23	3.06%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00268	0.00260	3.29%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000098	0.000073	0.000026	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.75	4.74	0.0498%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	12.4	12.5	0.699%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.167	0.171	2.40%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	18.9	19.0	0.617%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	0.00012	0.00013	0.000005	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00110	0.00116	0.00006	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 446890) - continued											
VA22A5644-001	SFC-2	uranium, total	7440-61-1	E420	0.000010	mg/L	0.000101	0.000101	0.0690%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0128	0.0127	0.00002	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 449795)											
FJ2200729-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 437071)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 437072)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 438706)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 439447)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 437073)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 437074)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 437075)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 437076)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 437077)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 437078)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 448665)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 448666)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 448667)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 448668)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Total Metals (QCLot: 440529)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 446890)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 446890) - continued						
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Aggregate Organics (QCLot: 449795)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 437070)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 437071)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 437072)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.7	90.0	110	----
Physical Tests (QCLot: 438706)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 439447)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	90.7	85.0	115	----
Anions and Nutrients (QCLot: 437073)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 437074)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 437075)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 437076)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 437077)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 437078)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 448665)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	94.5	75.0	125	----
Anions and Nutrients (QCLot: 448666)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 448667)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.8	80.0	120	----
Anions and Nutrients (QCLot: 448668)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----
Total Metals (QCLot: 440529)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	97.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 446890)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	99.2	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	96.3	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.0	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.6	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.5	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.2	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	89.7	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.3	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	96.0	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.3	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	110	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	100	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	96.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.2	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	101	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.6	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.9	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.3	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.5	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	83.7	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	98.5	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.5	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	99.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.0	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	92.9	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	91.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.8	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 446890) - continued									
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	93.9	80.0	120	----
Aggregate Organics (QCLot: 449795)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	110	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 437073)										
VA22A5638-002	Anonymous	fluoride	16984-48-8	E235.F	1.05 mg/L	1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 437074)										
VA22A5638-002	Anonymous	chloride	16887-00-6	E235.Cl	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 437075)										
VA22A5638-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.519 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 437076)										
VA22A5638-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.60 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 437077)										
VA22A5638-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.507 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 437078)										
VA22A5638-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 448665)										
VA22A5638-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	MS-B
Anions and Nutrients (QCLot: 448666)										
VA22A5638-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	2 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 448667)										
VA22A5638-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0477 mg/L	0.05 mg/L	95.4	70.0	130	----
Anions and Nutrients (QCLot: 448668)										
VA22A5638-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Total Metals (QCLot: 440529)										
VA22A5644-002	SFC-2B	mercury, total	7439-97-6	E508	0.000103 mg/L	0.0001 mg/L	103	70.0	130	----
Total Metals (QCLot: 446890)										
VA22A5644-001	SFC-2	aluminum, total	7429-90-5	E420	1.91 mg/L	2 mg/L	95.6	70.0	130	----
		antimony, total	7440-36-0	E420	0.185 mg/L	0.2 mg/L	92.6	70.0	130	----
		arsenic, total	7440-38-2	E420	0.179 mg/L	0.2 mg/L	89.7	70.0	130	----
		barium, total	7440-39-3	E420	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		beryllium, total	7440-41-7	E420	0.403 mg/L	0.4 mg/L	101	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0958 mg/L	0.1 mg/L	95.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 446890) - continued										
VA22A5644-001	SFC-2	boron, total	7440-42-8	E420	1.05 mg/L	1 mg/L	105	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		calcium, total	7440-70-2	E420	43.0 mg/L	40 mg/L	107	70.0	130	----
		cesium, total	7440-46-2	E420	0.0920 mg/L	0.1 mg/L	92.0	70.0	130	----
		chromium, total	7440-47-3	E420	0.378 mg/L	0.4 mg/L	94.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.185 mg/L	0.2 mg/L	92.6	70.0	130	----
		copper, total	7440-50-8	E420	0.189 mg/L	0.2 mg/L	94.6	70.0	130	----
		iron, total	7439-89-6	E420	18.9 mg/L	20 mg/L	94.5	70.0	130	----
		lead, total	7439-92-1	E420	0.200 mg/L	0.2 mg/L	99.9	70.0	130	----
		lithium, total	7439-93-2	E420	1.01 mg/L	1 mg/L	101	70.0	130	----
		magnesium, total	7439-95-4	E420	9.97 mg/L	10 mg/L	99.7	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.196 mg/L	0.2 mg/L	98.3	70.0	130	----
		nickel, total	7440-02-0	E420	0.375 mg/L	0.4 mg/L	93.7	70.0	130	----
		phosphorus, total	7723-14-0	E420	93.9 mg/L	100 mg/L	93.9	70.0	130	----
		potassium, total	7440-09-7	E420	37.2 mg/L	40 mg/L	92.9	70.0	130	----
		rubidium, total	7440-17-7	E420	0.184 mg/L	0.2 mg/L	92.2	70.0	130	----
		selenium, total	7782-49-2	E420	0.396 mg/L	0.4 mg/L	99.1	70.0	130	----
		silicon, total	7440-21-3	E420	85.5 mg/L	100 mg/L	85.5	70.0	130	----
		silver, total	7440-22-4	E420	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		sodium, total	7440-23-5	E420	18.2 mg/L	20 mg/L	91.1	70.0	130	----
		strontium, total	7440-24-6	E420	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		sulfur, total	7704-34-9	E420	195 mg/L	200 mg/L	97.7	70.0	130	----
		tellurium, total	13494-80-9	E420	0.393 mg/L	0.4 mg/L	98.2	70.0	130	----
		thallium, total	7440-28-0	E420	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		thorium, total	7440-29-1	E420	0.211 mg/L	0.2 mg/L	105	70.0	130	----
		tin, total	7440-31-5	E420	0.184 mg/L	0.2 mg/L	92.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.362 mg/L	0.4 mg/L	90.4	70.0	130	----
		tungsten, total	7440-33-7	E420	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		uranium, total	7440-61-1	E420	0.0371 mg/L	0.04 mg/L	92.7	70.0	130	----
		vanadium, total	7440-62-2	E420	0.939 mg/L	1 mg/L	93.9	70.0	130	----
		zinc, total	7440-66-6	E420	3.72 mg/L	4 mg/L	93.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.400 mg/L	0.4 mg/L	100	70.0	130	----
Aggregate Organics (QCLot: 449795)										
FJ2200768-001	Anonymous	chemical oxygen demand [COD]	----	E559	106 mg/L	100 mg/L	106	75.0	125	----

Qualifiers

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 - 663028

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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:	310 - 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	erogal@morrisonhershfield.com
Email 3	

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)	
Regular [R]	☒ Standard TAT if received by 3 pm - business days - no surcharges apply
PRIORITY (Business Days): 4 day [P4-20%]	☐
3 day [P3-25%]	☐
2 day [P2-50%]	☐
EMERGENCY: 1 Business day [E-100%]	☐
Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)]	☐
Date and Time Required for all E&P TATs:	dd-mmm-yy hh:mm
For tests that can not be performed according to the service level selected, you will be contacted.	

Invoice To		Invoice Distribution	
	Same as Report To ☐ YES ☒ NO	Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☒ YES ☐ NO	Email 1 or Fax	imckeachie@whistler.ca
Company:	Resort Municipality of Whistler (RMOW)	Email 2	ap@whistler.ca
Contact:	Kim McKeachie		

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	2100168	Major/Minor Code:	Routing Code:
PO / AFE:	726379	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact: C. Funginski	Sampler: E. Rogal + 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	Total Metals + Mercury	General Parameters	Nutrients, Anions, COD	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	SFC-2	17-Mar-22	11:50 AM	Water		R	R	R			4
	SFC-2B	17-Mar-22	12:00 PM	Water		R	R	R			4
	SFC-3	17-Mar-22	12:30 PM	Water		R	R	R			4
	SFC-4B	17-Mar-22	2:15 PM	Water		R	R	R			4
	SFC-11	17-Mar-22	12:35 PM	Water		R	R	R			4

Environmental Division
Vancouver
Work Order Reference
VA22A5644

Telephone : +1 604 253 4188

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

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				7	7	5	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Emily Kirk	Date: Mar 18/2022	Time:	Received by:	Date:	Time:	Received by: TC	Date: 18 Mar 22	Time: 9:30am

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**.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A5638**	Page	: 1 of 12
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604-454-0402	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 18-Mar-2022 09:30
PO	: ----	Date Analysis Commenced	: 19-Mar-2022
C-O-C number	: 17-862349	Issue Date	: 29-Apr-2022 13:29
Sampler	: ----		
Site	: ----		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Maqsood UlHassan	Laboratory Analyst	Organics, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
					Client sampling date / time	17-Mar-2022 10:10	17-Mar-2022 10:20	17-Mar-2022 11:20	17-Mar-2022 09:25	17-Mar-2022 14:45
						VA22A5638-001	VA22A5638-002	VA22A5638-003	VA22A5638-004	VA22A5638-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		316	90.2	28.9	141	17.8
conductivity	----	E100	2.0	µS/cm		958	281	173	398	865
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		323	100	46.7	148	172
pH	----	E108	0.10	pH units		7.14	7.17	6.86	7.01	6.98
solids, total suspended [TSS]	----	E160	3.0	mg/L		89.5	53.5	7.7	143	160
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		14.5	3.19	0.435	2.22	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.050	<0.050	0.054	<0.250 DLDS
chloride	16887-00-6	E235.Cl	0.50	mg/L		56.2	9.87	12.9	20.2	200
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.100 DLDS	0.095	0.022	0.033	<0.100 DLDS
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		14.0	3.31	0.594	2.38	0.680
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0250 DLDS	0.0068	0.745	0.0430	0.265
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0255	0.0068	0.745	0.0430	0.265
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0010	<0.0010	<0.0010	<0.0050 DLDS
nitrogen, total	7727-37-9	E366	0.030	mg/L		14.7	3.32	1.19	2.31	0.880
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.115	0.0496	0.0046	0.0881	0.942
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		117	36.1	33.7	39.4	83.5
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0032	0.0029	0.0195	----	0.0078
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.0130	0.00658	<0.00010	----	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0450	0.0794	0.0613	----	0.0429
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.238	0.085	<0.010	----	0.013
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000068	<0.0000050	0.000266	----	0.0000370
calcium, dissolved	7440-70-2	E421	0.050	mg/L		109	32.1	14.2	----	58.9
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		0.000021	0.000014	0.000040	----	0.000012
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.0106	0.00188	0.0102	----	<0.00010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
					Client sampling date / time	17-Mar-2022 10:10	17-Mar-2022 10:20	17-Mar-2022 11:20	17-Mar-2022 09:25	17-Mar-2022 14:45
						VA22A5638-001	VA22A5638-002	VA22A5638-003	VA22A5638-004	VA22A5638-005
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.0193	0.00366	0.00361	----	0.00093
iron, dissolved	7439-89-6	E421	0.010	mg/L		49.1	33.5	0.690	----	0.015
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000064	0.000117	<0.000050	----	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		12.3	4.87	2.73	----	6.09
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		3.05 RRV	1.21 RRV	1.92 RRV	----	0.00644
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0129	0.00382	0.000617	----	0.00150
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00222	0.00066	0.00143	----	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.102	<0.050	<0.050	----	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		20.1	6.38	2.03	----	3.80
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.0114	0.00409	0.00695	----	0.00573
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000095	<0.000050	<0.000050	----	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L		13.4	8.16	6.18	----	5.41
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		40.3	6.84	10.3	----	88.5
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.555	0.188	0.0916	----	0.668
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		40.6	12.0	10.7	----	29.9
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	<0.00020
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000031	<0.000010	0.000081	----	0.000029
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	----	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000130	0.000014	<0.000010	----	<0.000010
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0039	0.0068	0.0051	----	<0.0010
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	<0.00020
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	Field
Aggregate Organics										

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
					Client sampling date / time	17-Mar-2022 10:10	17-Mar-2022 10:20	17-Mar-2022 11:20	17-Mar-2022 09:25	17-Mar-2022 14:45
						VA22A5638-001	VA22A5638-002	VA22A5638-003	VA22A5638-004	VA22A5638-005
						Result	Result	Result	Result	Result
Aggregate Organics										
chemical oxygen demand [COD]	----	E559	20	mg/L		45	<20	<20	58	31
Volatile Organic Compounds										
chlorobenzene	108-90-7	E611C	0.50	µg/L		2.11	<0.50	<0.50	0.55	<0.50
chloromethane	74-87-3	E611C	5.0	µg/L		<5.0	<5.0	<5.0	<5.0	<5.0
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds [Drycleaning]										
carbon tetrachloride	56-23-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
chloroethane	75-00-3	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloromethane	75-09-2	E611C	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
tetrachloroethylene	127-18-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
trichloroethylene	79-01-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
vinyl chloride	75-01-4	E611C	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
ethylbenzene	100-41-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
					Client sampling date / time	17-Mar-2022 10:10	17-Mar-2022 10:20	17-Mar-2022 11:20	17-Mar-2022 09:25	17-Mar-2022 14:45
						VA22A5638-001	VA22A5638-002	VA22A5638-003	VA22A5638-004	VA22A5638-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
styrene	100-42-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
toluene	108-88-3	E611C	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
xylene, m+p-	179601-23-1	E611C	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
xylene, o-	95-47-6	E611C	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
xylenes, total	1330-20-7	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds [THMs]										
bromodichloromethane	75-27-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
bromoform	75-25-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
chloroform	67-66-3	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dibromochloromethane	124-48-1	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%		87.3	84.8	83.2	83.8	98.0
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%		96.9	95.3	94.3	96.3	94.3
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		105	97.7	95.3	92.8	97.3
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		114	126	114	120	126
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-4	MW-6
					Client sampling date / time	17-Mar-2022 10:10	17-Mar-2022 10:20	17-Mar-2022 11:20	17-Mar-2022 09:25	17-Mar-2022 14:45
						VA22A5638-001	VA22A5638-002	VA22A5638-003	VA22A5638-004	VA22A5638-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		106	110	101	98.8	100
naphthalene-d8	1146-65-2	E641A	0.1	%		98.8	101	97.6	93.3	99.6
phenanthrene-d10	1517-22-2	E641A	0.1	%		106	111	102	95.6	102

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Duplicate	Field Blank	GW Int.	L1	MW-4
					Client sampling date / time	17-Mar-2022 12:00	17-Mar-2022 12:00	17-Mar-2022 11:50	17-Mar-2022 11:00	17-Mar-2022 09:25
						VA22A5638-006	VA22A5638-007	VA22A5638-008	VA22A5638-009	VA22A5638-010
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		28.8	<1.0	161	43.9	----
conductivity	----	E100	2.0	µS/cm		176	<2.0	951	221	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		46.6	<0.60	341	91.0	----
pH	----	E108	0.10	pH units		6.81	5.28	7.11	7.30	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		12.8	<3.0	32.3	3.3	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.418	<0.0050	1.22	0.0082	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		0.051	<0.050	<0.250 DLDS	<0.050	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		10.6	<0.50	106	1.51	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.022	<0.020	0.128	0.021	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.656	<0.050	1.34	0.950	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.672	<0.0050	<0.0250 DLDS	8.58	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.675	<0.0051	<0.0255	8.58	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0029	<0.0010	<0.0050 DLDS	<0.0010	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		1.44	<0.030	1.32	8.70	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0221	<0.0020	0.0246	0.0466	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		34.4	<0.30	184	26.7	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0187	<0.0010	0.0307	0.0486	<0.0010
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00017	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	<0.00010	0.00048	0.00019	<0.00010
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0612	<0.00010	0.0818	0.0152	0.160
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		----	----	----	----	<0.000020
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	0.190	0.011	0.066
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.000248	<0.0000050	<0.0000050	0.0000453	0.000508
calcium, dissolved	7440-70-2	E421	0.050	mg/L		14.1	<0.050	120	32.8	48.2
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		0.000037	<0.000010	<0.000010	<0.000010	0.000039
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00870	<0.00010	0.00290	0.00015	0.0251

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Duplicate	Field Blank	GW Int.	L1	MW-4
Client sampling date / time					17-Mar-2022 12:00	17-Mar-2022 12:00	17-Mar-2022 11:50	17-Mar-2022 11:00	17-Mar-2022 09:25
					VA22A5638-006	VA22A5638-007	VA22A5638-008	VA22A5638-009	VA22A5638-010
					Result	Result	Result	Result	Result
Dissolved Metals									
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00384	<0.00020	<0.00020	0.0345	0.00073
iron, dissolved	7439-89-6	E421	0.010	mg/L	0.389	<0.010	25.3	0.030	0.019
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	2.76	<0.0050	9.98	2.22	6.96
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	1.82 RRV	<0.00010	2.32 RRV	0.00188	2.44
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000617	<0.000050	0.000447	0.000214	0.00163
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00128	<0.00050	0.00220	0.00205	0.00274
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.10	<0.050	6.72	1.54	6.10
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00667	<0.00020	0.00468	0.00095	0.00431
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	0.000142	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L	6.39	<0.050	8.72	7.05	9.95
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	0.000021	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	10.1	<0.050	54.7	3.26	16.1
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0892	<0.00020	0.742	0.117	0.278
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	10.6	<0.50	66.1	8.92	12.5
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000080	<0.000010	<0.000010	0.000028	0.000029
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0.00034	0.00032	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0.000019	0.000014	0.000040
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0084	<0.0010	0.0076	0.0435	0.0027
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	----	----	----	----	<0.00030
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Laboratory

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Duplicate	Field Blank	GW Int.	L1	MW-4
Client sampling date / time					17-Mar-2022 12:00	17-Mar-2022 12:00	17-Mar-2022 11:50	17-Mar-2022 11:00	17-Mar-2022 09:25
					VA22A5638-006	VA22A5638-007	VA22A5638-008	VA22A5638-009	VA22A5638-010
					Result	Result	Result	Result	Result
Aggregate Organics									
chemical oxygen demand [COD]	----	E559	20	mg/L	20	<20	26	24	----
Volatile Organic Compounds									
chlorobenzene	108-90-7	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
chloromethane	74-87-3	E611C	5.0	µg/L	<5.0	<5.0	<5.0	<5.0	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L	<0.75	<0.75	<0.75	<0.75	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L	<0.20	<0.20	<0.20	<0.20	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Volatile Organic Compounds [Drycleaning]									
carbon tetrachloride	56-23-5	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
chloroethane	75-00-3	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dichloromethane	75-09-2	E611C	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
tetrachloroethylene	127-18-4	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
trichloroethylene	79-01-6	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
vinyl chloride	75-01-4	E611C	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	----
Volatile Organic Compounds [Fuels]									
benzene	71-43-2	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
ethylbenzene	100-41-4	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Duplicate	Field Blank	GW Int.	L1	MW-4
Client sampling date / time					17-Mar-2022 12:00	17-Mar-2022 12:00	17-Mar-2022 11:50	17-Mar-2022 11:00	17-Mar-2022 09:25
					VA22A5638-006	VA22A5638-007	VA22A5638-008	VA22A5638-009	VA22A5638-010
					Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]									
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
styrene	100-42-5	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
toluene	108-88-3	E611C	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	----
xylene, m+p-	179601-23-1	E611C	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	----
xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	<0.30	<0.30	<0.30	----
xylenes, total	1330-20-7	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Volatile Organic Compounds [THMs]									
bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
bromoform	75-25-2	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
chloroform	67-66-3	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%	90.6	82.2	96.8	93.2	----
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	94.2	95.2	95.1	94.2	----
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	<250	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	<100	<100	----
HEPHw	----	EC600A	250	µg/L	<250	<250	<250	<250	----
LEPHw	----	EC600A	250	µg/L	<250	<250	<250	<250	----
VPHw	----	EC580A	100	µg/L	<100	<100	<100	<100	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	98.6	97.3	103	95.5	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	104	115	122	123	----
Polycyclic Aromatic Hydrocarbons									
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	<0.010	1.26	<0.010	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
acridine	260-94-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	<0.010	0.042	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Duplicate	Field Blank	GW Int.	L1	MW-4
					Client sampling date / time: 17-Mar-2022 12:00	17-Mar-2022 12:00	17-Mar-2022 11:50	17-Mar-2022 11:00	17-Mar-2022 09:25
					VA22A5638-006	VA22A5638-007	VA22A5638-008	VA22A5638-009	VA22A5638-010
					Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons									
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	----
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	----
fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	<0.010	0.266	<0.010	----
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	<0.010	0.371	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	----
naphthalene	91-20-3	E641A	0.050	µg/L	<0.050	<0.050	<0.050	<0.050	----
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	----
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	<0.010	0.144	<0.010	----
quinoline	91-22-5	E641A	0.050	µg/L	<0.050	<0.050	<0.050	<0.050	----
Polycyclic Aromatic Hydrocarbons Surrogates									
chrysene-d12	1719-03-5	E641A	0.1	%	95.1	101	109	97.8	----
naphthalene-d8	1146-65-2	E641A	0.1	%	98.1	110	122	109	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	102	111	120	105	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A5638**	Page	: 1 of 33
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 18-Mar-2022 09:30
PO	: ----	Issue Date	: 29-Apr-2022 13:30
C-O-C number	: 17-862349		
Sampler	: ----		
Site	: ----		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Duplicate	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
GW Int.	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
L1	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2D	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2S	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-3	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-4	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid)										
MW-6	E559	17-Mar-2022	----	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Duplicate	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Field Blank	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
GW Int.	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
L1	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-2D	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-2S	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
MW-3	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-4	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-6	E298	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE Duplicate	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE Field Blank	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE GW Int.	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE L1	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-2D	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-2S	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-3	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW-4	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
MW-6	E235.Br-L	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Duplicate	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
Field Blank	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
GW Int.	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
L1	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-2D	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-2S	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
MW-3	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-4	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-6	E235.Cl	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Duplicate	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Field Blank	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE GW Int.	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE L1	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-2D	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-2S	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-3	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-4	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-6	E235.F	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Duplicate	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE GW Int.	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE L1	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-2D	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-2S	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-3	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW-4	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
MW-6	E235.NO3-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Duplicate	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
Field Blank	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
GW Int.	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
L1	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW-2D	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW-2S	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
MW-3	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-4	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-6	E235.NO2-L	17-Mar-2022	----	----	----		19-Mar-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Duplicate	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Field Blank	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE GW Int.	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE L1	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-2D	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-2S	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-3	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-4	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-6	E235.SO4	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Duplicate	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
GW Int.	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
L1	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-2D	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-2S	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-3	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-4	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-6	E318	17-Mar-2022	02-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Duplicate	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
GW Int.	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
L1	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2D	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2S	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-3	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MW-4	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) MW-6	E366	17-Mar-2022	02-Apr-2022	----	----		05-Apr-2022	28 days	19 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Duplicate	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Field Blank	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) GW Int.	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) L1	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) MW-2D	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) MW-2S	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) MW-3	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
MW-4	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid)										
MW-6	E372-U	17-Mar-2022	02-Apr-2022	----	----		04-Apr-2022	28 days	18 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Duplicate	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
Field Blank	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
GW Int.	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
L1	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-2D	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-2S	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
MW-3	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-4	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-6	E509	17-Mar-2022	24-Mar-2022	----	----		24-Mar-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Duplicate	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Field Blank	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) GW Int.	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) L1	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-2D	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-2S	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-3	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
MW-6	E421	17-Mar-2022	01-Apr-2022	----	----		01-Apr-2022	180 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
MW-4	E421	17-Mar-2022	29-Apr-2022	----	----		29-Apr-2022	180 days	43 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Duplicate	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Field Blank	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
GW Int.	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
L1	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-2D	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-2S	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-3	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-4	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-6	E601A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	25-Mar-2022	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Duplicate	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Field Blank	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
GW Int.	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
L1	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-2D	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-2S	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-3	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW-4	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW-6	E581.VH+F1	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Duplicate	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE GW Int.	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE L1	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-2D	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-2S	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-3	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE MW-4	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-6	E290	17-Mar-2022	----	----	----		19-Mar-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Duplicate	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE GW Int.	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE L1	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-2D	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-2S	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-3	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE MW-4	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-6	E100	17-Mar-2022	----	----	----		19-Mar-2022	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE MW-6	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	45 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Duplicate	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE GW Int.	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-3	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	48 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE L1	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	49 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-2S	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	49 hrs	× EHTR-FM

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE MW-2D	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	50 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-4	E108	17-Mar-2022	----	----	----		19-Mar-2022	0.25 hrs	50 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE Duplicate	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Field Blank	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE GW Int.	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE L1	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-2D	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-2S	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-3	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE MW-4	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-6	E160	17-Mar-2022	----	----	----		22-Mar-2022	7 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) Duplicate	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) Field Blank	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) GW Int.	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) L1	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW-2D	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW-2S	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW-3	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-4	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-6	E641A	17-Mar-2022	24-Mar-2022	14 days	7 days	✓	24-Mar-2022	40 days	0 days	✓
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Duplicate	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Field Blank	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
GW Int.	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
L1	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW-2D	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW-2S	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW-3	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-4	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Duplicate	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Field Blank	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) L1	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-4	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Duplicate	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Field Blank	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) L1	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-4	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Duplicate	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Field Blank	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) L1	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW-4	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW-6	E611C	17-Mar-2022	22-Mar-2022	----	----		22-Mar-2022	----	----	

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	437071	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Conductivity in Water	E100	437072	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	441591	2	23	8.7	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	448325	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
pH by Meter	E108	437070	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	438706	2	40	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	439314	1	20	5.0	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	439315	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	437071	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
BC PHCs - EPH by GC-FID	E601A	440961	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Conductivity in Water	E100	437072	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	441591	2	23	8.7	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	448325	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	440962	1	20	5.0	5.0	✓
pH by Meter	E108	437070	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	438706	2	40	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	439314	1	20	5.0	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	439315	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	437071	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
BC PHCs - EPH by GC-FID	E601A	440961	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Conductivity in Water	E100	437072	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	441591	2	23	8.7	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	448325	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	440962	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	438706	2	40	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	439314	1	20	5.0	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	439315	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	448668	1	16	6.2	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	437075	1	18	5.5	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	449795	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	437074	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	441591	2	23	8.7	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	448325	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	437073	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	437076	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	437077	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	437078	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	448665	1	16	6.2	5.0	✓
Total Nitrogen by Colourimetry	E366	448666	1	16	6.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	448667	1	20	5.0	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	439315	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry	E559 Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Calgary - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Calgary - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
VOCs (BC List) by Headspace GC-MS	E611C Calgary - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Calgary - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
VPH: VH-BTEX-Styrene	EC580A Calgary - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Calgary - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 Calgary - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane Extraction	EP601 Calgary - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A5638**	Page	: 1 of 21
Client	: Morrison Hershfield Limited	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 8001 Hwy 99 Whistler BC Canada V0N 1B8	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 18-Mar-2022 09:30
PO	: ----	Date Analysis Commenced	: 19-Mar-2022
C-O-C number	: 17-862349	Issue Date	: 29-Apr-2022 13:29
Sampler	: ----		
Site	: ----		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Maqsood UlHassan	Laboratory Analyst	Organics, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Metals, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 437070)											
VA22A5638-003	MW-3	pH	----	E108	0.10	pH units	6.86	6.85	0.190%	4%	----
Physical Tests (QC Lot: 437071)											
VA22A5638-003	MW-3	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	28.9	29.0	0.345%	20%	----
Physical Tests (QC Lot: 437072)											
VA22A5638-003	MW-3	conductivity	----	E100	2.0	µS/cm	173	174	0.346%	10%	----
Physical Tests (QC Lot: 438706)											
VA22A5602-006	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 439447)											
VA22A5558-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	37.2	36.0	3.28%	20%	----
Anions and Nutrients (QC Lot: 437073)											
VA22A5638-001	MW-2D	fluoride	16984-48-8	E235.F	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437074)											
VA22A5638-001	MW-2D	chloride	16887-00-6	E235.Cl	2.50	mg/L	56.2	54.4	3.08%	20%	----
Anions and Nutrients (QC Lot: 437075)											
VA22A5638-001	MW-2D	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437076)											
VA22A5638-001	MW-2D	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437077)											
VA22A5638-001	MW-2D	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 437078)											
VA22A5638-001	MW-2D	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	117	116	0.461%	20%	----
Anions and Nutrients (QC Lot: 448665)											
VA22A5638-001	MW-2D	Kjeldahl nitrogen, total [TKN]	----	E318	0.250	mg/L	14.0	14.5	3.36%	20%	----
Anions and Nutrients (QC Lot: 448666)											
VA22A5638-001	MW-2D	nitrogen, total	7727-37-9	E366	0.300	mg/L	14.7	15.5	5.45%	20%	----
Anions and Nutrients (QC Lot: 448667)											
VA22A5638-001	MW-2D	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.115	0.114	0.0012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 448668)											
VA22A5638-001	MW-2D	ammonia, total (as N)	7664-41-7	E298	0.100	mg/L	14.5	14.5	0.176%	20%	----
Dissolved Metals (QC Lot: 441591)											
CG2203320-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 441592)											
VA22A5638-007	Field Blank	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 448325)											
VA22A5638-001	MW-2D	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0032	0.0032	0.00006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.0130	0.0133	2.01%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0450	0.0461	2.54%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.238	0.233	2.02%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000068	<0.0000050	0.0000018	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	109	106	2.54%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000021	0.000018	0.000003	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.0106	0.0108	1.78%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.0193	0.0196	1.41%	20%	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	49.1	49.5	0.899%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000064	<0.000050	0.000014	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.3	12.6	2.02%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	3.05	3.09	1.51%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.0129	0.0128	0.838%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00222	0.00221	0.00001	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.102	0.098	0.004	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	20.1	20.4	1.08%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0114	0.0120	5.00%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000095	0.000065	0.000030	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	13.4	13.8	2.44%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	40.3	41.0	1.84%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.555	0.551	0.700%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	40.6	41.0	1.00%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000031	0.000031	0.00000009	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 448325) - continued											
VA22A5638-001	MW-2D	titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000130	0.000131	1.38%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0039	0.0039	0.00006	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 472331)											
VA22A5638-010	MW-4	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.160	0.164	2.32%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.066	0.064	0.002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.000508	0.000544	6.85%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	48.2	48.1	0.174%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000039	0.000039	0.0000001	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.0251	0.0258	2.87%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00073	0.00072	0.000006	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.019	<0.010	0.009	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	6.96	7.04	1.09%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	2.44	2.46	1.07%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00163	0.00161	1.22%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00274	0.00296	0.00022	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	6.10	6.37	4.41%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00431	0.00446	3.49%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	9.95	9.83	1.16%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	16.1	16.7	3.44%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.278	0.280	0.674%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 472331) - continued											
VA22A5638-010	MW-4	sulfur, dissolved	7704-34-9	E421	0.50	mg/L	12.5	12.4	0.774%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000029	0.000028	0.0000007	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000040	0.000038	0.000002	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0027	0.0027	0.000006	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 449795)											
FJ2200729-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 439315)											
VA22A5638-001	MW-2D	benzene	71-43-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		bromoform	75-25-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		carbon tetrachloride	56-23-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chlorobenzene	108-90-7	E611C	0.50	µg/L	2.11	2.09	0.02	Diff <2x LOR	----
		chloroethane	75-00-3	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chloroform	67-66-3	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chloromethane	74-87-3	E611C	5.0	µg/L	<5.0	<5.0	0	Diff <2x LOR	----
		dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloromethane	75-09-2	E611C	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 439315) - continued											
VA22A5638-001	MW-2D	ethylbenzene	100-41-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		styrene	100-42-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		tetrachloroethylene	127-18-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611C	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichloroethylene	79-01-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichlorofluoromethane	75-69-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		vinyl chloride	75-01-4	E611C	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611C	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 439314)											
VA22A5638-001	MW-2D	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 437071)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 437072)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 438706)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 439447)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 437073)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 437074)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 437075)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 437076)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 437077)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 437078)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 448665)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 448666)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 448667)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 448668)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Dissolved Metals (QCLot: 441591)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 441592)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 448325)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 448325) - continued						
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 448325) - continued						
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 472331)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 472331) - continued						
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 449795)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----
Volatile Organic Compounds (QCLot: 439315)						
benzene	71-43-2	E611C	0.5	µg/L	<0.50	----
bromodichloromethane	75-27-4	E611C	0.5	µg/L	<0.50	----
bromoform	75-25-2	E611C	0.5	µg/L	<0.50	----
carbon tetrachloride	56-23-5	E611C	0.5	µg/L	<0.50	----
chlorobenzene	108-90-7	E611C	0.5	µg/L	<0.50	----
chloroethane	75-00-3	E611C	0.5	µg/L	<0.50	----
chloroform	67-66-3	E611C	0.5	µg/L	<0.50	----
chloromethane	74-87-3	E611C	5	µg/L	<5.0	----
dibromochloromethane	124-48-1	E611C	0.5	µg/L	<0.50	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.5	µg/L	<0.50	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.5	µg/L	<0.50	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.5	µg/L	<0.50	----
dichloroethane, 1,1-	75-34-3	E611C	0.5	µg/L	<0.50	----
dichloroethane, 1,2-	107-06-2	E611C	0.5	µg/L	<0.50	----
dichloroethylene, 1,1-	75-35-4	E611C	0.5	µg/L	<0.50	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.5	µg/L	<0.50	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.5	µg/L	<0.50	----
dichloromethane	75-09-2	E611C	1	µg/L	<1.0	----
dichloropropane, 1,2-	78-87-5	E611C	0.5	µg/L	<0.50	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.5	µg/L	<0.50	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611C	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.5	µg/L	<0.50	----
styrene	100-42-5	E611C	0.5	µg/L	<0.50	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.5	µg/L	<0.50	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.2	µg/L	<0.20	----
tetrachloroethylene	127-18-4	E611C	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 439315) - continued						
toluene	108-88-3	E611C	0.4	µg/L	<0.40	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.5	µg/L	<0.50	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.5	µg/L	<0.50	----
trichloroethylene	79-01-6	E611C	0.5	µg/L	<0.50	----
trichlorofluoromethane	75-69-4	E611C	0.5	µg/L	<0.50	----
vinyl chloride	75-01-4	E611C	0.4	µg/L	<0.40	----
xylene, m+p-	179601-23-1	E611C	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611C	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 439314)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 440961)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 440962)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 437070)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 437071)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	102	85.0	115	----
Physical Tests (QCLot: 437072)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.7	90.0	110	----
Physical Tests (QCLot: 438706)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 439447)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	90.7	85.0	115	----
Anions and Nutrients (QCLot: 437073)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 437074)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 437075)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	104	85.0	115	----
Anions and Nutrients (QCLot: 437076)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 437077)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 437078)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 448665)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	94.5	75.0	125	----
Anions and Nutrients (QCLot: 448666)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 448667)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.8	80.0	120	----
Anions and Nutrients (QCLot: 448668)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.0	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 448325)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.2	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	97.7	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	91.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	92.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.2	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.5	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	91.1	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	93.5	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	93.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.8	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	93.3	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	94.4	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	93.4	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.5	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	86.2	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	93.1	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	99.9	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.7	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	94.5	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.0	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.6	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	92.4	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	96.9	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	93.2	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 448325) - continued									
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.4	80.0	120	----
Dissolved Metals (QCLot: 472331)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	110	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	108	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	107	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	109	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	110	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	107	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	108	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	108	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	107	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	109	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	108	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	108	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	94.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	112	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	110	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	106	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	104	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 472331) - continued									
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	109	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	105	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
Aggregate Organics (QCLot: 449795)									
chemical oxygen demand [COD]	----	E559	20	mg/L	100 mg/L	110	85.0	115	----
Volatile Organic Compounds (QCLot: 439315)									
benzene	71-43-2	E611C	0.5	µg/L	100 µg/L	97.6	70.0	130	----
bromodichloromethane	75-27-4	E611C	0.5	µg/L	100 µg/L	101	70.0	130	----
bromoform	75-25-2	E611C	0.5	µg/L	100 µg/L	91.7	70.0	130	----
carbon tetrachloride	56-23-5	E611C	0.5	µg/L	100 µg/L	105	70.0	130	----
chlorobenzene	108-90-7	E611C	0.5	µg/L	100 µg/L	108	70.0	130	----
chloroethane	75-00-3	E611C	0.5	µg/L	100 µg/L	112	70.0	130	----
chloroform	67-66-3	E611C	0.5	µg/L	100 µg/L	108	70.0	130	----
chloromethane	74-87-3	E611C	5	µg/L	100 µg/L	114	70.0	130	----
dibromochloromethane	124-48-1	E611C	0.5	µg/L	100 µg/L	90.6	70.0	130	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.5	µg/L	100 µg/L	103	70.0	130	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.5	µg/L	100 µg/L	110	70.0	130	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.5	µg/L	100 µg/L	119	70.0	130	----
dichloroethane, 1,1-	75-34-3	E611C	0.5	µg/L	100 µg/L	102	70.0	130	----
dichloroethane, 1,2-	107-06-2	E611C	0.5	µg/L	100 µg/L	96.8	70.0	130	----
dichloroethylene, 1,1-	75-35-4	E611C	0.5	µg/L	100 µg/L	117	70.0	130	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.5	µg/L	100 µg/L	97.6	70.0	130	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.5	µg/L	100 µg/L	117	70.0	130	----
dichloromethane	75-09-2	E611C	1	µg/L	100 µg/L	114	70.0	130	----
dichloropropane, 1,2-	78-87-5	E611C	0.5	µg/L	100 µg/L	100	70.0	130	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.5	µg/L	100 µg/L	98.0	70.0	130	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.5	µg/L	100 µg/L	100.0	70.0	130	----
ethylbenzene	100-41-4	E611C	0.5	µg/L	100 µg/L	96.4	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.5	µg/L	100 µg/L	106	70.0	130	----
styrene	100-42-5	E611C	0.5	µg/L	100 µg/L	89.6	70.0	130	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.5	µg/L	100 µg/L	99.4	70.0	130	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.2	µg/L	100 µg/L	113	70.0	130	----
tetrachloroethylene	127-18-4	E611C	0.5	µg/L	100 µg/L	98.2	70.0	130	----
toluene	108-88-3	E611C	0.4	µg/L	100 µg/L	89.9	70.0	130	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.5	µg/L	100 µg/L	108	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 439315) - continued									
trichloroethane, 1,1,2-	79-00-5	E611C	0.5	µg/L	100 µg/L	99.8	70.0	130	----
trichloroethylene	79-01-6	E611C	0.5	µg/L	100 µg/L	87.1	70.0	130	----
trichlorofluoromethane	75-69-4	E611C	0.5	µg/L	100 µg/L	107	60.0	140	----
vinyl chloride	75-01-4	E611C	0.4	µg/L	100 µg/L	110	60.0	140	----
xylene, m+p-	179601-23-1	E611C	0.4	µg/L	200 µg/L	100	70.0	130	----
xylene, o-	95-47-6	E611C	0.3	µg/L	100 µg/L	86.7	70.0	130	----
Hydrocarbons (QCLot: 439314)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	110	70.0	130	----
Hydrocarbons (QCLot: 440961)									
EPH (C10-C19)	----	E601A	250	µg/L	7719.3 µg/L	109	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3536.8 µg/L	113	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 440962)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	98.5	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	95.6	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	107	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	112	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	88.0	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	97.1	50.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	104	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	92.0	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 437073)										
VA22A5638-002	MW-2S	fluoride	16984-48-8	E235.F	1.05 mg/L	1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 437074)										
VA22A5638-002	MW-2S	chloride	16887-00-6	E235.Cl	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 437075)										
VA22A5638-002	MW-2S	bromide	24959-67-9	E235.Br-L	0.519 mg/L	0.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 437076)										
VA22A5638-002	MW-2S	nitrate (as N)	14797-55-8	E235.NO3-L	2.60 mg/L	2.5 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 437077)										
VA22A5638-002	MW-2S	nitrite (as N)	14797-65-0	E235.NO2-L	0.507 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 437078)										
VA22A5638-002	MW-2S	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 448665)										
VA22A5638-002	MW-2S	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	MS-B
Anions and Nutrients (QCLot: 448666)										
VA22A5638-002	MW-2S	nitrogen, total	7727-37-9	E366	ND mg/L	2 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 448667)										
VA22A5638-002	MW-2S	phosphorus, total	7723-14-0	E372-U	0.0477 mg/L	0.05 mg/L	95.4	70.0	130	----
Anions and Nutrients (QCLot: 448668)										
VA22A5638-002	MW-2S	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Dissolved Metals (QCLot: 441591)										
CG2203320-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000100 mg/L	0.0001 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 441592)										
VA22A5638-008	GW Int.	mercury, dissolved	7439-97-6	E509	0.000102 mg/L	0.0001 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 448325)										
VA22A5638-002	MW-2S	aluminum, dissolved	7429-90-5	E421	1.79 mg/L	2 mg/L	89.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.176 mg/L	0.2 mg/L	88.2	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.172 mg/L	0.2 mg/L	86.3	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.170 mg/L	0.2 mg/L	85.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 448325) - continued										
VA22A5638-002	MW-2S	beryllium, dissolved	7440-41-7	E421	0.401 mg/L	0.4 mg/L	100	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0942 mg/L	0.1 mg/L	94.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	1.02 mg/L	1 mg/L	102	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0363 mg/L	0.04 mg/L	90.7	70.0	130	----
		calcium, dissolved	7440-70-2	E421	39.8 mg/L	40 mg/L	99.4	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0891 mg/L	0.1 mg/L	89.1	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.368 mg/L	0.4 mg/L	92.1	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.179 mg/L	0.2 mg/L	89.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.179 mg/L	0.2 mg/L	89.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.196 mg/L	0.2 mg/L	98.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.990 mg/L	1 mg/L	99.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	9.04 mg/L	10 mg/L	90.4	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.361 mg/L	0.4 mg/L	90.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	88.8 mg/L	100 mg/L	88.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	35.3 mg/L	40 mg/L	88.2	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.182 mg/L	0.2 mg/L	91.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.379 mg/L	0.4 mg/L	94.8	70.0	130	----
		silicon, dissolved	7440-21-3	E421	83.5 mg/L	100 mg/L	83.5	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0363 mg/L	0.04 mg/L	90.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	17.2 mg/L	20 mg/L	85.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.184 mg/L	0.2 mg/L	92.0	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	185 mg/L	200 mg/L	92.4	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.368 mg/L	0.4 mg/L	92.0	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0363 mg/L	0.04 mg/L	90.8	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.178 mg/L	0.2 mg/L	88.9	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.349 mg/L	0.4 mg/L	87.4	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.178 mg/L	0.2 mg/L	88.9	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0358 mg/L	0.04 mg/L	89.6	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.916 mg/L	1 mg/L	91.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.68 mg/L	4 mg/L	92.0	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.380 mg/L	0.4 mg/L	95.1	70.0	130	----
Aggregate Organics (QCLot: 449795)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Aggregate Organics (QCLot: 449795) - continued										
FJ2200768-001	Anonymous	chemical oxygen demand [COD]	----	E559	106 mg/L	100 mg/L	106	75.0	125	----
Volatile Organic Compounds (QCLot: 439315)										
VA22A5638-001	MW-2D	benzene	71-43-2	E611C	101 µg/L	100 µg/L	101	70.0	130	----
		bromodichloromethane	75-27-4	E611C	103 µg/L	100 µg/L	103	70.0	130	----
		bromoform	75-25-2	E611C	101 µg/L	100 µg/L	101	70.0	130	----
		carbon tetrachloride	56-23-5	E611C	96.8 µg/L	100 µg/L	96.8	70.0	130	----
		chlorobenzene	108-90-7	E611C	106 µg/L	100 µg/L	106	70.0	130	----
		chloroethane	75-00-3	E611C	113 µg/L	100 µg/L	113	70.0	130	----
		chloroform	67-66-3	E611C	108 µg/L	100 µg/L	108	70.0	130	----
		chloromethane	74-87-3	E611C	113 µg/L	100 µg/L	113	70.0	130	----
		dibromochloromethane	124-48-1	E611C	93.8 µg/L	100 µg/L	93.8	70.0	130	----
		dichlorobenzene, 1,2-	95-50-1	E611C	101 µg/L	100 µg/L	101	70.0	130	----
		dichlorobenzene, 1,3-	541-73-1	E611C	106 µg/L	100 µg/L	106	70.0	130	----
		dichlorobenzene, 1,4-	106-46-7	E611C	112 µg/L	100 µg/L	112	70.0	130	----
		dichloroethane, 1,1-	75-34-3	E611C	118 µg/L	100 µg/L	118	70.0	130	----
		dichloroethane, 1,2-	107-06-2	E611C	106 µg/L	100 µg/L	106	70.0	130	----
		dichloroethylene, 1,1-	75-35-4	E611C	116 µg/L	100 µg/L	116	70.0	130	----
		dichloroethylene, cis-1,2-	156-59-2	E611C	102 µg/L	100 µg/L	102	70.0	130	----
		dichloroethylene, trans-1,2-	156-60-5	E611C	113 µg/L	100 µg/L	113	70.0	130	----
		dichloromethane	75-09-2	E611C	119 µg/L	100 µg/L	119	70.0	130	----
		dichloropropane, 1,2-	78-87-5	E611C	104 µg/L	100 µg/L	104	70.0	130	----
		dichloropropylene, cis-1,3-	10061-01-5	E611C	81.9 µg/L	100 µg/L	81.9	70.0	130	----
		dichloropropylene, trans-1,3-	10061-02-6	E611C	88.2 µg/L	100 µg/L	88.2	70.0	130	----
		ethylbenzene	100-41-4	E611C	111 µg/L	100 µg/L	111	70.0	130	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	106 µg/L	100 µg/L	106	70.0	130	----
		styrene	100-42-5	E611C	84.1 µg/L	100 µg/L	84.1	70.0	130	----
		tetrachloroethane, 1,1,1,2-	630-20-6	E611C	97.0 µg/L	100 µg/L	97.0	70.0	130	----
		tetrachloroethane, 1,1,2,2-	79-34-5	E611C	120 µg/L	100 µg/L	120	70.0	130	----
		tetrachloroethylene	127-18-4	E611C	90.9 µg/L	100 µg/L	90.9	70.0	130	----
		toluene	108-88-3	E611C	92.4 µg/L	100 µg/L	92.4	70.0	130	----
		trichloroethane, 1,1,1-	71-55-6	E611C	102 µg/L	100 µg/L	102	70.0	130	----
		trichloroethane, 1,1,2-	79-00-5	E611C	107 µg/L	100 µg/L	107	70.0	130	----
		trichloroethylene	79-01-6	E611C	86.2 µg/L	100 µg/L	86.2	70.0	130	----
		trichlorofluoromethane	75-69-4	E611C	122 µg/L	100 µg/L	122	70.0	130	----
		vinyl chloride	75-01-4	E611C	109 µg/L	100 µg/L	109	70.0	130	----
		xylene, m+p-	179601-23-1	E611C	204 µg/L	200 µg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 439315) - continued										
VA22A5638-001	MW-2D	xylene, o-	95-47-6	E611C	85.1 µg/L	100 µg/L	85.1	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 - 862349

Page of

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:	310-4321 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 (RMOW)
Contact:	Ian McKeachie

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: erogal@morrisonhershfield.com
Email 3:

Invoice Distribution

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: imckeachie@whistler.com
Email 2: ap@whistler.com

Project Information

ALS Account # / Quote #:
Job #: 2100168800
PO / AFE: 7263379
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. Furginski Sampler: E. Rogal + J. Gilson

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

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

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

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

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

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	F/P ★	Dissolved Metals+Mercury	General Parameters	Nutrients, Anions, COD	PAH/LEPH/HEPH	VOCs
	MW-2D	17-Mar-22	10:10 AM	Water			R	R	R	R	R
	MW-2S	17-Mar-22	10:20 AM	Water			R	R	R	R	R
	MW-3	17-Mar-22	11:20 AM	Water			R	R	R	R	R
	MW-4	17-Mar-22	9:25 AM	Water			R	R	R	R	R
	MW-6	17-Mar-22	2:45PM	Water			R	R	R	R	R
	Duplicate	17-Mar-22	12:00 PM	Water			R	R	R	R	R
	Field Blank	17-Mar-22	12:00 PM	Water			R	R	R	R	R
	GW Int.	17-Mar-22	11:50 AM	Water			R	R	R	R	R
	L1	17-Mar-22	11:00 AM	Water			R	R	R	R	R

SAMPLES ON HOLD

SUSPECTED HAZARD (see Special Instructions)

Environmental Division Vancouver
Work Order Reference
VA22A5638

Telephone : +1 604 253 4188

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

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

Are samples for human consumption/ use? | | YES | | NO

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

NOTE: metals sample bottle for MW-4 is not filtered, not preserved. The mercury sample bottle for MW-4 is filtered/preserved

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			
				7	7	5	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Emily Rogal	Mar 18/2022	

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
JC	18 Mar 22	930am

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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C1315**	Page	: 1 of 5
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604-454-0402	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 08-Sep-2022 09:50
PO	: 726379	Date Analysis Commenced	: 09-Sep-2022
C-O-C number	: 20-1015755	Issue Date	: 19-Sep-2022 10:14
Sampler	: E.Rogal		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Inorganics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SFC-2	SFC-3	SFC-4B	SFC-11	----
					Client sampling date / time	07-Sep-2022 15:15	07-Sep-2022 12:40	07-Sep-2022 09:00	07-Sep-2022 12:50	----
						VA22C1315-001	VA22C1315-002	VA22C1315-003	VA22C1315-004	--------
						Result	Result	Result	Result	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		60.8	35.5	46.4	32.8	----
conductivity	----	E100	2.0	µS/cm		287	134	278	147	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		102	46.2	92.7	52.0	----
pH	----	E108	0.10	pH units		7.32	7.32	7.53	7.25	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		6.4	12.2	<3.0	<3.0	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.304	0.0122	0.0060	0.0064	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.050	0.076	<0.050	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		22.6	10.9	36.5	12.4	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.039	0.043	0.051	0.043	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		0.372	0.180	0.079	0.117	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.282	0.0516	0.309	0.614	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.282	0.0516	0.309	0.614	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.651	0.135	0.352	0.624	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0044	0.0261	<0.0020	0.0091	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		41.5	12.9	29.6	16.9	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0823	0.102	0.0177	0.0297	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00012	0.00020	<0.00010	<0.00010	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0570	0.0170	0.0201	0.0124	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.033	<0.010	0.033	0.010	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000287	0.0000136	<0.0000050	0.0000167	----
calcium, total	7440-70-2	E420	0.050	mg/L		35.7	14.9	32.3	16.9	----
cesium, total	7440-46-2	E420	0.000010	mg/L		0.000010	<0.000010	<0.000010	<0.000010	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00434	0.00085	0.00024	<0.00010	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SFC-2	SFC-3	SFC-4B	SFC-11	----
					Client sampling date / time	07-Sep-2022 15:15	07-Sep-2022 12:40	07-Sep-2022 09:00	07-Sep-2022 12:50	----
						VA22C1315-001	VA22C1315-002	VA22C1315-003	VA22C1315-004	--------
						Result	Result	Result	Result	----
Total Metals										
copper, total	7440-50-8	E420	0.00050	mg/L		0.00209	0.00118	0.00064	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L		2.87	1.40	0.099	0.034	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.0050	mg/L		3.12	2.19	2.92	2.37	----
manganese, total	7439-96-5	E420	0.00010	mg/L		1.17	0.161	0.132	0.00801	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00228	0.000243	0.000523	0.000169	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00072	<0.00050	<0.00050	<0.00050	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
potassium, total	7440-09-7	E420	0.050	mg/L		3.42	0.722	1.91	0.798	----
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00373	0.00071	0.00175	0.00042	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000051	<0.000050	<0.000050	<0.000050	----
silicon, total	7440-21-3	E420	0.10	mg/L		4.61	9.48	7.39	10.8	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		13.6	7.21	15.6	7.83	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.231	0.175	0.366	0.217	----
sulfur, total	7704-34-9	E420	0.50	mg/L		14.8	4.14	9.80	5.61	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
thallium, total	7440-28-0	E420	0.000010	mg/L		0.000010	<0.000010	<0.000010	<0.000010	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	0.00267	<0.00030	<0.00090 DLM	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000015	<0.000010	<0.000010	<0.000010	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00051	<0.00050	0.00058	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0036	<0.0030	<0.0030	<0.0030	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		12	12	<10	<10	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C1315**	Page	: 1 of 15
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 08-Sep-2022 09:50
PO	: 726379	Issue Date	: 19-Sep-2022 10:14
C-O-C number	: 20-1015755		
Sampler	: E.Rogal		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) SFC-11	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) SFC-2	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) SFC-3	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) SFC-4B	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-11	E298	07-Sep-2022	12-Sep-2022	----	----		14-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-2	E298	07-Sep-2022	12-Sep-2022	----	----		14-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-3	E298	07-Sep-2022	12-Sep-2022	----	----		14-Sep-2022	28 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) SFC-4B	E298	07-Sep-2022	12-Sep-2022	----	----		14-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-11	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-2	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-3	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE SFC-4B	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-11	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-2	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-3	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SFC-4B	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-11	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-2	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-3	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SFC-4B	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-11	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-2	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-3	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE SFC-4B	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE SFC-11	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SFC-2	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SFC-3	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SFC-4B	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-11	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-2	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-3	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
SFC-4B	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SFC-11	E318	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
SFC-2	E318	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) SFC-3	E318	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) SFC-4B	E318	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-11	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-2	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-3	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) SFC-4B	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SFC-11	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SFC-2	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SFC-3	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
SFC-4B	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-11	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-2	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-3	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SFC-4B	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
SFC-11	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
SFC-2	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
SFC-3	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
SFC-4B	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE SFC-11	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-2	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-3	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SFC-4B	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE SFC-11	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SFC-2	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SFC-3	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE SFC-4B	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SFC-11	E508	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SFC-2	E508	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SFC-3	E508	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SFC-4B	E508	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-11	E420	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-2	E420	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-3	E420	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SFC-4B	E420	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	639303	2	31	6.4	5.0	✓
Ammonia by Fluorescence	E298	642466	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639308	2	28	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646603	2	33	6.0	5.0	✓
Chloride in Water by IC	E235.Cl	639307	2	29	6.9	5.0	✓
Conductivity in Water	E100	639304	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	639306	2	28	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639309	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639310	2	33	6.0	5.0	✓
pH by Meter	E108	639302	2	34	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	639311	2	34	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642467	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	642928	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	645168	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642471	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642465	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	641102	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	639303	2	31	6.4	5.0	✓
Ammonia by Fluorescence	E298	642466	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639308	2	28	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646603	2	33	6.0	5.0	✓
Chloride in Water by IC	E235.Cl	639307	2	29	6.9	5.0	✓
Conductivity in Water	E100	639304	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	639306	2	28	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639309	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639310	2	33	6.0	5.0	✓
pH by Meter	E108	639302	2	34	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	639311	2	34	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642467	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	642928	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	645168	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642471	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642465	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	641102	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	639303	2	31	6.4	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	642466	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639308	2	28	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646603	2	33	6.0	5.0	✓
Chloride in Water by IC	E235.Cl	639307	2	29	6.9	5.0	✓
Conductivity in Water	E100	639304	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	639306	2	28	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639309	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639310	2	33	6.0	5.0	✓
Sulfate in Water by IC	E235.SO4	639311	2	34	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642467	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	642928	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	645168	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642471	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642465	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	641102	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	642466	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639308	2	28	7.1	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646603	2	33	6.0	5.0	✓
Chloride in Water by IC	E235.Cl	639307	2	29	6.9	5.0	✓
Fluoride in Water by IC	E235.F	639306	2	28	7.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639309	2	33	6.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639310	2	33	6.0	5.0	✓
Sulfate in Water by IC	E235.SO4	639311	2	34	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642467	1	11	9.0	5.0	✓
Total Mercury in Water by CVAAS	E508	642928	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	645168	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642471	1	6	16.6	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642465	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22C1315**	Page	: 1 of 14
Client	: Morrison Hershfield Limited	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 8001 Hwy 99 Whistler BC Canada V0N 1B8	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 08-Sep-2022 09:50
PO	: 726379	Date Analysis Commenced	: 09-Sep-2022
C-O-C number	: 20-1015755	Issue Date	: 19-Sep-2022 10:14
Sampler	: E.Rogal		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Inorganics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 639302)											
VA22C1276-003	Anonymous	pH	----	E108	0.10	pH units	7.99	7.98	0.100%	4%	----
Physical Tests (QC Lot: 639303)											
VA22C1276-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	106	107	0.282%	20%	----
Physical Tests (QC Lot: 639304)											
VA22C1276-003	Anonymous	conductivity	----	E100	2.0	µS/cm	2200	2200	0.00%	10%	----
Physical Tests (QC Lot: 639519)											
VA22C1323-001	Anonymous	pH	----	E108	0.10	pH units	6.77	6.91	2.09%	4%	----
Physical Tests (QC Lot: 639520)											
VA22C1323-001	Anonymous	conductivity	----	E100	2.0	µS/cm	958	937	2.22%	10%	----
Physical Tests (QC Lot: 639521)											
VA22C1323-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	301	256	16.3%	20%	----
Physical Tests (QC Lot: 641102)											
VA22C1298-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639306)											
VA22C1276-001	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639307)											
VA22C1276-001	Anonymous	chloride	16887-00-6	E235.Cl	10.0	mg/L	<10.0	<10.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639308)											
VA22C1276-001	Anonymous	bromide	24959-67-9	E235.Br-L	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639309)											
VA22C1276-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639310)											
VA22C1276-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639311)											
VA22C1276-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	1290	1280	0.867%	20%	----
Anions and Nutrients (QC Lot: 639523)											
VA22C1315-003	SFC-4B	chloride	16887-00-6	E235.Cl	0.50	mg/L	36.5	36.6	0.143%	20%	----
Anions and Nutrients (QC Lot: 639524)											
VA22C1315-003	SFC-4B	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	29.6	29.7	0.122%	20%	----
Anions and Nutrients (QC Lot: 639525)											
VA22C1315-003	SFC-4B	fluoride	16984-48-8	E235.F	0.020	mg/L	0.051	0.051	0.0006	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 639526)											
VA22C1315-003	SFC-4B	bromide	24959-67-9	E235.Br-L	0.050	mg/L	0.076	0.077	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639527)											
VA22C1315-003	SFC-4B	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.309	0.310	0.363%	20%	----
Anions and Nutrients (QC Lot: 639528)											
VA22C1315-003	SFC-4B	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 642465)											
KS2203309-005	Anonymous	phosphorus, total	7723-14-0	E372-U	0.100	mg/L	2.58	2.57	0.303%	20%	----
Anions and Nutrients (QC Lot: 642466)											
KS2203309-005	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	3.66	3.60	1.71%	20%	----
Anions and Nutrients (QC Lot: 642467)											
KS2203346-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.250	mg/L	16.3	17.2	4.93%	20%	----
Anions and Nutrients (QC Lot: 642471)											
KS2203346-001	Anonymous	nitrogen, total	7727-37-9	E366	0.600	mg/L	15.7	15.9	1.28%	20%	----
Total Metals (QC Lot: 642928)											
VA22C1264-003	Anonymous	mercury, total	7439-97-6	E508	0.000250	mg/L	0.000284	0.000268	0.0000150	Diff <2x LOR	----
Total Metals (QC Lot: 645168)											
VA22C1315-001	SFC-2	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0823	0.0836	1.50%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00012	0.000003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0570	0.0556	2.38%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.033	0.031	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000287	0.0000346	0.0000059	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	35.7	33.5	6.23%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	0.000010	<0.000010	0.000000009	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00434	0.00440	1.54%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00209	0.00213	0.00004	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	2.87	2.88	0.434%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	3.12	3.11	0.328%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	1.17	1.16	0.648%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00228	0.00227	0.308%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 645168) - continued											
VA22C1315-001	SFC-2	nickel, total	7440-02-0	E420	0.00050	mg/L	0.00072	0.00076	0.00004	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	3.42	3.46	1.17%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00373	0.00378	1.27%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000051	<0.000050	0.000001	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	4.61	4.47	3.17%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	13.6	13.8	1.58%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.231	0.237	2.42%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	14.8	13.7	7.95%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000010	0.000012	0.000001	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000015	0.000016	0.000001	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0036	0.0034	0.0002	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 646603)											
FJ2202543-001	Anonymous	chemical oxygen demand [COD]	----	E559-L	10	mg/L	33	36	2	Diff <2x LOR	----
Aggregate Organics (QC Lot: 646604)											
VA22C1315-002	SFC-3	chemical oxygen demand [COD]	----	E559-L	10	mg/L	12	14	2	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 639303)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 639304)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 639520)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 639521)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 641102)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 639306)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 639307)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 639308)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 639309)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 639310)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 639311)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 639523)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 639524)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 639525)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 639526)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 639527)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 639528)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 642465)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 642466)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 642467)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 642471)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Total Metals (QCLot: 642928)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Total Metals (QCLot: 645168)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 645168) - continued						
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 646603)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 646604)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 639302)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 639303)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 639304)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.5	90.0	110	----
Physical Tests (QCLot: 639519)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 639520)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.3	90.0	110	----
Physical Tests (QCLot: 639521)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 641102)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	92.3	85.0	115	----
Anions and Nutrients (QCLot: 639306)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.6	90.0	110	----
Anions and Nutrients (QCLot: 639307)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 639308)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	94.7	85.0	115	----
Anions and Nutrients (QCLot: 639309)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 639310)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.9	90.0	110	----
Anions and Nutrients (QCLot: 639311)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 639523)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 639524)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 639525)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 639526)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 639526) - continued									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	99.0	85.0	115	----
Anions and Nutrients (QCLot: 639527)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 639528)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 642465)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	86.6	80.0	120	----
Anions and Nutrients (QCLot: 642466)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	95.9	85.0	115	----
Anions and Nutrients (QCLot: 642467)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.5	75.0	125	----
Anions and Nutrients (QCLot: 642471)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	104	75.0	125	----
Total Metals (QCLot: 642928)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	107	80.0	120	----
Total Metals (QCLot: 645168)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	108	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	109	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	97.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.6	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	111	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	105	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	107	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	107	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 645168) - continued									
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	98.0	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	98.0	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.8	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	100	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	98.9	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	107	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.2	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
Aggregate Organics (QCLot: 646603)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	109	85.0	115	----
Aggregate Organics (QCLot: 646604)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	109	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 639306)										
VA22C1276-002	Anonymous	fluoride	16984-48-8	E235.F	18.8 mg/L	20 mg/L	93.8	75.0	125	----
Anions and Nutrients (QCLot: 639307)										
VA22C1276-002	Anonymous	chloride	16887-00-6	E235.Cl	1970 mg/L	2000 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 639308)										
VA22C1276-002	Anonymous	bromide	24959-67-9	E235.Br-L	8.86 mg/L	10 mg/L	88.6	75.0	125	----
Anions and Nutrients (QCLot: 639309)										
VA22C1276-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	49.4 mg/L	50 mg/L	98.7	75.0	125	----
Anions and Nutrients (QCLot: 639310)										
VA22C1276-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	9.59 mg/L	10 mg/L	95.9	75.0	125	----
Anions and Nutrients (QCLot: 639311)										
VA22C1276-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1930 mg/L	2000 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 639523)										
VA22C1323-001	Anonymous	chloride	16887-00-6	E235.Cl	496 mg/L	500 mg/L	99.2	75.0	125	----
Anions and Nutrients (QCLot: 639524)										
VA22C1323-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	494 mg/L	500 mg/L	98.8	75.0	125	----
Anions and Nutrients (QCLot: 639525)										
VA22C1323-001	Anonymous	fluoride	16984-48-8	E235.F	5.01 mg/L	5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 639526)										
VA22C1323-001	Anonymous	bromide	24959-67-9	E235.Br-L	2.53 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 639527)										
VA22C1323-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	12.5 mg/L	12.5 mg/L	99.8	75.0	125	----
Anions and Nutrients (QCLot: 639528)										
VA22C1323-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	2.43 mg/L	2.5 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 642465)										
KS2203346-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	2.5 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 642466)										
KS2203346-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 642467)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 642467) - continued										
KS2203346-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 642471)										
KS2203346-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	4 mg/L	ND	70.0	130	----
Total Metals (QCLot: 642928)										
VA22C1271-001	Anonymous	mercury, total	7439-97-6	E508	0.000101 mg/L	0.0001 mg/L	101	70.0	130	----
Total Metals (QCLot: 645168)										
VA22C1315-002	SFC-3	aluminum, total	7429-90-5	E420	0.212 mg/L	0.2 mg/L	106	70.0	130	----
		antimony, total	7440-36-0	E420	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		barium, total	7440-39-3	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	95.7	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00988 mg/L	0.01 mg/L	98.8	70.0	130	----
		chromium, total	7440-47-3	E420	0.0385 mg/L	0.04 mg/L	96.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		copper, total	7440-50-8	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		iron, total	7439-89-6	E420	2.08 mg/L	2 mg/L	104	70.0	130	----
		lead, total	7439-92-1	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		lithium, total	7439-93-2	E420	0.1000 mg/L	0.1 mg/L	100.0	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.96 mg/L	10 mg/L	99.6	70.0	130	----
		potassium, total	7440-09-7	E420	4.05 mg/L	4 mg/L	101	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		selenium, total	7782-49-2	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	8.83 mg/L	10 mg/L	88.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00415 mg/L	0.004 mg/L	104	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	21.0 mg/L	20 mg/L	105	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0374 mg/L	0.04 mg/L	93.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 645168) - continued										
VA22C1315-002	SFC-3	thallium, total	7440-28-0	E420	0.00396 mg/L	0.004 mg/L	99.0	70.0	130	----
		thorium, total	7440-29-1	E420	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0391 mg/L	0.04 mg/L	97.8	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00396 mg/L	0.004 mg/L	99.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0996 mg/L	0.1 mg/L	99.6	70.0	130	----
		zinc, total	7440-66-6	E420	0.394 mg/L	0.4 mg/L	98.6	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
Aggregate Organics (QCLot: 646603)										
FJ2202543-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	106 mg/L	100 mg/L	106	75.0	125	----
Aggregate Organics (QCLot: 646604)										
VA22C1315-003	SFC-4B	chemical oxygen demand [COD]	----	E559-L	101 mg/L	100 mg/L	101	75.0	125	----

Qualifiers

Qualifier	Description
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1015755

Canada Toll Free: 1 800 668 9878

Page

www.alsglobal.com

Environmental Division Vancouver
Work Order Reference
VA22C1315

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Morrison Hershfield Ltd.	Select Report Format: ☐ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Josie Gilson	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:		☒ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	310-4321 Still Creek Drive	Email 1 or Fax jgilson@morrisonhershfield.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Burnaby BC	Email 2 erogal@morrisonhershfield.com	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additi may apply to rush requests on weekends, statutory holidays and non-ro
Postal Code:	V5C 6S7	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☐ YES ☒ NO	**Invoice Recipients**	For all tests with rush TATs requested, please c
	Copy of Invoice with Report ☒ YES ☐ NO	Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	Analysis Re
Company:	Resort Municipality of Whistler	Email 1 or Fax inckeachie@whistler.ca	
Contact:	Ian McKeachie	Email 2 ap@whistler.ca	
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Account # / Quote #:		AFE/Cost Center: PO#	
Job #:	2100168	Major/Minor Code: Routing Code:	
PO / AFE:	726379	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Ian Chen Sampler: E. Rogal	

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P	Total Metals + Mercury	General Parameters	Nutrients, Anions, COD	SAMPLES ON HOLD	EXTENDED STORAGE REQUIR	SUSPECTED HAZARD (see note
	SFC-2	07-Sep-22	15:15	Water	4		X	X	X			
	SFC-3	07-Sep-22	12:40	↓	4		X	X	X			
	SFC-4B	07-Sep-22	09:00	↓	4		X	X	X			
	SFC-11	07-Sep-22	12:50	↓	4		X	X	X			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO	BC Approved + Working Water Quality Guidelines
Are samples for human consumption/ use? ☐ YES ☒ NO	BC Contaminated Sites Regulation Stage 10 (May 2015) Amendment (Nov 2017)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date: Sep 8/2022	Time: 9:30	Received by:	Date:	Time:	Received by: AJ TC	Date: SEP - 8 2022	Time: 950

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

White Paper Co. 604 951-3900

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1015755

Canada Toll Free: 1 800 668 9878

Page

www.alsglobal.com

Environmental Division
Vancouver
Work Order Reference
VA22C1315

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Morrison Hershfield Ltd.	Select Report Format: ☐ PDF ☒ EXCEL ☐ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Josie Gilson	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:		☒ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	310-4321 Still Creek Drive	Email 1 or Fax jgilson@morrisonhershfield.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Burnaby BC	Email 2 erogal@morrisonhershfield.com	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additi may apply to rush requests on weekends, statutory holidays and non-ro
Postal Code:	V5C 6S7	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☐ YES ☒ NO	**Invoice Recipients**	For all tests with rush TATs requested, please c
	Copy of Invoice with Report ☒ YES ☐ NO	Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	Analysis Re
Company:	Resort Municipality of Whistler	Email 1 or Fax imckeachie@whistler.ca	
Contact:	Ian McKeachie	Email 2 ap@whistler.ca	

Project Information	Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	AFE/Cost Center:	PO#
Job #: 2100168	Major/Minor Code:	Routing Code:
PO / AFE: 726379	Requisitioner:	
LSD:	Location:	
ALS Lab Work Order # (ALS use only):	ALS Contact: Ian Chen	Sampler: E. Rogal

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P	Total Metals + Mercury	General Parameters	Nutrients, Anions, COD	SAMPLES ON HOLD	EXTENDED STORAGE REQUIR	SUSPECTED HAZARD (see note
	SFC-2	07-Sep-22	15:15	Water	4		X	X	X			
	SFC-3	07-Sep-22	12:40	↓	4		X	X	X			
	SFC-4B	07-Sep-22	09:00		4		X	X	X			
	SFC-11	07-Sep-22	12:50		4		X	X	X			

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

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

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

Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC Approved + Working Water Quality Guidelines (May 2015)
BC Contaminated Sites Regulation Stage 10 Amendment (Nov 2017)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				6			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date: Sep 8/2022	Time: 9:30	Received by:	Date:	Time:	Received by:	Date: SEP - 8 2022	Time: 9:50am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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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**.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C1323**	Page	: 1 of 12
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604-454-0402	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 08-Sep-2022 09:50
PO	: 726379	Date Analysis Commenced	: 09-Sep-2022
C-O-C number	: 20-1015752	Issue Date	: 22-Sep-2022 09:54
Sampler	: E.Rogal		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Harsha Attanayake	Laboratory Analyst	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Inorganics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
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).*
DLQ	*Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-6	DUP
					Client sampling date / time	07-Sep-2022 10:30	07-Sep-2022 17:00	07-Sep-2022 16:00	07-Sep-2022 11:45	07-Sep-2022 12:00
						VA22C1323-001	VA22C1323-002	VA22C1323-003	VA22C1323-004	VA22C1323-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		301	96.9	30.7	51.9	97.3
conductivity	----	E100	2.0	µS/cm		958	324	125	637	323
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		312	93.0	31.8	110	90.7
pH	----	E108	0.10	pH units		6.77	6.86	6.70	7.01	6.83
solids, total suspended [TSS]	----	E160	3.0	mg/L		82.8	32.0	4.8	191	38.4
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		14.3	3.64	0.315	0.0219	3.48
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.050	<0.050	<0.250 DLDS	<0.050
chloride	16887-00-6	E235.Cl	0.50	mg/L		47.6	8.71	7.59	116	8.79
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.100 DLDS	0.132	0.020	<0.100 DLDS	0.147
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		14.8	3.50	0.406	0.729	3.83
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0250 DLDS	0.0226	0.505	0.115	0.0260
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0255	0.0226	0.505	0.115	0.0260
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0050 DLDS	<0.0010	<0.0010	<0.0050 DLDS	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		14.6	3.53	0.486	0.989	3.62
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0972	0.0665	0.0094	1.14	0.0723
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		130	52.2	16.2	77.6	52.2
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0100	0.0083	0.0135	0.0127	0.0089
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.0135	0.00658	<0.00010	0.00045	0.00699
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0445	0.0765	0.0617	0.0433	0.0806
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.211	0.074	<0.010	0.012	0.080
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000100 DLM	<0.0000050	0.0000788	0.0000225	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		105	30.0	9.80	37.2	28.2
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		0.000017	0.000014	0.000032	<0.000010	0.000015
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.0104	0.00161	0.00128	0.00104	0.00169

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-6	DUP
					Client sampling date / time	07-Sep-2022 10:30	07-Sep-2022 17:00	07-Sep-2022 16:00	07-Sep-2022 11:45	07-Sep-2022 12:00
						VA22C1323-001	VA22C1323-002	VA22C1323-003	VA22C1323-004	VA22C1323-005
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	<0.00020	0.00124	0.00119	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L		47.5	29.8	0.046	2.14	30.0
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		12.0	4.40	1.78	4.10	4.92
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		3.02	1.11	0.927	0.127	1.20
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0123	0.00401	0.000704	0.00226	0.00361
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00206	0.00053	<0.00050	<0.00050	0.00056
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		0.094	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		20.3	6.56	2.68	4.13	7.09
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.0113	0.00404	0.00656	0.00485	0.00455
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000072	<0.000050	<0.000050	<0.000050	<0.000050
silicon, dissolved	7440-21-3	E421	0.050	mg/L		13.7	8.54	6.08	6.15	9.25
silver, dissolved	7440-22-4	E421	0.000010	mg/L		0.000016	0.000096	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		40.9	8.19	7.22	75.9	8.39
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.549	0.183	0.0940	0.383	0.179
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		44.2	16.3	5.04	26.8	15.8
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	0.000040	0.000024	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000134	0.000010	<0.000010	0.000019	0.000014
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0011	0.0032	0.0018	0.0011	0.0034
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Aggregate Organics										

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-6	DUP
					Client sampling date / time	07-Sep-2022 10:30	07-Sep-2022 17:00	07-Sep-2022 16:00	07-Sep-2022 11:45	07-Sep-2022 12:00
						VA22C1323-001	VA22C1323-002	VA22C1323-003	VA22C1323-004	VA22C1323-005
						Result	Result	Result	Result	Result
Aggregate Organics										
chemical oxygen demand [COD]	----	E559-L	10	mg/L		42	37	16	73	53
Volatile Organic Compounds										
chlorobenzene	108-90-7	E611C	0.50	µg/L		2.30	<0.50	<0.50	<0.50	<0.50
chloromethane	74-87-3	E611C	5.0	µg/L		<5.0	<5.0	<5.0	<5.0	<5.0
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds [Drycleaning]										
carbon tetrachloride	56-23-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
chloroethane	75-00-3	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dichloromethane	75-09-2	E611C	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
tetrachloroethylene	127-18-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
trichloroethylene	79-01-6	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
vinyl chloride	75-01-4	E611C	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
ethylbenzene	100-41-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-6	DUP
					Client sampling date / time	07-Sep-2022 10:30	07-Sep-2022 17:00	07-Sep-2022 16:00	07-Sep-2022 11:45	07-Sep-2022 12:00
						VA22C1323-001	VA22C1323-002	VA22C1323-003	VA22C1323-004	VA22C1323-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
styrene	100-42-5	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
toluene	108-88-3	E611C	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
xylene, m+p-	179601-23-1	E611C	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
xylene, o-	95-47-6	E611C	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
xylenes, total	1330-20-7	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds [THMs]										
bromodichloromethane	75-27-4	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
bromoform	75-25-2	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
chloroform	67-66-3	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
dibromochloromethane	124-48-1	E611C	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%		88.4	91.4	87.5	85.9	91.7
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%		101	101	102	101	99.6
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		79.0	83.9	82.5	86.0	82.4
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		79.2	89.5	93.2	76.1	82.6
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW-2D	MW-2S	MW-3	MW-6	DUP
					Client sampling date / time	07-Sep-2022 10:30	07-Sep-2022 17:00	07-Sep-2022 16:00	07-Sep-2022 11:45	07-Sep-2022 12:00
						VA22C1323-001	VA22C1323-002	VA22C1323-003	VA22C1323-004	VA22C1323-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		100	99.6	98.1	101	102
naphthalene-d8	1146-65-2	E641A	0.1	%		95.4	97.5	91.2	95.6	95.8
phenanthrene-d10	1517-22-2	E641A	0.1	%		106	109	102	106	108

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Field Blank	GW Int.	----	----	----
					Client sampling date / time	07-Sep-2022 18:00	07-Sep-2022 14:25	----	----	----
						VA22C1323-006	VA22C1323-007	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		<1.0	130	----	----	----
conductivity	----	E100	2.0	µS/cm		<2.0	665	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		<0.60	176	----	----	----
pH	----	E108	0.10	pH units		5.38	6.77	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		<3.0	64.2	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	0.963	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.050	<0.250 DLDS	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	95.0	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		<0.020	<0.100 DLDS	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L		<0.050	1.48	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0250 DLDS	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0255	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0050 DLDS	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		<0.030	1.28	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		<0.0020	0.0843	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<0.30	64.8	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0068 RRV	0.0388	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		<0.00010	0.00040	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00100 RRV	0.0595	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.110	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	0.0000051	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		<0.050	60.7	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	0.00084	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	<0.00020	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Field Blank	GW Int.	----	----	----
					Client sampling date / time: 07-Sep-2022 18:00	07-Sep-2022 14:25	----	----	----
					VA22C1323-006	VA22C1323-007	--------	--------	--------
					Result	Result	----	----	----
Dissolved Metals									
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	19.8	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	5.90	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	1.70	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	0.000566	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00087	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	5.53	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	<0.00020	0.00383	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	8.50	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	<0.050	52.6	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	0.442	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	21.3	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	0.00033	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	0.000014	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	0.00067	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	0.0118	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----
Aggregate Organics									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	46	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Field Blank	GW Int.	----	----	----
					Client sampling date / time	07-Sep-2022 18:00	07-Sep-2022 14:25	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C1323-006	VA22C1323-007	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds										
chlorobenzene	108-90-7	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
chloromethane	74-87-3	E611C	5.0	µg/L		<5.0	<5.0	----	----	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloropropylene, cis+trans-1,3-	542-75-6	E611C	0.75	µg/L		<0.75	<0.75	----	----	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L		<0.20	<0.20	----	----	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
trichlorofluoromethane	75-69-4	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
Volatile Organic Compounds [Drycleaning]										
carbon tetrachloride	56-23-5	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
chloroethane	75-00-3	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
dichloromethane	75-09-2	E611C	1.0	µg/L		<1.0	<1.0	----	----	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
tetrachloroethylene	127-18-4	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
trichloroethylene	79-01-6	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
vinyl chloride	75-01-4	E611C	0.40	µg/L		<0.40	<0.40	----	----	----
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
ethylbenzene	100-41-4	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L		<0.50	<0.50	----	----	----
styrene	100-42-5	E611C	0.50	µg/L		<0.50	<0.50	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Field Blank	GW Int.	----	----	----
					Client sampling date / time: 07-Sep-2022 18:00	07-Sep-2022 14:25	----	----	----
					VA22C1323-006	VA22C1323-007	--------	--------	--------
					Result	Result	----	----	----
Volatile Organic Compounds [Fuels]									
toluene	108-88-3	E611C	0.40	µg/L	<0.40	<0.40	----	----	----
xylene, m+p-	179601-23-1	E611C	0.40	µg/L	<0.40	<0.40	----	----	----
xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	<0.30	----	----	----
xylenes, total	1330-20-7	E611C	0.50	µg/L	<0.50	<0.50	----	----	----
Volatile Organic Compounds [THMs]									
bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	<0.50	----	----	----
bromoform	75-25-2	E611C	0.50	µg/L	<0.50	<0.50	----	----	----
chloroform	67-66-3	E611C	0.50	µg/L	1.50 RRV	<0.50	----	----	----
dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	<0.50	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	E611C	1.0	%	93.0	86.0	----	----	----
difluorobenzene, 1,4-	540-36-3	E611C	1.0	%	100	102	----	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	----	----	----
HEPHw	----	EC600A	250	µg/L	<250	<250	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	<250	----	----	----
VPHw	----	EC580A	100	µg/L	<100	<100	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%	81.6	85.3	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%	88.9	87.7	----	----	----
Polycyclic Aromatic Hydrocarbons									
acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	0.649	----	----	----
acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
acridine	260-94-6	E641A	0.010	µg/L	<0.010	<0.014 DLQ	----	----	----
anthracene	120-12-7	E641A	0.010	µg/L	<0.010	0.015	----	----	----
benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	0.0053	----	----	----
benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.011 DLQ	----	----	----
benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: Field Blank	GW Int.	----	----	----
					Client sampling date / time: 07-Sep-2022 18:00	07-Sep-2022 14:25	----	----	----
					VA22C1323-006	VA22C1323-007	--------	--------	--------
					Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons									
benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
chrysene	218-01-9	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	<0.0050	----	----	----
fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	0.163	----	----	----
fluorene	86-73-7	E641A	0.010	µg/L	<0.010	0.074	----	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	<0.010	<0.010	----	----	----
naphthalene	91-20-3	E641A	0.050	µg/L	<0.050	<0.050	----	----	----
phenanthrene	85-01-8	E641A	0.020	µg/L	<0.020	0.028	----	----	----
pyrene	129-00-0	E641A	0.010	µg/L	<0.010	0.090	----	----	----
quinoline	91-22-5	E641A	0.050	µg/L	<0.050	<0.050	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates									
chrysene-d12	1719-03-5	E641A	0.1	%	94.9	104	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%	90.7	94.0	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%	101	106	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C1323**	Page	: 1 of 29
Client	: **Morrison Hershfield Limited**	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 4321 Still Creek Dr Burnaby BC Canada V5C 6S7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 08-Sep-2022 09:50
PO	: 726379	Issue Date	: 22-Sep-2022 09:54
C-O-C number	: 20-1015752		
Sampler	: E.Rogal		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Matrix Spike (MS) Recoveries								
Dissolved Metals	Anonymous	Anonymous	silver, dissolved	7440-22-4	E421	57.7 % MS-Ag	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

Qualifier	Description
MS-Ag	*MS-Ag: Matrix Spike recovery for silver was marginally below DQO (40 to <60%) due to its instability in the sample matrix. Silver was not detected. Reported result (< LOR) is reliable*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) DUP	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Field Blank	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) GW Int.	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW-2D	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW-2S	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW-3	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) MW-6	E559-L	07-Sep-2022	----	----	----		14-Sep-2022	28 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) DUP	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Field Blank	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) GW Int.	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-2D	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-2S	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-3	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) MW-6	E298	07-Sep-2022	12-Sep-2022	----	----		15-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE DUP	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE Field Blank	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE GW Int.	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-2D	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-2S	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-3	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE MW-6	E235.Br-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE DUP	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE GW Int.	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-2D	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-2S	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-3	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-6	E235.Cl	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUP	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Field Blank	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE GW Int.	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-2D	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-2S	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-3	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-6	E235.F	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE DUP	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE GW Int.	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-2D	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-2S	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-3	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE MW-6	E235.NO3-L	07-Sep-2022	09-Sep-2022	3 days	2 days	✓	09-Sep-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE DUP	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Field Blank	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE GW Int.	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-2D	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-2S	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-3	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE MW-6	E235.NO2-L	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUP	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Field Blank	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE GW Int.	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-2D	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-2S	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-3	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
MW-6	E235.SO4	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
DUP	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
Field Blank	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
GW Int.	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-2D	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-2S	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-3	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
MW-6	E318	07-Sep-2022	12-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
DUP	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
Field Blank	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
GW Int.	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2D	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-2S	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-3	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
MW-6	E366	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) DUP	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Field Blank	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) GW Int.	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MW-2D	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MW-2S	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MW-3	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) MW-6	E372-U	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	28 days	6 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) DUP	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) Field Blank	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) GW Int.	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-2D	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-2S	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-3	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-6	E509	07-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-2S	E421	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUP	E421	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) Field Blank	E421	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) GW Int.	E421	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-2D	E421	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-3	E421	07-Sep-2022	15-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-6	E421	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	180 days	9 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) Field Blank	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) GW Int.	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW-2D	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW-2S	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW-3	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-6	E601A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Field Blank	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
GW Int.	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-2S	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-3	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-2D	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW-6	E581.VH+F1	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
DUP	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE GW Int.	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-2D	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-2S	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-3	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE MW-6	E290	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE DUP	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE GW Int.	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE MW-2D	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-2S	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-3	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE MW-6	E100	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE DUP	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE GW Int.	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-2D	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-2S	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE MW-3	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE MW-6	E108	07-Sep-2022	09-Sep-2022	----	----		09-Sep-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE DUP	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE Field Blank	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE GW Int.	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-2D	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-2S	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-3	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓
Physical Tests : TSS by Gravimetry										
HDPE MW-6	E160	07-Sep-2022	----	----	----		10-Sep-2022	7 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
Field Blank	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
GW Int.	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-2D	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-2S	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-3	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW-6	E641A	07-Sep-2022	15-Sep-2022	14 days	8 days	✓	16-Sep-2022	40 days	0 days	✓
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Field Blank	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Field Blank	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Drycleaning] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Field Blank	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	14 days	7 days	✓
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) Field Blank	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) GW Int.	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2D	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-2S	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-3	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	
Volatile Organic Compounds [THMs] : VOCs (BC List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-6	E611C	07-Sep-2022	12-Sep-2022	----	----		13-Sep-2022	----	----	

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	639521	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	642511	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639526	1	8	12.5	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646604	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	639523	1	9	11.1	5.0	✓
Conductivity in Water	E100	639520	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	643166	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	647336	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	639525	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639527	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639528	1	13	7.6	5.0	✓
pH by Meter	E108	639519	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	639524	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642512	1	11	9.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642513	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642510	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	641102	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	643785	1	16	6.2	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	643784	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	639521	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	642511	1	17	5.8	5.0	✓
BC PHCs - EPH by GC-FID	E601A	649713	1	12	8.3	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639526	1	8	12.5	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646604	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	639523	1	9	11.1	5.0	✓
Conductivity in Water	E100	639520	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	643166	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	647336	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	639525	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639527	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639528	1	13	7.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	649712	1	12	8.3	5.0	✓
pH by Meter	E108	639519	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	639524	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642512	1	11	9.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642513	1	12	8.3	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642510	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	641102	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	643785	1	16	6.2	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	643784	1	11	9.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	639521	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	642511	1	17	5.8	5.0	✓
BC PHCs - EPH by GC-FID	E601A	649713	1	12	8.3	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639526	1	8	12.5	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646604	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	639523	1	9	11.1	5.0	✓
Conductivity in Water	E100	639520	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	643166	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	647336	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	639525	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639527	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639528	1	13	7.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	649712	1	12	8.3	5.0	✓
Sulfate in Water by IC	E235.SO4	639524	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642512	1	11	9.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642513	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642510	1	17	5.8	5.0	✓
TSS by Gravimetry	E160	641102	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	643785	1	16	6.2	5.0	✓
VOCs (BC List) by Headspace GC-MS	E611C	643784	1	11	9.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	642511	1	17	5.8	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	639526	1	8	12.5	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	646604	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	639523	1	9	11.1	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	643166	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	647336	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	639525	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	639527	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	639528	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	639524	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	642512	1	11	9.0	5.0	✓
Total Nitrogen by Colourimetry	E366	642513	1	12	8.3	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	642510	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	643785	1	16	6.2	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
VOCs (BC List) by Headspace GC-MS	E611C	643784	1	11	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Bromide in Water by IC (Low Level)	E235.Br-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
VOCs (BC List) by Headspace GC-MS	E611C Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22C1323**	Page	: 1 of 22
Client	: Morrison Hershfield Limited	Laboratory	: Vancouver - Environmental
Contact	: Josie Gilson	Account Manager	: Carla Fuginski
Address	: 8001 Hwy 99 Whistler BC Canada V0N 1B8	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: 2100168	Date Samples Received	: 08-Sep-2022 09:50
PO	: 726379	Date Analysis Commenced	: 09-Sep-2022
C-O-C number	: 20-1015752	Issue Date	: 22-Sep-2022 09:54
Sampler	: E.Rogal		
Site	:		
Quote number	: Q65605 - Whistler Landfill Closure Environmental Monitoring Program		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Delson Resende	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Harsha Attanayake	Laboratory Analyst	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Inorganics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 639519)											
VA22C1323-001	MW-2D	pH	----	E108	0.10	pH units	6.77	6.91	2.09%	4%	----
Physical Tests (QC Lot: 639520)											
VA22C1323-001	MW-2D	conductivity	----	E100	2.0	µS/cm	958	937	2.22%	10%	----
Physical Tests (QC Lot: 639521)											
VA22C1323-001	MW-2D	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	301	256	16.3%	20%	----
Physical Tests (QC Lot: 641102)											
VA22C1298-004	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639523)											
VA22C1315-003	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	36.5	36.6	0.143%	20%	----
Anions and Nutrients (QC Lot: 639524)											
VA22C1315-003	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	29.6	29.7	0.122%	20%	----
Anions and Nutrients (QC Lot: 639525)											
VA22C1315-003	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.051	0.051	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639526)											
VA22C1315-003	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	0.076	0.077	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 639527)											
VA22C1315-003	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.309	0.310	0.363%	20%	----
Anions and Nutrients (QC Lot: 639528)											
VA22C1315-003	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 642510)											
VA22C1263-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.184	0.179	0.0047	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 642511)											
VA22C1263-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0661	0.0652	1.43%	20%	----
Anions and Nutrients (QC Lot: 642512)											
VA22C1263-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.838	0.875	4.38%	20%	----
Anions and Nutrients (QC Lot: 642513)											
VA22C1263-001	Anonymous	nitrogen, total	7727-37-9	E366	0.150	mg/L	4.49	4.57	1.78%	20%	----
Dissolved Metals (QC Lot: 643166)											
FJ2202505-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 643167)											
VA22C1323-003	MW-3	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 647336)											
FJ2202545-006	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00243	0.00245	0.710%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.120	0.125	4.11%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.046	0.044	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	80.5	82.1	1.95%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	2.42	2.48	2.32%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0761	0.0772	1.37%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	32.0	33.5	4.46%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0528	0.0544	2.94%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00567	0.00585	3.17%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.858	0.901	4.87%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00044	0.00051	0.00007	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000124	0.000170	0.000046	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.60	2.56	1.58%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	36.0	37.5	4.09%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.376	0.390	3.53%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	67.5	67.1	0.627%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 647336) - continued											
FJ2202545-006	Anonymous	uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000015	0.000016	0.000001	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 647338)											
VA22C1351-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0334	0.0309	0.0025	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	0.0231	0.0233	0.873%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.0296	0.0299	1.16%	20%	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.0310	0.0309	0.430%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	0.391	0.402	0.010	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	0.000348	0.000341	2.14%	20%	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	421	426	1.14%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000050	mg/L	0.000679	0.000710	4.46%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	0.00935	0.00909	0.00026	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	0.065	0.061	0.004	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.0099	0.0122	0.0023	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	46.8	47.3	1.02%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00050	mg/L	0.0219	0.0212	3.25%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.240	0.244	1.40%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	113	113	0.279%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.0641	0.0637	0.610%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000250	mg/L	0.0172	0.0168	2.16%	20%	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	5.09	5.10	0.0491%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	1350	1370	1.66%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	8.87	9.08	2.32%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	1500	1510	0.292%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 647338) - continued											
VA22C1351-001	Anonymous	thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	0.00259	0.00256	0.00003	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.000785	0.000757	3.52%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	0.00628	0.00629	0.000008	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 646604)											
VA22C1315-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	10	mg/L	12	14	2	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 643784)											
VA22C1274-002	Anonymous	benzene	71-43-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		bromodichloromethane	75-27-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		bromoform	75-25-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		carbon tetrachloride	56-23-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chlorobenzene	108-90-7	E611C	0.55	µg/L	<0.55	<0.55	0	Diff <2x LOR	----
		chloroethane	75-00-3	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chloroform	67-66-3	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chloromethane	74-87-3	E611C	5.0	µg/L	<5.0	<5.0	0	Diff <2x LOR	----
		dibromochloromethane	124-48-1	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,2-	95-50-1	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,3-	541-73-1	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,4-	106-46-7	E611C	0.50	µg/L	0.57	0.52	0.04	Diff <2x LOR	----
		dichloroethane, 1,1-	75-34-3	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethane, 1,2-	107-06-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, 1,1-	75-35-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, cis-1,2-	156-59-2	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, trans-1,2-	156-60-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloromethane	75-09-2	E611C	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		dichloropropane, 1,2-	78-87-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloropropylene, cis-1,3-	10061-01-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloropropylene, trans-1,3-	10061-02-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 643784) - continued											
VA22C1274-002	Anonymous	styrene	100-42-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		tetrachloroethylene	127-18-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611C	0.40	µg/L	2.84	2.94	3.45%	30%	----
		trichloroethane, 1,1,1-	71-55-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichloroethane, 1,1,2-	79-00-5	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichloroethylene	79-01-6	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichlorofluoromethane	75-69-4	E611C	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		vinyl chloride	75-01-4	E611C	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611C	0.40	µg/L	0.51	0.55	0.04	Diff <2x LOR	----
		xylene, o-	95-47-6	E611C	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 643785)											
VA22C1323-001	MW-2D	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 639520)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 639521)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 641102)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 639523)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 639524)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 639525)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 639526)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 639527)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 639528)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 642510)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 642511)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 642512)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 642513)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Dissolved Metals (QCLot: 643166)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 643167)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 647336)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 647336) - continued						
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 647338)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 647338) - continued						
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 646604)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Volatile Organic Compounds (QCLot: 643784)						
benzene	71-43-2	E611C	0.5	µg/L	<0.50	----
bromodichloromethane	75-27-4	E611C	0.5	µg/L	<0.50	----
bromoform	75-25-2	E611C	0.5	µg/L	<0.50	----
carbon tetrachloride	56-23-5	E611C	0.5	µg/L	<0.50	----
chlorobenzene	108-90-7	E611C	0.5	µg/L	<0.50	----
chloroethane	75-00-3	E611C	0.5	µg/L	<0.50	----
chloroform	67-66-3	E611C	0.5	µg/L	<0.50	----
chloromethane	74-87-3	E611C	5	µg/L	<5.0	----
dibromochloromethane	124-48-1	E611C	0.5	µg/L	<0.50	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.5	µg/L	<0.50	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.5	µg/L	<0.50	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.5	µg/L	<0.50	----
dichloroethane, 1,1-	75-34-3	E611C	0.5	µg/L	<0.50	----
dichloroethane, 1,2-	107-06-2	E611C	0.5	µg/L	<0.50	----
dichloroethylene, 1,1-	75-35-4	E611C	0.5	µg/L	<0.50	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.5	µg/L	<0.50	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.5	µg/L	<0.50	----
dichloromethane	75-09-2	E611C	1	µg/L	<1.0	----
dichloropropane, 1,2-	78-87-5	E611C	0.5	µg/L	<0.50	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.5	µg/L	<0.50	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	E611C	0.5	µg/L	<0.50	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.5	µg/L	<0.50	----
styrene	100-42-5	E611C	0.5	µg/L	<0.50	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.5	µg/L	<0.50	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.2	µg/L	<0.20	----
tetrachloroethylene	127-18-4	E611C	0.5	µg/L	<0.50	----
toluene	108-88-3	E611C	0.4	µg/L	<0.40	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.5	µg/L	<0.50	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 643784) - continued						
trichloroethylene	79-01-6	E611C	0.5	µg/L	<0.50	----
trichlorofluoromethane	75-69-4	E611C	0.5	µg/L	<0.50	----
vinyl chloride	75-01-4	E611C	0.4	µg/L	<0.40	----
xylene, m+p-	179601-23-1	E611C	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611C	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 643785)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 649713)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 649712)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 639519)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 639520)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.3	90.0	110	----
Physical Tests (QCLot: 639521)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 641102)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	92.3	85.0	115	----
Anions and Nutrients (QCLot: 639523)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 639524)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 639525)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 639526)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	99.0	85.0	115	----
Anions and Nutrients (QCLot: 639527)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 639528)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 642510)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	85.9	80.0	120	----
Anions and Nutrients (QCLot: 642511)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	94.4	85.0	115	----
Anions and Nutrients (QCLot: 642512)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	94.0	75.0	125	----
Anions and Nutrients (QCLot: 642513)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	104	75.0	125	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	108	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	109	80.0	120	----
Dissolved Metals (QCLot: 647336)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.7	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 647336) - continued									
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	95.7	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	97.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	97.1	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.0	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	92.8	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.3	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.4	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	87.2	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	98.2	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	96.2	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.8	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.9	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	96.7	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 647338)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.6	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	95.5	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.6	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	94.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.8	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	95.8	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.5	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.1	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.8	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.2	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.0	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.9	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	109	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.1	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	103	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.4	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.0	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.6	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.0	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	92.2	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.9	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 647338) - continued									
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	94.8	80.0	120	----
Aggregate Organics (QCLot: 646604)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	109	85.0	115	----
Volatile Organic Compounds (QCLot: 643784)									
benzene	71-43-2	E611C	0.5	µg/L	100 µg/L	108	70.0	130	----
bromodichloromethane	75-27-4	E611C	0.5	µg/L	100 µg/L	94.5	70.0	130	----
bromoform	75-25-2	E611C	0.5	µg/L	100 µg/L	92.2	70.0	130	----
carbon tetrachloride	56-23-5	E611C	0.5	µg/L	100 µg/L	106	70.0	130	----
chlorobenzene	108-90-7	E611C	0.5	µg/L	100 µg/L	110	70.0	130	----
chloroethane	75-00-3	E611C	0.5	µg/L	100 µg/L	115	60.0	140	----
chloroform	67-66-3	E611C	0.5	µg/L	100 µg/L	101	70.0	130	----
chloromethane	74-87-3	E611C	5	µg/L	100 µg/L	108	60.0	140	----
dibromochloromethane	124-48-1	E611C	0.5	µg/L	100 µg/L	92.3	70.0	130	----
dichlorobenzene, 1,2-	95-50-1	E611C	0.5	µg/L	100 µg/L	109	70.0	130	----
dichlorobenzene, 1,3-	541-73-1	E611C	0.5	µg/L	100 µg/L	119	70.0	130	----
dichlorobenzene, 1,4-	106-46-7	E611C	0.5	µg/L	100 µg/L	121	70.0	130	----
dichloroethane, 1,1-	75-34-3	E611C	0.5	µg/L	100 µg/L	109	70.0	130	----
dichloroethane, 1,2-	107-06-2	E611C	0.5	µg/L	100 µg/L	90.3	70.0	130	----
dichloroethylene, 1,1-	75-35-4	E611C	0.5	µg/L	100 µg/L	113	70.0	130	----
dichloroethylene, cis-1,2-	156-59-2	E611C	0.5	µg/L	100 µg/L	106	70.0	130	----
dichloroethylene, trans-1,2-	156-60-5	E611C	0.5	µg/L	100 µg/L	117	70.0	130	----
dichloromethane	75-09-2	E611C	1	µg/L	100 µg/L	100	70.0	130	----
dichloropropane, 1,2-	78-87-5	E611C	0.5	µg/L	100 µg/L	104	70.0	130	----
dichloropropylene, cis-1,3-	10061-01-5	E611C	0.5	µg/L	100 µg/L	107	70.0	130	----
dichloropropylene, trans-1,3-	10061-02-6	E611C	0.5	µg/L	100 µg/L	114	70.0	130	----
ethylbenzene	100-41-4	E611C	0.5	µg/L	100 µg/L	123	70.0	130	----
methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	0.5	µg/L	100 µg/L	103	70.0	130	----
styrene	100-42-5	E611C	0.5	µg/L	100 µg/L	109	70.0	130	----
tetrachloroethane, 1,1,1,2-	630-20-6	E611C	0.5	µg/L	100 µg/L	107	70.0	130	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611C	0.2	µg/L	100 µg/L	93.4	70.0	130	----
tetrachloroethylene	127-18-4	E611C	0.5	µg/L	100 µg/L	114	70.0	130	----
toluene	108-88-3	E611C	0.4	µg/L	100 µg/L	118	70.0	130	----
trichloroethane, 1,1,1-	71-55-6	E611C	0.5	µg/L	100 µg/L	108	70.0	130	----
trichloroethane, 1,1,2-	79-00-5	E611C	0.5	µg/L	100 µg/L	96.4	70.0	130	----
trichloroethylene	79-01-6	E611C	0.5	µg/L	100 µg/L	112	70.0	130	----
trichlorofluoromethane	75-69-4	E611C	0.5	µg/L	100 µg/L	108	60.0	140	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 643784) - continued									
vinyl chloride	75-01-4	E611C	0.4	µg/L	100 µg/L	117	60.0	140	----
xylene, m+p-	179601-23-1	E611C	0.4	µg/L	200 µg/L	124	70.0	130	----
xylene, o-	95-47-6	E611C	0.3	µg/L	100 µg/L	120	70.0	130	----
Hydrocarbons (QCLot: 643785)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	86.9	70.0	130	----
Hydrocarbons (QCLot: 649713)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	102	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	105	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 649712)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	87.8	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	97.5	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	97.8	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	96.1	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	94.8	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	93.7	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	105	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	86.8	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	84.5	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	86.5	50.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	103	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	106	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 639523)										
VA22C1323-001	MW-2D	chloride	16887-00-6	E235.Cl	496 mg/L	500 mg/L	99.2	75.0	125	----
Anions and Nutrients (QCLot: 639524)										
VA22C1323-001	MW-2D	sulfate (as SO4)	14808-79-8	E235.SO4	494 mg/L	500 mg/L	98.8	75.0	125	----
Anions and Nutrients (QCLot: 639525)										
VA22C1323-001	MW-2D	fluoride	16984-48-8	E235.F	5.01 mg/L	5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 639526)										
VA22C1323-001	MW-2D	bromide	24959-67-9	E235.Br-L	2.53 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 639527)										
VA22C1323-001	MW-2D	nitrate (as N)	14797-55-8	E235.NO3-L	12.5 mg/L	12.5 mg/L	99.8	75.0	125	----
Anions and Nutrients (QCLot: 639528)										
VA22C1323-001	MW-2D	nitrite (as N)	14797-65-0	E235.NO2-L	2.43 mg/L	2.5 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 642510)										
VA22C1264-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 642511)										
VA22C1264-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 642512)										
VA22C1264-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 642513)										
VA22C1323-001	MW-2D	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 643166)										
VA22C1200-011	Anonymous	mercury, dissolved	7439-97-6	E509	0.000106 mg/L	0.0001 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 643167)										
VA22C1323-004	MW-6	mercury, dissolved	7439-97-6	E509	0.000107 mg/L	0.0001 mg/L	107	70.0	130	----
Dissolved Metals (QCLot: 647336)										
FJ2202545-007	Anonymous	aluminum, dissolved	7429-90-5	E421	0.193 mg/L	0.2 mg/L	96.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0355 mg/L	0.04 mg/L	88.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 647336) - continued										
FJ2202545-007	Anonymous	bismuth, dissolved	7440-69-9	E421	0.00834 mg/L	0.01 mg/L	83.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.095 mg/L	0.1 mg/L	95.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.00958 mg/L	0.01 mg/L	95.8	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0382 mg/L	0.04 mg/L	95.6	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0183 mg/L	0.02 mg/L	91.3	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0172 mg/L	0.02 mg/L	86.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	91.8	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0860 mg/L	0.1 mg/L	86.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0352 mg/L	0.04 mg/L	88.1	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	9.88 mg/L	10 mg/L	98.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.57 mg/L	4 mg/L	89.3	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.82 mg/L	10 mg/L	88.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00231 mg/L	0.004 mg/L	57.7	70.0	130	MS-Ag
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0345 mg/L	0.04 mg/L	86.2	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00372 mg/L	0.004 mg/L	92.9	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00400 mg/L	0.004 mg/L	100	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0992 mg/L	0.1 mg/L	99.2	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.352 mg/L	0.4 mg/L	87.9	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
Dissolved Metals (QCLot: 647338)										
VA22C1351-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.996 mg/L	1 mg/L	99.6	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0941 mg/L	0.1 mg/L	94.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 647338) - continued										
VA22C1351-002	Anonymous	arsenic, dissolved	7440-38-2	E421	0.0958 mg/L	0.1 mg/L	95.8	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0933 mg/L	0.1 mg/L	93.3	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.195 mg/L	0.2 mg/L	97.3	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0426 mg/L	0.05 mg/L	85.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.474 mg/L	0.5 mg/L	94.9	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0494 mg/L	0.05 mg/L	98.7	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0911 mg/L	0.1 mg/L	91.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0909 mg/L	0.1 mg/L	90.9	70.0	130	----
		iron, dissolved	7439-89-6	E421	9.31 mg/L	10 mg/L	93.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0885 mg/L	0.1 mg/L	88.5	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.477 mg/L	0.5 mg/L	95.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	5 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0938 mg/L	0.1 mg/L	93.8	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.184 mg/L	0.2 mg/L	91.9	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	54.8 mg/L	50 mg/L	110	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		silicon, dissolved	7440-21-3	E421	49.5 mg/L	50 mg/L	99.0	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	100 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.201 mg/L	0.2 mg/L	101	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0176 mg/L	0.02 mg/L	88.0	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0942 mg/L	0.1 mg/L	94.2	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.193 mg/L	0.2 mg/L	96.5	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0929 mg/L	0.1 mg/L	92.9	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.490 mg/L	0.5 mg/L	98.0	70.0	130	----
		zinc, dissolved	7440-66-6	E421	1.90 mg/L	2 mg/L	94.9	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Aggregate Organics (QCLot: 646604)										
VA22C1315-003	Anonymous	chemical oxygen demand [COD]	----	E559-L	101 mg/L	100 mg/L	101	75.0	125	----
Volatile Organic Compounds (QCLot: 643784)										
VA22C1274-002	Anonymous	benzene	71-43-2	E611C	97.6 µg/L	100 µg/L	97.6	60.0	140	----
		bromodichloromethane	75-27-4	E611C	91.3 µg/L	100 µg/L	91.3	60.0	140	----
		bromoform	75-25-2	E611C	88.6 µg/L	100 µg/L	88.6	60.0	140	----
		carbon tetrachloride	56-23-5	E611C	89.6 µg/L	100 µg/L	89.6	60.0	140	----
		chlorobenzene	108-90-7	E611C	102 µg/L	100 µg/L	102	60.0	140	----
		chloroethane	75-00-3	E611C	96.8 µg/L	100 µg/L	96.8	50.0	150	----
		chloroform	67-66-3	E611C	92.5 µg/L	100 µg/L	92.5	60.0	140	----
		chloromethane	74-87-3	E611C	88.1 µg/L	100 µg/L	88.1	50.0	150	----
		dibromochloromethane	124-48-1	E611C	92.4 µg/L	100 µg/L	92.4	60.0	140	----
		dichlorobenzene, 1,2-	95-50-1	E611C	101 µg/L	100 µg/L	101	60.0	140	----
		dichlorobenzene, 1,3-	541-73-1	E611C	102 µg/L	100 µg/L	102	60.0	140	----
		dichlorobenzene, 1,4-	106-46-7	E611C	104 µg/L	100 µg/L	104	60.0	140	----
		dichloroethane, 1,1-	75-34-3	E611C	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		dichloroethane, 1,2-	107-06-2	E611C	90.2 µg/L	100 µg/L	90.2	60.0	140	----
		dichloroethylene, 1,1-	75-35-4	E611C	93.4 µg/L	100 µg/L	93.4	60.0	140	----
		dichloroethylene, cis-1,2-	156-59-2	E611C	97.0 µg/L	100 µg/L	97.0	60.0	140	----
		dichloroethylene, trans-1,2-	156-60-5	E611C	109 µg/L	100 µg/L	109	60.0	140	----
		dichloromethane	75-09-2	E611C	94.7 µg/L	100 µg/L	94.7	60.0	140	----
		dichloropropane, 1,2-	78-87-5	E611C	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		dichloropropylene, cis-1,3-	10061-01-5	E611C	102 µg/L	100 µg/L	102	60.0	140	----
		dichloropropylene, trans-1,3-	10061-02-6	E611C	111 µg/L	100 µg/L	111	60.0	140	----
		ethylbenzene	100-41-4	E611C	107 µg/L	100 µg/L	107	60.0	140	----
		methyl-tert-butyl ether [MTBE]	1634-04-4	E611C	98.5 µg/L	100 µg/L	98.5	60.0	140	----
		styrene	100-42-5	E611C	100 µg/L	100 µg/L	100	60.0	140	----
		tetrachloroethane, 1,1,1,2-	630-20-6	E611C	103 µg/L	100 µg/L	103	60.0	140	----
		tetrachloroethane, 1,1,2,2-	79-34-5	E611C	92.6 µg/L	100 µg/L	92.6	60.0	140	----
		tetrachloroethylene	127-18-4	E611C	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		toluene	108-88-3	E611C	105 µg/L	100 µg/L	105	60.0	140	----
		trichloroethane, 1,1,1-	71-55-6	E611C	93.1 µg/L	100 µg/L	93.1	60.0	140	----
		trichloroethane, 1,1,2-	79-00-5	E611C	98.2 µg/L	100 µg/L	98.2	60.0	140	----
		trichloroethylene	79-01-6	E611C	96.7 µg/L	100 µg/L	96.7	60.0	140	----
		trichlorofluoromethane	75-69-4	E611C	87.5 µg/L	100 µg/L	87.5	50.0	150	----
		vinyl chloride	75-01-4	E611C	92.4 µg/L	100 µg/L	92.4	50.0	150	----
		xylene, m+p-	179601-23-1	E611C	219 µg/L	200 µg/L	110	60.0	140	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 643784) - continued										
VA22C1274-002	Anonymous	xylene, o-	95-47-6	E611C	109 µg/L	100 µg/L	109	60.0	140	----
Hydrocarbons (QCLot: 643785)										
VA22C1323-002	MW-2S	VHw (C6-C10)	----	E581.VH+F1	4930 µg/L	6310 µg/L	78.2	60.0	140	----

Qualifiers

Qualifier	Description
MS-Ag	MS-Ag: Matrix Spike recovery for silver was marginally below DQO (40 to <60%) due to its instability in the sample matrix. Silver was not detected. Reported result (< LOR) is reliable
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1015752

Canada Toll Free: 1 800 668 9878

Page of

www.alsglobal.com

Environmental Division Vancouver
Work Order Reference
VA22C1323

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Morrison Hershfield Ltd.
Contact:	Josie Gilson
Phone:	
	Company address below will appear on the final report
Street:	310-4321 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:	Ian McKeachie

Reports / Recipients

Select Report Format: ☐ PDF ☒ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A
☒ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: jgilson@morrisonhershfield.com
Email 2: erogal@morrisonhershfield.com
Email 3:

Invoice Recipients

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

Turnaround Time (TAT) Requested

☒ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests.

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	2100168	Major/Minor Code:	Routing Code:
PO / AFE:	726379	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Ian Chen	Sampler: E. Rogal

Analysis Requ

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	F/P	Dissolved metals + Mercury	General Parameters	Nutrients, Anions, COD	PAH/LEPH/HEPH	VOCs	SAMPLES ON HOLD	EXTENDED STORAGE REQU	SUSPECTED HAZARD (see n
	MW-2D	07-Sep-22	10:30	Water	8		X	X	X	X	X			
	MW-2S	07-Sep-22	19:00		8		X	X	X	X	X			
	MW-3	07-Sep-22	16:00		8		X	X	X	X	X			
	MW-6	07-Sep-22	11:45		8		X	X	X	X	X			
	DUP	07-Sep-22	12:00		8		X	X	X	X	X			
	Field Blank	07-Sep-22	18:00		8		X	X	X	X	X			
	GW Int.	07-Sep-22	14:25	↓	8		X	X	X	X	X			

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

Are samples taken from a Regulated DW System? ☐ YES ☒ NO
Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC Approved & Working Water Quality Guidelines (May 2015)
BC Contaminated Sites Regulation Stage 10 Amendment (Nov 2017)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

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

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	Sep 8/2022	9:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
BK JC	SEP - 8 2022	950am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

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

Sample ID		SFC-2B		SFC-2		SFC-3		SFC-4B		SFC-11	
Date Sampled		17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22
Quarter		Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q3
Analyte	**Units**										
Field Parameters											
Field Conductivity	uS/cm	184.2		203.9	203.6	163.3	98	133.3	210.9	17.8	98.3
Temperature	C	3.6		5.5	9.4	3.3	10.1	3.8	11.1	3.1	6.8
pH	-	5.86		6.56	6.75	7.26	6.82	7.2	7.17	7.23	6.56
Dissolved Oxygen	mg/L	10.03		10.82	6.19	13.7	4.66	13.76	7.27	14.53	7.54
Oxidation Reduction Potential	mV	149.2		132.9	122.3	107.6	85.9	138.6	100.5	105.2	95.8

Sample ID		Leachate Manhole		GW Interceptor	
Date Sampled		17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22
Quarter		Q1	Q3	Q1	Q3
Analyte	**Units**				
Field Parameters					
Field Conductivity	uS/cm	140.2		713.0	520.0
Temperature	C	3.4		7.8	9.9
pH	-	6.98		6.5	6.27
Dissolved Oxygen	mg/L	10.6		1.56	0.99
Oxidation Reduction Potential	mV	89.3		147.2	166.3

Sample ID		MW-2D		MW-2S		MW-3		MW-4		MW-6	
Date Sampled		17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22	17-Mar-22	7-Sep-22
Quarter		Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q3
Analyte	**Units**										
Field Parameters											
Field Conductivity	uS/cm	731.0	710.0	259.4	241.5	123.3	88.8	367.8		606.0	462.5
Temperature	C	6.8	9.1	6.7	9	6.9	8.8	7.7		7.3	10.7
pH	-	6.8	6.76	6.86	6.95	6.17	6.26	6.19		6.64	6.52
Dissolved Oxygen	mg/L	3.32	2.71	2.82	3.54	1.97	1.52	6.19		8.15	2.87
Oxidation Reduction Potential	mV	86.1	107.9	86.3	96.1	116.4	132.1	98.2		159.7	117.3

Well ID	Ground Surface Elevation	Top of Well Riser Elevation	Date	Depth to Water	Static Water Level Elevation	Date	Depth to Water	Static Water Level Elevation
	mASML	mASML	Q1	mbtowr	mASL	Q3	mbtowr	mASL
MW2S	603.84	604.94	17-Mar-22	5.63	599.31	7-Sep-22	6.469	598.47
MW2D	603.84	604.9		5.68	599.22		6.524	598.38
MW3	600.61	601.47		1.43	600.04		2.106	599.36
MW4	596.54	677.54		3.95	673.59		> 3.5	< 674.04
MW6	610.88	610.88		4.15	606.73		5.215	605.67

APPENDIX C: Letter of Competency & Conflict of Interest Disclosure

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional: Josephine Gilson

   Title: Registered Biologist Technician

2. Are you a registered member of a professional association in B.C.? ☑ Yes ☐ No

   Name of Association: College of Applied Biology Registration # 46

3. Brief description of professional services:

   Provided direction, oversight and final review of the field programs, data analysis and reporting.

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature:

X J. L

Print Name: Josephine Gilson

Witnessed by:

X M Giesbrecht

Print Name: Monica Giesbrecht

Date signed: March 13, 2023

[1] *Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

A qualified professional [1] providing services to either the Ministry of Environment and Climate Change Strategy ("ministry"), or to a regulated person for the purpose of obtaining an authorization from the ministry, or pursuant to a requirement imposed under the *Environmental Management Act,* the *Integrated Pest Management Act* or the *Park Act* has a real or perceived conflict of interest when the qualified professional, or their relatives, close associates or personal friends have a financial or other interest in the outcome of the work being performed.

A real or perceived conflict of interest occurs when a qualified professional has

a) an ownership interest in the regulated person's business;

b) an opportunity to influence a decision that leads to financial benefits from the regulated person or their business other than a standard fee for service (e.g. bonuses, stock options, other profit sharing arrangements);

c) a personal or professional interest in a specific outcome;

d) the promise of a long term or ongoing business relationship with the regulated person, that is contingent upon a specific outcome of work;

e) a spouse or other family member who will benefit from a specific outcome; or

f) any other interest that could be perceived as a threat to the independence or objectivity of the qualified professional in performing a duty or function.

Qualified professionals who work under ministry legislation must take care in the conduct of their work that potential conflicts of interest within their control are avoided or mitigated. Precise rules in conflict of interest are not possible and professionals must rely on guidance of their professional associations, their common sense, conscience and sense of personal integrity.

Declaration

I Josephine Gilson, as a member of the College of Applied Biology declare

Select one of the following:

☑ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this Landfill Closure Annual Monitoring & Reporting. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to Ian McKeachie at the Resort Municipality of Whistler, erring on the side of caution.

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

I will maintain my objectivity, conducting my work in accordance with my Code of Ethics and standards of practice.

In addition, I will take the following steps to mitigate the real or perceived conflict(s) I have disclosed, to ensure the public interest remains paramount:

_____

_____

_____

Further, I acknowledge that this disclosure may be interpreted as a threat to my independence and will be considered by the statutory decision maker accordingly.

This conflict of interest disclosure statement is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Signature:

X J. L

Witnessed by:

X M Giesbrecht

Print name: Josephine Gilson

Print name: Monica Giesbrecht

Date: March 13, 2023

[1]*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*